Received: 22 September 2022 | Revised: 9 January 2024 | Accepted: 19 February 2024

DOI: 10.1111/isj.12515

RESEARCH ARTICLE

WILEY

Techno-eustress creators: Conceptualization and empirical validation

Monideepa Tarafdar[1] | **Jean-François Stich**[2] | **Christian Maier**[3] | **Sven Laumer**[4]

[1]Isenberg School of Management, University of Massachusetts Amherst, Amherst, Massachusetts, USA

[2]ICN Business School, CEREFIGE, Nancy, France

[3]University of Bamberg, Bamberg, Germany

[4]Friedrich-Alexander-Universität (FAU) Erlangen-Nürnberg, Erlangen, Germany

Correspondence
Monideepa Tarafdar, Isenberg School of Management, University of Massachusetts Amherst, Amherst, MA, USA.
Email: mtarafdar@isenberg.umass.edu

Abstract

Technostress is an inevitable part of work life. This paper takes a step toward mastering it by focusing on positive stress that Information Systems (IS) creates for IS users, known as techno-eustress. Factors that create techno-eustress are known as techno-eustress creators, which we conceptualise as cognitions experienced by IS users, that IS positively challenges and motivates them to enhance their work. They are important to study because they represent foundational opportunities for professional achievement and growth emanating from IS use. Drawing from theories of psychological eustress, self-determination and proactive work, this paper theorises and validates an instrument to measure techno-eustress creators. We establish the construct's validity and examine its nomological relationships based on data collected from working professionals who used IT for their work. We draw on data from two qualitative studies ($N = 35$) and three quantitative surveys ($N = 980$) conducted at different points in time. We validate techno-eustress creators as a second-order reflective construct having four dimensions: techno-mastery, techno-autonomy,

techno-enrichment and techno-relatedness. We examine its nomological relationships with factors that create techno-distress, IT strain, and user satisfaction. We contribute to the literature by theorising and validating four ways in which IS users are challenged and motivated by IS to enhance their work. We inform to managerial practice by drawing attention to how organisations can strengthen the different ways employees experience the creators of the 'good' stress that use of IS generates.

KEYWORDS
IS-driven positive work cognition, IT strain, scale development, technostress, techno-eustress, techno-eustress creators

1 | INTRODUCTION

Techno-eustress is the 'good' stress that challenges and motivates information systems (IS) users[1] in a positive way, toward positive outcomes of growth and achievement at work (e.g., Tarafdar, Cooper, et al., 2019). Factors that create techno-eustress are techno-eustress creators. Techno-eustress creators are cognitions experienced by IS users, that the IS they use at work positively challenges and motivates them to enhance their work. For example (e.g., Lal et al., 2021; Melendez, 2020; Proffitt, 2020; Tarafdar, Beath, & Ross, 2019; van den Broek et al., 2021), advanced analysis and visualisation features of analytics and AI applications are complex and difficult to use. Yet, they can positively challenge IS users to thoroughly understand and master the domain problem at hand, for example, become an expert at predicting product demand by running different models and visualisations. Similarly, users find it difficult to navigate broad-based applications such as MS Teams. Yet, they may find it a positive challenge to take advantage of the plethora of features to take control of their tasks and meetings and find new ways to ideate with remote colleagues. These examples show that IS users can comprehend IS as something that challenges and motivates them to enhance different aspects of their work and push against the boundaries of what they can accomplish at work and how. Research by the Pew Research Center[2] finds that 47% of respondents consider that technologies such as the Internet are favourable for users' wellbeing, because, among other things, they help individuals in fulfilling their ambitions and objectives.

Techno-eustress creators are important from both theoretical and practical perspectives. Theoretically speaking, they are the point of origin for the IS users' experience of techno-eustress, in which sense, they represent foundational opportunities for professional achievement and growth emanating from IS use. As a typical scenario, AI applications can take care of routine and repetitive tasks so that IS users feel positively challenged, to use such applications to transform their work to focus on more value-added and complex tasks (Tarafdar & Beath, 2018) and to develop new work-related skills and understanding (Bornet, 2020). For example, generative AI applications write grammatically correct and standard answers to questions, so that users are challenged to be experts in the subject matter in order to ask more informed questions to elicit deeper insight from such applications. Or, smartphones and tablets can stimulate IS users to work deftly across different work tasks in their own time (e.g., Diaz et al., 2012; Leung, 2011; Ohly & Latour, 2014). Theoretically elucidating such scenarios is essential to understanding why people feel challenged and motivated by IS and how IS can be a propellant in the individual's work-related growth and

[1] 'IS users' refers to organisational users of IS at all hierarchical levels.
[2] https://www.pewresearch.org/internet/2018/04/17/the-future-of-well-being-in-a-tech-saturated-world/.

development. Practically speaking, the study of techno-eustress creators helps organisations identify different ways in which employees can engage with IS that would help them excel and grow professionally, and accordingly develop programs to facilitate such engagement. It can inform managerial understanding of organisational actions needed to enable employees to use IS not just as a tool to be more efficient, but to create positive and difficult challenges to enrich their work. From both perspectives, the study of techno-eustress creators is essential to explain how IS challenges and motivates IS users to enhance their work; it is a starting point in the quest for understanding how individuals can be driven by IS to grow and flourish in their work. Our objective in this paper is to conceptualise and validate the concept of techno-eustress creators.

We theorise the dimensions of techno-eustress creators. In order to so, we first draw on the literature on psychological eustress to broadly identify four overarching aspects constituting eustress creators (e.g., Edwards & Cooper, 1988; Lazarus, 1966; Le Fevre et al., 2003; Selye, 1976). To concretize these overarching aspects, we then draw from the theories of self-determination (Ryan & Deci, 2000) and proactive work (Grant & Ashford, 2008) to conceptualise and validate four dimensions of techno-eustress creators, namely techno-mastery, techno-autonomy, techno-relatedness and techno-enrichment. Drawing from the dual systems perspective (Cenfetelli & Schwarz, 2011), we demonstrate nomological validity of techno-eustress creators by investigating techno-eustress creators in a shared nomological network with techno-distress creators, i.e., the conditions that create negative stress from IS use (Ragu-Nathan et al., 2008). Specifically, we develop nomological relationships to link techno-eustress creators and techno-distress creators to user satisfaction and IT strain.

Our results draw from data from two qualitative studies involving 35 individuals, and three quantitative surveys conducted at multiple points in time across four countries in Europe and involving 980 respondents. All respondents were full-time employees who used IT applications and devices for work. Data from the qualitative studies was used to establish content validity. The survey data was used to establish convergent validity, discriminant validity, reliability, and dimensional structure, and to test the nomological relationships.

In terms of scholarly contribution, we explain how IS use can create work cognitions of challenge and motivation, by conceptualising and empirically validating the multi-dimensional construct of techno-eustress creators. Research has examined challenging demands that IS users face in specific and narrow contexts of IS use, such as work-home spillovers (Benlian, 2020); innovative use of IS such as using IS in new ways for work (Maier et al., 2021); and the work of Uber drivers (Cram et al., 2022). Our study in contrast, investigates IS-driven cognitions experienced by IS users, that IS positively challenges and motivates them to enhance their work. The multi-dimensional quality of our conceptualization allows for broad applicability. We identify four dimensions of techno-eustress creators, which exemplify how IS can challenge and motivate users to enhance work-related autonomy and mastery, enhance their social connectedness and make their work more enriching. We further examined the simultaneous and comparative effects of techno-eustress creators and techno-distress creators in a shared nomological network. Our study's practical implications are that organisations can use our findings to audit employees' experience of techno-eustress creators, and enhance that by developing programs that guide employees to identify how they can use IS to have greater control of their work, get better at it, make it intellectually more challenging, and work better with colleagues.

The paper is organised as follows. In section 2, we present literature background. In section 3, we conceptualise the dimensions of techno-eustress creators and develop their nomological relationships with relevant constructs. Section 4 describes the paper's methods and results, and section 5 concludes the paper with contributions, future research, and practical implications.

2 | LITERATURE BACKGROUND

We first present concepts on psychological eustress. Drawing from them, we focus on techno-eustress and techno-eustress creators and describe the characteristics of techno-eustress creators. We then describe concepts from self-determination and proactive work to theoretically ground our identification of the different dimensions of techno-eustress creators.

2.1 | Psychological eustress

Eustress is 'good' stress that challenges and motivates individuals in a positive way (Selye, 1983). It is borne out of a positive psychological response to the demands of the environment (Cavanaugh et al., 2000; Crawford et al., 2010; Le Fevre et al., 2003) and leads to constructive and fulfilling outcomes (Edwards & Cooper, 1988; Nelson & Simmons, 2003; Selye, 1976; Simmons & Nelson, 2001). Eustress creators give rise to eustress (Le Fevre et al., 2003). They are positive work-related cognitions that challenge and motivate individuals (Carver et al., 1989; Parker et al., 2006; Ryan & Deci, 2000) to view difficult work situations as opportunity for professional development and growth (Cavanaugh et al., 2000; Crawford et al., 2010; Lazarus, 1966; Lazarus & Folkman, 1984; LePine et al., 2004; Selye, 1976). Eustress creators broadly capture four aspects of work (e.g., Cooper et al., 2001; Kahn et al., 1964; Karasek, 1979) as follows. Work-related expertise can propel individuals to engage in difficult and stretch tasks that they find fulfilling (Lazarus & Folkman, 1984; LePine et al., 2004; Selye, 1983). Control over work conditions can inspire individuals to higher levels of professional achievement because they have the freedom to work in ways that they want to (Cavanaugh et al., 2000; Crawford et al., 2010). Work that is difficult and cognitively advanced stimulates individuals' curiosity and provides novelty, and thus challenges them to work more innovatively (Cavanaugh et al., 2000). High quality work relationships enthuse individuals to support and spur one another to achieve positive and superior work outcomes (McGonigal, 2016).

2.2 | Techno-eustress and techno-eustress creators

Drawing from the above, the phenomenon of 'techno-eustress' (Tarafdar, Cooper, & Stich, 2019) embodies positive stress that IS users experience from using IS. IS users experiencing techno-eustress perceive IS as driving and pushing them in a positive way toward affirmative work outcomes. Techno-eustress creators create techno-eustress. They are cognitions experienced by IS users, that IS positively challenges and motivates them to enhance their work. Drawing from the insights on eustress creators presented above as the overarching framing, we suggest that techno-eustress creators would embody four distinct aspects. Multi-dimensional constructs are needed to represent such multi-faceted and complex concepts in a theoretically comprehensive way (Edwards, 2011). Thus, we conceptualise techno-eustress creators as constituting multiple dimensions, all of which relate to how users are challenged and motivated to use IS to enhance and grow vis-à-vis their work, our goal being to theorise a broad-based conceptualization for techno-eustress creators.

The IS literature notes that IS presents stressful challenge demands to individuals. Faced with these demands, IS users work more and faster, learn more IT skills and take on more IS related responsibilities. This leads to more innovative use of IS in the form of finding new uses of IS or developing new IS to support work (Maier et al., 2021), and to positive emotions at home, spilling over from work (Benlian, 2020). In algorithmic ride-sharing, Uber drivers face positive demands from the Uber app in response to which they drive more skillfully and improve their driver ratings (Cram et al., 2022). All of these studies focus on demands from IS; demands are externally focused. Our focus is on how IS users experience cognitions that IS positively challenge and motivate them to enhance their work; cognitions are internally generated. Moreover, these existing studies are in contained and *specific* contexts. We investigate different aspects of how IS can challenge and motivate IS in *general organisational work*. Further we take a deeper, more complex approach by theorising a *multi-dimensional concept* of techno-eustress creators.

2.3 | Theories of self-determination and proactive work orientation

To concretize the four overarching facets of eustress creators identified in Section 2.1, we draw from two theoretical perspectives to conceptualise four aspects of techno-eustress creators. Self-determination theory (Ryan &

Deci, 2000) suggests that individuals feel positively challenged and motivated in their work under three conditions, thus expounding on three of the aspects associated with eustress creators. One, when they can work autonomously. Individuals feel positively challenged and motivated when they execute work tasks of their own volition, rather than because of extrinsic factors (Gagné & Deci, 2005; Strauss & Parker, 2014), and can make their own decisions on what to do and how to do it (Grant & Ashford, 2008). Two, when they achieve mastery in their work; individuals feel positively challenged and motivated when they develop task-related expertise and skills (Aspinwall & Taylor, 1997; Yeo et al., 2009) and improve their work ability (Ryan & Deci, 2000). Three, when they are socially connected to colleagues at work (Grant & Parker, 2009). Individuals who seek and enjoy work challenges solicit support from and give support to, colleagues, to accomplish work (McGonigal, 2016; Strauss & Parker, 2014). Given that individuals' work tasks and responsibilities are interrelated and interdependent within the social system of connected work roles in the organisation (Katz & Kahn, 1978), they need to collaborate to get their work done. Interpersonal interactions are thus crucial to progress and development (Grant & Parker, 2009). The fourth aspect of eustress creators is doing work that is cognitively difficult. We draw from the theory of proactive work orientation to frame this aspect. This theory suggests that individuals experience positive work cognitions when they feel motivated to proactively enrich their work in the cognitive sense, implying that individuals actively shape their work and set difficult goals (Avey et al., 2011; Bandura, 1991; Deci & Ryan, 2014), rather than passively executing what is given to them (Grant & Ashford, 2008).

3 | THEORISING TECHNO-EUSTRESS CREATORS

Drawing from the above, we theorise techno-eustress creators by, first, conceptualising their dimensions, and second, examining their nomological relationships.

3.1 | Dimensions of techno-eustress creators

We theorise four dimensions of techno-eustress creators (see Table 1). Each represents a particular cognition of challenge and motivation that the IS user experiences from IS use, and that relates to a particular aspect of their

TABLE 1 Techno-eustress creators.

Techno-eustress creators	
Four dimensions that describe how IS positively challenges and motivates IS users to use IS to become—(1) more competent at; (2) have greater control over; (3) improve their socialisation at; and (4) intellectually develop—their work.	
Techno-mastery	IS users are challenged and motivated by use of IS to achieve competence, efficiency, and proficiency at work. For example, Aral et al., 2012; Rahrovani & Pinsonneault, 2020; Maier et al., 2021.
Techno-autonomy	IS users are challenged and motivated by use of IS to act with agency in prioritising and executing work. For example, Li et al., 2011; Mazmanian et al., 2013; Wheatley & Bickerton, 2016; Addas & Pinsonneault, 2018.
Techno-relatedness	IS users are challenged and motivated by use of IS to leverage their connectivity with colleagues to exchange work feedback and social support. For example, Day et al., 2012; Monzani et al., 2014; McGonigal, 2016; Waytz & Gray, 2018; Domahidi, 2018.
Techno-enrichment	IS users are challenged and motivated by use of IS to make work more interesting, and orient it toward adding value and solving problems. Spreitzer & Porath, 2014; Davenport, 2018; Wilson & Daugherty, 2018; Tarafdar, Beath, et al., 2019.

work. We correspondingly conceptualise them as techno-mastery, techno-autonomy, techno-enrichment and techno-relatedness.

3.1.1 | Techno-mastery

Techno-mastery refers to individuals' cognition that the use of IS challenges and motivates them to achieve competence, efficiency, and proficiency at work. The use of IS can push individuals to finish their tasks efficiently and productively because it enables quick information processing (e.g., Aral et al., 2012; Bandura, 2015; Maier et al., 2021). They can harness a range of functions to explore different ways of doing work (Bloom et al., 2014; Rahrovani & Pinsonneault, 2020) and develop new and efficient work routines to complete their tasks (Bala & Venkatesh, 2013). For example, emails containing information useful for individuals' tasks challenge them to pay attention to incoming alerts so that they can use current and relevant information for their work, leading to more proficient work (Addas & Pinsonneault, 2018). Thus, the use of IS can challenge individuals to attain mastery over their work.

3.1.2 | Techno-autonomy

Techno-autonomy refers to individuals' cognition that IS use challenges and motivates them to act with a sense of agency and choice, to prioritise important tasks, and execute them as they want. The use of IS can push individuals to work autonomously. Office productivity tools such as to-do list applications and automated email sorting can nudge individuals to prioritise their work and focus on what is important when features such as foldering, archiving, batching or filtering are used (Addas & Pinsonneault, 2018). Being able to use IS to acquire and process critical work-related information on time challenges individuals to not procrastinate on essential tasks (Mano & Mesch, 2010). IS users can choose to work simultaneously on multiple tasks to accomplish meaningful work, which is particularly relevant for polychronic individuals who find multitasking stimulating and are positively challenged by tackling several tasks simultaneously (Li et al., 2011). Conversely, individuals can choose to focus on a single task with the help of IS, for example, by silencing notifications (Russell et al., 2017). Further, the use of IS facilitates the ability to work anytime and anywhere. This can challenge and push individuals to be flexible about when and where they do their work and then use this expanded choice constructively (Mazmanian et al., 2013). For example, they can choose to fill their commute time with activities, such as responding to emails or making phone calls, thereby leaving office time for work that requires more face-to-face contact or more analytical activities (Wheatley & Bickerton, 2016), which require greater social or cognitive focus. In such ways, the use of IS motivates people to forge agency and choice at work.

3.1.3 | Techno-relatedness

Techno-relatedness refers to individuals' cognition that IS use challenges and motivates them to leverage their connectivity with colleagues to exchange feedback and social support. The use of videoconferencing, text messaging, enterprise social media, and email applications can drive individuals to enhance their connectedness with colleagues because they shape the social aspects of organisational life (e.g., Day et al., 2012; Domahidi, 2018; Waytz & Gray, 2018). Communication and messaging applications can quickly retrieve and transmit documents from and to co-workers (X. Zhang & Venkatesh, 2013), and can galvanise individuals to seek timely and relevant information and feedback on their work from colleagues (Monzani et al., 2014). Social networks built through enterprise social media can spur individuals to learn more about their colleagues, build a community, provide social support, and seek and exchange new ideas and feedback (Leonardi, 2018).

3.1.4 | Techno-enrichment

Techno-enrichment refers to individuals' cognition that the use of IS challenges and motivates them to make their work more interesting, and oriented toward adding value and solving problems. IS can push individuals to do work that adds more value (e.g., a financial planner who understands why a client's investment needs might have changed in a given year and develops customised financial products) because they can delegate more routine tasks to applications (e.g., the financial planner uses scraping and downloading applications to automate the gathering of the client's past investment transactions). Analytical/modelling tools and data mining applications can stimulate individuals to tackle difficult and complex tasks that require higher levels of problem-solving, creativity (Tarafdar, Beath, & Ross, 2019; Wilson & Daugherty, 2018) and learning (Davenport, 2018), because they provide computational and decision support (e.g., Aral et al., 2012; Müller-Wienbergen et al., 2011) and enable cognitive engagement (Spreitzer & Porath, 2014). Further, by providing access to a range of task-relevant information that can reveal insights about different aspects of tasks, IS can challenge individuals to engage more deeply with and develop the cognitive intricacies of their tasks. For example, integrating online website reviews with customer feedback on social media can push marketing managers to develop more sophisticated models for analysing customer preferences (e.g., Wan et al., 2012; Wang & Haggerty, 2011).

3.2 | Nomological relationships

We next place techno-eustress creators in a nomological network of constructs of interest. Specifically, we examine if techno-eustress creators is significantly related to other constructs hypothesized to be part of its nomological network (MacKenzie et al., 2011). We approach this in two ways.

First, we consider that techno-eustress creators are nomologically related to factors that create techno-distress in the context of organisational work. The latter are examined through established constructs in the technostress literature (e.g., Nastjuk et al., 2023; Ragu-Nathan et al., 2008). Factors that create techno-eustress and techno-distress are opposite in their valence of relationship to similar outcomes (Cram et al., 2022). The IS literature considers them simultaneously (Benlian, 2020; Maier et al., 2021; Tarafdar, Cooper, & Stich, 2019), pointing to a holistic approach in examining their nomological relationships.[3] They respectively drive techno-eustress and techno-distress, which are dual-factored phenomena (Cenfetelli & Schwarz, 2011), implying that they exist independently rather than along a single bipolar continuum.[4] Dual-factored phenomena reside in distinct but related nomological nets, which have two characteristics, namely, they include: (1) corresponding relationships whereby the positive and negative valence phenomena are respectively focused on positive and negative outcomes; and (2) comparative relationships whereby the strengths of their effects on the positive and negative outcomes are not symmetric. To holistically understand the influence on key outcomes, these relationships are investigated in shared nomological networks (e.g., Cenfetelli & Schwarz, 2011; Edwards & Cooper, 1988). We draw from these ideas to theorise corresponding and comparative relationships involving techno-eustress creators in a shared nomological network with techno-distress creators.[5]

Second, we considered two outcomes that are predicted by techno-distress creators. In keeping with the dual-factored logic, these outcomes are nomologically relevant to techno-eustress creators. These are user

[3]This characterisation is also supported by literature in organisational psychology that has theorised work-related eustress and distress as two distinct processes (Edwards & Cooper, 1988; Le Fevre et al., 2003).

[4]Other pairs of dual factored IS phenomenon are IS adoption and IS resistance, which are shaped respectively by enabling and inhibiting factors (Cenfetelli & Schwarz, 2011), and website satisfaction versus dissatisfaction (e.g., P. Zhang & Von Dran, 2000).

[5]Conditions that create techno-distress are widely examined through technostress creators (e.g., Ragu-Nathan et al., 2008) or threat techno-stressors (e.g., Tarafdar, Cooper, et al., 2019). Conditions that create techno-eustress have been conceptually referred to as "challenge techno-stressors" (e.g., Tarafdar, Cooper, et al., 2019). For the sake of uniformity, we refer to the former as "techno-distress creators" and the latter as "techno-eustress creators".

satisfaction (e.g., Tarafdar et al., 2010) and IT strain (Ayyagari et al., 2011). User satisfaction describes a positive attitude and perception among individuals toward the IS that they use. It is an important variable because it is considered a surrogate for the success of the system (Delone & McLean, 2003). It represents an outcome related to the system. IT strain describes a negative outcome salient in technostress (e.g., Ayyagari et al., 2011). It represents feelings of exhaustion, depletion, tiredness and burnout from activities associated with use of IS. It is an indicator of wellbeing relating to the use of IS. Investigating these two variables together allows us to examine—(1) both positive and negative facets, and (2) both system-related and wellbeing-related facets. This is in keeping with the holistic intent of our study.

3.2.1 | Corresponding nomological relationships between techno-eustress creators and techno-distress creators, and user satisfaction and IT strain

We first examine corresponding nomological relationships involving techno-eustress creators and techno-distress creators, and user satisfaction and IT strain respectively (Figure 1).

From psychological stress studies, we know that eustress creators create opportunities for accomplishment and goal attainment (Webster et al., 2011), leading to positive outcomes. Distress creators create a risk of harm or failure (Lazarus & Folkman, 1984; Webster et al., 2011), resulting in negative outcomes.

Techno-mastery implies that IS users are motivated and challenged by IS to be more proficient in their work. The IS they use make them feel more competent and confident in tackling difficult tasks. When individuals feel competent in their work, they are enthusiastic and eager to do more (Ryan & Deci, 2000), experience greater satisfaction (Gagné & Deci, 2005; Van den Broeck et al., 2016) and feel less strained (Olafsen et al., 2016). When IS users feel challenged and motivated by IS to improve and become more competent in their work, they experience greater user satisfaction and less strain, with the IS they use.

Techno-autonomy implies that IS users seek work-related empowerment through their use of IS, and to control various aspects of their work. Empowerment is associated with greater satisfaction with work (Gagné & Deci, 2005; Van den Broeck et al., 2016) because individuals can choose the time and place of their work (Olafsen et al., 2016). IS users who experience techno-autonomy are motivated and challenged to find ways to use IS to find empowerment in their work (Mazmanian et al., 2013). For example, they might proactively to choose to use email applications either stay on top of their work (constant checking) or be less at the beck and call of colleagues (checking at certain frequencies) (Gerlach & Cenfetelli, 2020). This would lead to less IT strain. They would also feel that the IS they use supports them in their work, because it is the means through which they achieve their work autonomy; they are likely to be satisfied with IS.

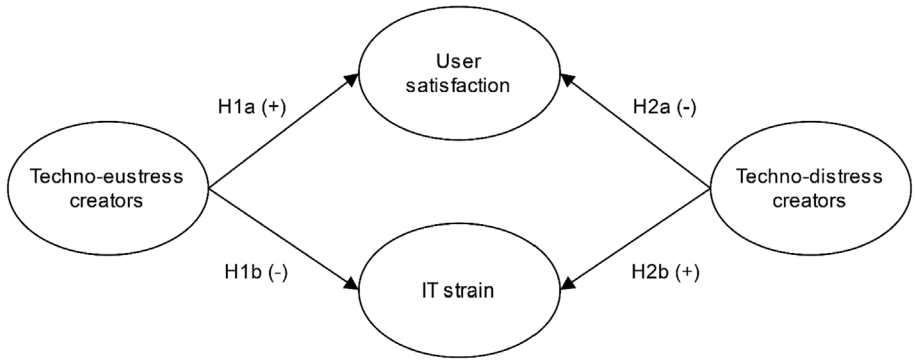

FIGURE 1 Corresponding nomological relationships.

Individuals who experience techno-relatedness would actively use IS to develop rewarding social support and professional relationships in the workplace. For example, they might use video conferencing applications to exchange feedback relating to work and thrive on their professional relationships, or use enterprise social media applications such as Yammer to stay in touch with colleagues and support them in their work projects (Bertin et al., 2020). In such situations, they are more able to bounce ideas off colleagues rather than deal with issues by themselves. Thus, they are likely to draw upon their IS-driven social support to lessen IT strain. They also tend to see use of IS as a driving factor for rewarding work relationships, and thus are highly satisfied with using IS.

Techno-enrichment is the use of IS to elevate one's work to make it more challenging and difficult. It drives IS users to do work that is intellectually stimulating and requires problem-solving. In doing so, IS users stretch themselves to do work that is cognitively more enriching. For example, IS users can work with complex analytics applications and use the models to grapple with interesting and difficult organisational decisions pertaining to product design, marketing promotions, or process improvement (Tao et al., 2018; van der Aalst, 2012). Such activities can instill a sense of energy and accomplishment in the use of IS, thus diminishing IT strain. Further, when they engage in experimentation and problem solving with IS, they are better able to leverage the features of and information from IS (Sun, 2012), and experience satisfaction while using it.

In summary, techno-eustress creators embody conditions under which IS use is the basis for IS users challenging and motivating themselves to make their work more autonomous and intellectually stimulating, improve their work mastery, and generate better social relationships at work. IS users with such positive cognitions about IS experience greater satisfaction with IS and less strain and burden from IS use. We frame the following hypotheses:

Hypothesis 1a. Techno-eustress creators will be positively related with user satisfaction.

Hypothesis 1b. Techno-eustress creators will be negatively related with IT strain.

We expect the relationship between techno-distress creators and IT strain to be positive. Techno-invasion, for example, can lead to constant use of IS for checking work emails and updates, and doing work-related tasks at different times, often outside structured work hours. Techno-overload can lead individuals to work more quickly when using IS, such as rapid back and forth of work-related communication and processing of more work-related information. Techno-complexity implies constant learning of new IS features and functionalities, leaving them feeling potentially depleted. Techno-insecurity can be mentally exhausting due to the fear of losing professional abilities to others who have a better understanding of how to use IS. Techno-uncertainty implies lack of clarity regarding potential changes in IS, leading to anxiety about how individuals might face up to changes and how that might disrupt their work. It can also lead individuals to do more work involving IS, such as installing updates. All of these instances are expected to lead to strain, either because more work has to be done, or because of depletion of cognitive resources. The negative relationship between techno-distress creators and user satisfaction has been documented in a number of studies (e.g., Srivastava et al., 2015; Tarafdar et al., 2010). Based on the above, we state the following.

Hypothesis 2a. Techno-distress creators will be positively related with IT strain.

Hypothesis 2b. Techno-distress creators will be negatively related with user satisfaction.

3.2.2 | Comparative nomological relationships between techno-eustress creators and techno-distress creators, and user satisfaction and IT strain

We next examine comparative nomological relationships involving techno-eustress creators and techno-distress creators, and user satisfaction and IT strain respectively, as shown in Figure 2. When faced with psychological eustress

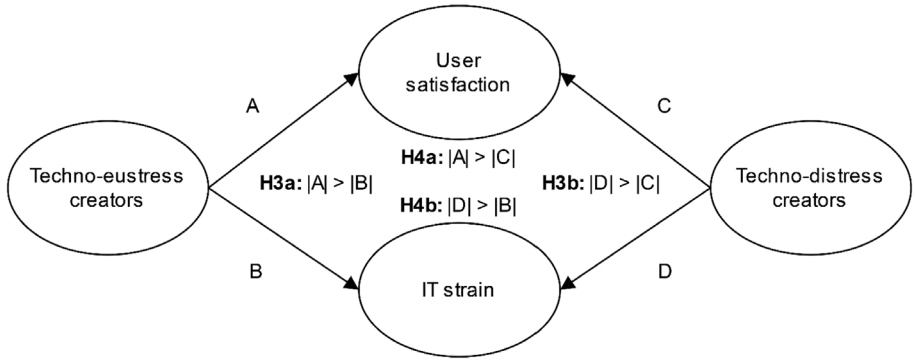

FIGURE 2 Comparative nomological relationships.

creators and distress creators, individuals are consciously aware of which one they are experiencing (Cavanaugh et al., 2000; Lazarus, 1966; Selye, 1976). Individuals facing eustress creators are conscious of being positively challenged and motivated, and experience primarily positive outcomes (Cavanaugh et al., 2000; Cummings & Cooper, 1979). Those experiencing distress creators are conscious of feeling threatened; they experience primarily negative outcomes (Cavanaugh et al., 2000; Cummings & Cooper, 1979). Thus, positive outcomes are more salient for those experiencing eustress creators and negative outcomes are more salient for those facing distress creators (Edwards et al., 2006).

IS users experiencing techno-mastery will be more focused on learning how to use different IS features to improve their work skills and make their work more efficient, and thus will less feel overwhelmed by the features (Ahuja & Thatcher, 2005; Bloom et al., 2014). Even if they find it difficult to use the features, they will see the difficulty as a positive, motivating challenge, rather than frustrating (Olafsen et al., 2016). IS users experiencing techno-autonomy will be motivated to use IS applications (e.g., email, to-do lists) to prioritise their work, rather than being bogged down with unimportant tasks (Li et al., 2011). They will use the IS applications they want to, instead of feeling overloaded with too many applications. IS users experiencing techno-relatedness will be motivated to use IS to build social relationships at work and seek support from colleagues (Leonardi, 2018), rather than focusing on constant connectivity and feeling that their time is invaded. IS users experiencing techno-enrichment will use IS to increase intellectual challenge and stimulation in their work (Spreitzer & Porath, 2014), and will learn to use the functionalities required to do so (Davenport, 2018), rather than focus on the complexity of those functionalities. In all these cases, IS users will be more prone to experiencing satisfaction with IS because they experience positive work cognitions from IS use (i.e., work mastery, work autonomy, connectedness to colleagues and work enrichment). They may also experience diminished IT strain, but their cognitive awareness will be more attuned to user satisfaction because their use of IS challenges them in a positive way and keeps them motivated at their work.

IS users experiencing techno-overload will be cognitively more oriented toward having to work more and faster due to IS, while those subject to techno-complexity will be more oriented toward the difficulty of learning new IS (Ragu-Nathan et al., 2008), rather than toward learning new IS features to use in their work. Even if they do learn, they will do so only to deal with the struggle. IS users experiencing techno-insecurity and techno-uncertainty will be more oriented toward the threat of their own IS-related obsolescence in the face of new IS (Ragu-Nathan et al., 2008) than toward the possibility of their work enrichment from new IS. Those experiencing techno-invasion will be more focused on the possible loss of vacation time and work-life balance due to IS use (Bélanger & Crossler, 2011), rather than on IS-enabled work flexibility. In all these cases, IS users will be more prone to experiencing IT strain because they experience intimidating and threatening work-related cognitions due to IS use. They may also experience diminished user satisfaction, but the increase in IT strain will be more salient for them.

Overall, when IS users experience techno-eustress creators, they are driven by quest and discovery and feel confident of tackling the difficulties with IS use, and thus are focused more on the positive aspects of IS, in this case, user satisfaction. When they experience techno-distress creators, they feel a sense of struggle in tackling the difficulties associated with IS use, and thus focus more on the negative aspects of IS, in this case, IT strain. In each case, the corresponding opposite outcome is less salient. Therefore, we state:

Hypothesis 3a. The positive effect of techno-eustress creators on user satisfaction will be greater than the negative effect of techno-eustress creators on IT strain.

Hypothesis 3b. The positive effect of techno-distress creators on IT strain will be greater than the negative effect of techno-distress creators on user satisfaction.

Research on psychological stress has often found positive outcomes to be primarily affected by conditions associated with positive stress and negative outcomes by conditions associated with negative stress (Edwards & Cooper, 1988; French et al., 1982; Webster et al., 2010). One reason for this is that the psychological power of the presence of an attribute is more than that of its absence (Leyens et al., 1997; Peeters et al., 1995). For IS users experiencing techno-eustress creators, positive attributes are high, such as the discovery and growth possibilities emanating from IS use, while for those experiencing techno-distress creators, these aspects are relatively weak. For IS users experiencing techno-distress creators, negative attributes are strong, such as struggle and drain emanating from IS use, while for those experiencing techno-eustress creators, these aspects are absent or relatively weak. IS research suggests that IS users who experience positive (negative) attributes experience positive (negative) IS related outcomes. Kim and Son (2009) showed that IS users who are more dedicated to online services are more likely to have higher usage intention than those experiencing constraints. IS users facing demands that challenge them (e.g., Maier et al., 2021) are more likely to engage in innovative IS use, than those facing hindering demands. Relating such findings to our context, techno-eustress creators will have a stronger effect on user satisfaction than techno-distress creators because the power of the positive attributes will hold sway. Similarly, techno-distress creators will have a stronger effect on IT strain than techno-eustress creators because the power of the negative attributes will dominate. Thus, the positive outcome of user satisfaction is more salient for those experiencing techno-eustress creators as compared to those experiencing techno-distress creators, and the negative outcome of IT strain is more salient for those experiencing techno-distress creators as compared to those experiencing techno-eustress creators. Therefore, we state:

Hypothesis 4a. The positive effect of techno-eustress creators on user satisfaction will be greater than the negative effect of techno-distress creators on user satisfaction.

Hypothesis 4b. The positive effect of techno-distress creators on IT strain will be greater than the negative effect of techno-eustress creators on IT strain.

4 | METHODS AND RESULTS

We used multiple techniques to establish different validities for the techno-eustress creators construct. Our research design is based on guidance provided in the literature (MacKenzie et al., 2011) and followed in IS studies (Zhang et al., 2022). We executed the study in four steps (see Table 2). In the first step (Section 4.1), we developed the items for the four dimensions of techno-eustress creators as theorised in the previous section. In the second step (Section 4.2), we established their convergent validity, discriminant validity, reliability, and dimensional structure, establishing a second-order construct for techno-eustress creators. In the third step (Section 4.3), we established the

TABLE 2 Study design.

Section	Analysis	Description	Sample
4.1	Item development and content validity	Produce an initial set of items and establish that they represent different facets of techno-eustress creators.	Interviews, $n = 7$ Q-sort, $n = 28$
4.2	Convergent and discriminant validities	Establish that the dimensions of techno-eustress creators are distinct from one another.	Sample 1, $n = 341$ Sample 2, $n = 175$
	Construct reliability	Establish that, for each dimension, the dimension items are consistent with one another.	Sample 2, $n = 175$
	Dimensional structure	Establish that techno-eustress creators is a second-order construct with four first-order factors.	Sample 2, $n = 175$
4.3	Measurement invariance	Establish that the measurement of techno-eustress creators is invariant over time.	Sample 3, $n = 121 \times 2$, two-wave longitudinal survey separated by 8 months
4.4	Hypotheses testing	Validate nomological relationships.	Sample 4, $n = 400$

construct's measurement invariance over time. In the fourth step (Section 4.4), we tested the nomological relationships. The use of multiple and diverse samples is recommended for cross-validation (MacKenzie et al., 2011). Accordingly, our data consists of interviews, Q-sort and four different surveys from European countries, involving over a thousand participants. All were full-time employees who used IT applications and devices for work. Specifically, interviews were conducted with 7 full-time employees from an organisation in Europe; Q-sort was conducted with 38 executives enrolled as IT/business graduate students in an executive masters' program in a university in Europe; samples 1, 2 and 3 were collected from a large European organisation in the public administration sector ($n = 341$, $n = 175$ and $n = 121 \times 2$, respectively); and sample 4 was collected through an online survey on Prolific from two countries in Europe ($n = 400$).

4.1 | Item development and content validity

We developed our initial conceptualizations of techno-mastery, techno-autonomy, techno-relatedness, and techno-enrichment based on our literature review, as detailed in Section 3. We first generated a potential list of items based on the literature. We then conducted content validation interviews with seven employees and a Q-sort exercise with 28 working executives enrolled in an IT/business executive master's program in a university.

4.1.1 | Interviews with practitioners

We conducted semi-structured telephone interviews with seven full-time employees from an organisation in Europe (see Table A1 for demographics and Table A2 for the interview guide). The interviews lasted 34 min on average. All employees had white-collar consulting jobs in the human resource sector. They used IS extensively to conduct their work. We asked them to describe situations where the IT applications and devices they used for work challenged them positively or motivated them. The purpose of these interviews was to (1) understand how our construct manifested in practice and find real-world illustrative and operational examples, and (2) validate/augment findings from the literature review (MacKenzie et al., 2011; Patton, 2002). The interview guide (Table A2) was based on the theorised dimensions. We analysed the interviews using a priori themes corresponding to techno-mastery, techno-autonomy, techno-relatedness, and techno-enrichment. We found that techno-eustress creators indeed manifested

itself in practice, consistent with the aspects we envisioned, and aligning with the objective of the interviews. For example, one IS user (William, 40) said, "*IT challenges me to be efficient, and I derive satisfaction from it because I work faster and I can better structure my thinking*." He felt challenged to use IT to improve his work methods, thereby experiencing what we conceptualised as techno-mastery. Another individual (Charlotte, 55) thought IS provided her with "more autonomy" (techno-autonomy) as she was able to harness IS to work how she wanted and prioritise her work as she saw fit: "*I feel more confident in the organization of my work […] I have access to the information I need so I can really organize and plan my activity accordingly*." Individuals also felt motivated by the relationships they nurtured through IS (techno-relatedness), such as when they were motivated to use collaborative tools to "show each other the work and discuss it, leading to increased exchanges." (Jane, 26) or to get feedback on their work from colleagues in other offices of the company. There were also many instances where IT applications and devices challenged individuals to do work that was more interesting or value-added (techno-enrichment), "*renewing or broadening our jobs, or the way we do them. […] It is the idea that technology enhances the purpose and does not replace it*." (Charles, 55). We thus established that the four aspects had practical relevance and expression through our analysis of the interviews.

We generated our pool of items by combining the insights from the literature review and interviews (MacKenzie et al., 2011) (see Table 3). For each dimension, we examined the associated quotes and integrated the understanding derived from them with that from the literature reviewed in Section 3.1. The items for techno-mastery captured the cognition of IS challenging individuals to improve their work methods or make them more efficient (Bala & Venkatesh, 2013) and effective (Aral et al., 2012). Regarding the items for techno-autonomy, individuals were challenged by IS to work how they wanted (Li et al., 2011) and to prioritise their work (Russell et al., 2017). Items for techno-relatedness captured the IS driven challenge of staying connected and interacting with numerous colleagues (Waytz & Gray, 2018), and receiving or giving social support (Strauss & Parker, 2014). For techno-enrichment, items embodied the challenge from IS to do work that was more problem-solving oriented (Nambisan et al., 1999), interesting, and intellectually stimulating (Ryan & Deci, 2000).

4.1.2 | Q-sort

Our pool of items was refined using Q-sort exercises (Nahm et al., 2002), where items are sorted into different constructs. Agreement ratios are calculated, and those items are deleted for which the agreement ratios do not reach a satisfactory level of agreement. Prior research suggests that all items assigned correctly by less than 61% of the respondents should be deleted (Nahm et al., 2002). We conducted Q-sort with 28 (part-time or full-time) executives who were enrolled as IT/business graduate students in a European university. They regularly used IT as part of their work and were therefore familiar with the scenarios presented in the items. We explained the notion of techno-eustress creators to the respondents. We then presented the four dimensions and the corresponding definitions. We instructed them on how to do the Q-sorting exercise through two examples. We asked them to assign each of the 21 initial items to one of the four constructs proposed. Based on the respondents' assignment, we calculated ratios of correct assignments of the items of (see Table 4). No item had to be removed, indicating that all items had high semantic coherence.

The Q-sort results provided credible validation that these items represented the four aspects of techno-eustress creators, thereby establishing content validity.

4.2 | Convergent validity, discriminant validity, reliability, and dimensional structure

We conducted surveys to measure the constructs. Using different samples during the scale development process is recommended for cross-validation (MacKenzie et al., 2011). We conducted two surveys separated by an eight-month

TABLE 3 Initial set of items with example quotes.

	#	Items	Example quotes
Leading sentence		The IT applications and devices I use for work challenge me in a positive way and motivate me to…	"IT challenges me…", "It is very rewarding…", "Tools bring me joy when…", "It's a real added value to…".
Techno-mastery	1	Make my work methods more efficient.	"IT challenges me to be *efficient*, and I derive satisfaction from it because I work *faster* and I can better structure my thinking." (William, 40). "I appreciate an IT application that can be used quite intuitively, that *saves me time* and allows me to do things that I would have liked to do for years without ever having enough time." (Charles, 55). "With social networks, we have access to a mass of information to which we didn't have access before as easily. It's a real added value to be able to use this information and be up to date without having to make a lot of phone calls. I am more *responsive* and I can *anticipate* a certain number of things better." (Charles, 55).
	2	Make my work methods more innovative.	
	3	Make my work methods more effective.	
	4	Improve my work methods.	
	5	Improve work-related information processing.	
Techno-autonomy	6	Work how I want to (e.g., decide on which applications I use).	"My job is about producing intellectual contributions. There are moments when I manage to produce very well and others when I'm stuck. It's pleasant and reassuring *not to miss the moment* when my brain or my mood makes the writing come out on its own. It can be a morning on the train, for example, when I am wide awake." (William, 40). "I feel more *confident in the organization of my work* […] I have *access to the information I need* so I can really organise and plan my activity accordingly. […] We do everything ourselves. We write, send, proofread, organise our interviews and our trips. It's a real help. When you're on the train, you have all the information. It improves *autonomy*." (Charlotte, 55). "I use off-peak times to manage things by email. I deal with anything that can be dealt with. When I arrive at the office, I can then easily *organize my day* because my mind is freed up. I've already done what I had to do." (Louis, 32).
	7	Prioritise my work (e.g., with the help of to-do list applications).	
	8	Work flexibly.	
	9	Focus on work that is important.	
	10	Change the prioritisation of my work if necessary.	
	11	Spend more time on important tasks (e.g., with the help of to-do list applications).	
Techno-relatedness	12	Stay connected with many colleagues through IT.	"It is very rewarding to *learn different things from colleagues* I see rarely or not at all. It's stimulating to work not only with the people in your office, but also with those in all the other offices of the company. We can *exchange* on our practices, on the way we work. We can *share ideas* and *meet colleagues with different profiles*. It adds something really stimulating." (William, 40). "When this collaboration tool was not available in face-to-face meetings, everyone worked on their own computer and we couldn't see each other's work. Now we can show each other the work and discuss it, leading to *increased exchanges*." (Jane, 26). "We no longer need to punctuate every call with, "I just sent you this document". The person has received all the documents before. So when we call, we can immediately start producing value, *listening to each other and challenging each other*." (Louis, 32).
	13	Interact with many colleagues.	
	14	Get feedback on my work from many colleagues.	
	15	Give social support to many colleagues.	
	16	Exchange with many colleagues on work matters.	

TABLE 3 (Continued)

	#	Items	Example quotes
Techno-enrichment	17	Do work that is more interesting (e.g., by having access to new information).	"Tools bring me joy when they allow me to do something that is completely innovative, that is off the beaten track. […] For me, the best tools are those that support me. They can provide me with support, a decision aid, can *help automate non-value-added tasks*, they can be a teaching aid, a visual aid, can act as information processing. All these functions are peripheral, but they allow me to *focus on the core of my job*." (Louis, 32). "Some tools are *renewing or broadening our jobs*, or the way we do them. […] It's the idea that technology serves a purpose and does not replace it. The tools that work for me have allowed me to do something I wasn't able to do before. They allowed me to *do things differently* and to work towards an objective, a human objective in this case." (Charles, 55). "With collaborative tools, we can work together and mutually improve our writing. They also give me *new ideas*. It's not so much about developing skills, more like *enriching* them, I'd say" (Jane, 26).
	18	Do work that is more value-added (e.g., work that involves less routine tasks).	
	19	Do work that is more problem-solving oriented (e.g., through Excel spreadsheets, analytical tools and research tools).	
	20	Do work that is more prominent (e.g., make my expertise more identifiable through social networks or intranets).	
	21	Do work that is more intellectually stimulating (e.g., by having access to different kinds of information from many sources).	

TABLE 4 Q-sorting exercise results ($N = 28$) (percentages of agreements).

Techno-eustress creators	Item	Techno-mastery	Techno-autonomy	Techno-relatedness	Techno-enrichment
Techno-mastery	1	**76.9**	7.7	0	15.4
	2	**75.0**	8.3	0	16.7
	3	**75.0**	8.3	0	16.7
	4	**76.9**	0	0	23.1
	5	**83.3**	0	0	16.7
Techno-autonomy	6	0	**100**	0	0
	7	30.8	**69.2**	0	0
	8	7.7	**76.9**	7.7	7.7
	9	15.4	**61.5**	7.7	15.4
	10	15.4	**76.9**	0	7.7
	11	25.0	**61.5**	0	13.5
Techno-relatedness	12	0	7.7	**92.3**	0
	13	0	7.7	**92.3**	0
	14	7.7	0	**92.3**	0
	15	0	0	**92.3**	7.7
	16	7.7	0	**92.3**	0
Techno-enrichment	17	0	0	0	**100**
	18	7.7	7.7	0	**84.6**
	19	16.7	16.7	0	**66.7**
	20	9.1	0	18.2	**72.7**
	21	0	23.1	0	**76.9**

Note: Values in bold represent items assigned correctly by 61% or more of the respondents.

interval in a large European organisation in the public administration sector (we refer to them as Sample 1 and Sample 2, respectively). All survey participants were full-time employees who used IT applications and devices for work. We collected 341 responses in the first survey (42% response rate), and 175 in the second (22% response rate). Demographics are detailed in Table A3. all items were assessed using 5-point Likert scales ranging from "1 = Strongly Disagree" to "5 = Strongly Agree". Participants also had a "not applicable" option available. Missing values (1% of the data points across all items) were replaced with the sample mean of the item.

We conducted several tests to establish the convergent and discriminant validity of the four constructs. First, we conducted an exploratory factor analysis on Sample 1 ($n = 341$), using the set of 21 items (Table 5), with maximum likelihood extraction, and Varimax rotation. It yielded a four-factor structure. All 21 items were retained because (1) each mapped on its correct factor with a loading above 0.40, and (2) none loaded on a different factor with a loading above 0.40 (Ragu-Nathan et al., 2008; Salisbury et al., 2002).

Next, we conducted a confirmatory factor analysis on Sample 2 ($n = 175$).[6] Five items (items 1, 6, 8, 13 and 20) were deleted because of the high correlations between their error terms that indicated redundancy and weakened the identification of the model (Kline, 2015). We analysed the measurement model, which included the four constructs. For a well-fitting model, comparative fit index (CFI) should exceed 0.900 (Bentler, 1990), root mean square error of approximation (RMSEA) and its 90% confidence interval should not exceed 0.100, standardised root mean

[6]The analyses were conducted using R version 3.6.1 with the Lavaan package version 0.65.

TABLE 5 Exploratory factor analysis: rotated matrix of item loadings (Sample 1, $n = 341$).

Item	Techno-mastery	Techno-autonomy	Techno-relatedness	Techno-enrichment
1	**0.782**	0.209	0.180	0.140
2	**0.592**	0.203	0.153	0.297
3	**0.799**	0.194	0.152	0.169
4	**0.689**	0.308	0.197	0.213
5	**0.548**	0.287	0.196	0.305
6	0.298	**0.488**	0.162	0.234
7	0.278	**0.700**	0.111	0.083
8	0.266	**0.557**	0.148	0.272
9	0.189	**0.770**	0.147	0.200
10	0.118	**0.752**	0.176	0.172
11	0.174	**0.776**	0.167	0.229
12	0.227	0.243	**0.720**	0.058
13	0.217	0.121	**0.801**	0.153
14	0.114	0.123	**0.696**	0.363
15	0.106	0.184	**0.709**	0.283
16	0.145	0.137	**0.773**	0.229
17	0.290	0.232	0.253	**0.701**
18	0.235	0.359	0.214	**0.636**
19	0.258	0.319	0.224	**0.452**
20	0.219	0.236	0.276	**0.624**
21	0.180	0.146	0.233	**0.727**

Note: Values in bold represent items with factor loadings above 0.40.

residual (SRMR) should not exceed 0.100 (Kline, 2015) and χ^2 divided by the degrees of freedom should be between 1 and 5 (Salisbury et al., 2002). The measurement model demonstrated good fit on all recommended cut-off values (see Table 6) indicating good discriminant and convergent validity among the four constructs. The final list of items validated through CFA is shown in Table 7 and the correlation matrix in Table 8.[7]

Table 8 shows that for each construct, the square root of its average variance extracted (AVE) exceeds its maximum correlation with the other constructs. We further analysed the heterotrait-monotrait (HTMT) ratio of correlations (Henseler et al., 2015) of each construct, and established than none of them exceeded the cut-off value of 0.850 (Kline, 2015). Next, we evaluated construct reliability. Construct reliability was high because Composite Reliability (CR) is higher than 0.700, the AVE is higher than 0.500 (Fornell & Larcker, 1981), and Cronbach's Alpha is higher than 0.700 (Nunnally, 1978).

Finally, we examined the dimensional structure of the four constructs to empirically investigate the second-order reflective latent construct formulation for techno-eustress creators with four first-order dimensions.[8] We tested and

[7]The measurement model was tested on all samples (1 to 4) and demonstrated good fit on all recommended cut-off values for each of the samples.

[8]We theorised techno-eustress creators as a reflective second-order latent construct (Diamantopoulos, 2011). This implies that techno-eustress creators can manifest itself in any of the four dimensions (Diamantopoulos, 2011; Edwards, 2011; Polites et al., 2012). Each of the four dimensions is thus a reflection of techno-eustress creators, and the direction of causality goes from the second-order latent construct to its first-order factors (Jarvis et al., 2003). A change in techno-eustress creators can result in a change in one or more of the dimensions. We based our formulation on the formulation of techno-distress creators, which is similarly established as a reflective construct second-order construct (Ragu-Nathan et al., 2008). Our representation is consistent with literature on stress that models stress creators as reflective (Law et al., 1998). It is also consistent with studies that model constructs of a cognitive nature (e.g., Agarwal & Karahanna, 2000) or related to psychological states (Edwards, 2011) as reflective.

TABLE 6 Fit indices for measurement model (Sample 2, $n = 175$).

Fit indices	Recommended values (Bentler, 1990; Kline, 2015; Salisbury et al., 2002)	Measurement model
Sig. (p value)		0.000
χ^2/d.f.	[1; 5]	2.256
CFI	≥0.900	0.934
RMSEA	< 0.100	0.085
RMSEA 90% conf. interval	[0; 0.100[	[0.070;0.0996]
SRMR	<0.100	0.060

TABLE 7 Items for techno-eustress creators.

Techno-eustress creators items	
• The following questions are about your experiences related to the use of information technology. • The term 'information technology' refers to the day-to-day computer-based applications and devices you use, such as email, work applications, communication applications, laptops, mobile devices and so forth. • The following statements describe typical situations where the use of information technology challenges you in a positive way and motivates you. • Please read each statement carefully and select the option that corresponds best to how you feel, using the scale "strongly agree", "agree", "neutral", "disagree" and "strongly disagree", or selecting the "not applicable" option if the statement does not apply to you. • The IT applications and devices I use for work challenge me in a positive way and motivate me to…	
Techno-mastery	1. Make my work methods more innovative. 2. Make my work methods more effective. 3. Improve my work methods. 4. Improve work-related information processing.
Techno-autonomy	1. Prioritise my work (e.g., with the help of to-do list applications). 2. Focus on work that is important. 3. Change the prioritisation of my work if necessary. 4. Spend more time on important tasks (e.g., with the help of to-do list applications).
Techno-relatedness	1. Stay connected with many colleagues through IT. 2. Get feedback on my work from many colleagues. 3. Give social support to many colleagues. 4. Exchange with many colleagues on work matters.
Techno-enrichment	1. Do work that is more interesting (e.g., by having access to new information). 2. Do work that is more value-added (e.g., work that involves less routine tasks). 3. Do work that is more problem-solving oriented (e.g., through Excel spreadsheets, analytical tools and research tools). 4. Do work that is more intellectually stimulating (e.g., by having access to different kinds of information from many sources).

compared two measurement models: (1) a model with the four constructs freely correlated, and (2) a second-order model. Although both models demonstrated good fit (see Table 9), their χ^2 values were significantly different (χ^2 difference = 8.766, $p = 0.012$). Further, the target coefficient (i.e., the ratio of the χ^2 value of the freely correlated model and that second-order model) (Marsh & Hocevar, 1985) was 96%, exceeding the recommended value of 80%. We thus formulate techno-eustress as a second-order reflective latent construct with four first-order factors of techno-master, techno-autonomy, techno-enrichment, and techno-relatedness.

TABLE 8 Correlation matrix of measurement model (Sample 2, $n = 175$).

	TM	TA	TR	TE
TM. Techno-mastery (CR = 0.897/α = 0.889 / HTMT = 0.613)	0.824			
TA. Techno-autonomy (CR = 0.921/α = 0.920/HTMT = 0.603)	0.651	0.862		
TR. Techno-relatedness (CR = 0.872/α = 0.868/HTMT = 0.519)	0.526	0.512	0.794	
TE. Techno-enrichment (CR = 0.870/α = 0.859/HTMT = 0.611)	0.661	0.645	0.521	0.788

Note: The diagonal shows the square root of the average variance extracted.

TABLE 9 Comparison of fit indices between measurement models (Sample 2, $n = 175$).

Fit indices	Recommended values (Bentler, 1990; Kline, 2015; Salisbury et al., 2002)	First-order freely correlated model	Second-order model
Sig. (p value)		0.000	0.000
χ^2/d.f.	[1; 5]	2.212	2.256
CFI	≥0.900	0.938	0.934
RMSEA	<0.100	0.083	0.085
RMSEA 90% conf. interval	[0; 0.100]	[0.068;0.098]	[0.070;0.099]
SRMR	<0.100	0.056	0.060
χ^2 difference			8.766 ($p = 0.012$)

4.3 | Measurement invariance of techno-eustress creators

We established the measurement invariance of techno-eustress creators over time (Vandenberg & Lance, 2000), using Sample 3, a longitudinal sample composed of the 121 employees who responded both to the first and second surveys, and thereby comprising 242 data points.

We first established that techno-eustress creators possessed the same factor structure across the two time points (i.e., configural invariance). We assessed a baseline multilevel measurement model in which (1) levels corresponded to time points, (2) the same factor structure was imposed on techno-eustress creators at the two time points, and (3) factor loadings were freely estimated. This model demonstrated a good fit (Table 10). Second, we established that techno-eustress creators held the same factor loadings across the two time points (i.e., metric or weak factorial invariance) (Vandenberg & Lance, 2000). We assessed the same multilevel measurement model as for configural invariance, except that the factor loadings were here constrained to be equal across the two time points. The model also demonstrated a good fit. A χ^2 difference test further revealed that this metric invariance model was not significantly different from the configural invariance model (Table 10). Third, we tested whether techno-eustress creators possessed the same factor loadings and intercepts across the two time points (i.e., scalar or strong factorial invariance). We assessed the same multilevel measurement model as for metric invariance, except that, in addition to the previous constraints, intercepts were also constrained to be equal across the two time points. Again, the model demonstrated a good fit, with a χ^2 difference test revealing that the scalar invariance model was not significantly different from the metric invariance model (Table 10).

4.4 | Nomological validity

Our final step was to test for nomological validity. We used Sample 4, which was collected using 400 respondents from two countries in Europe, recruited through a Prolific panel. To join the survey, users had to (1) be full-time

TABLE 10 Fit indices and model comparison for measurement invariance models (Sample 3, $n = 242$).

Fit indices	Model 1: Configural invariance	Model 2: Metric invariance	Model 3: Scalar invariance
Sig. (p value)	0.000	0.000	0.000
χ^2/d.f.	2.097	2.061	1.995
CFI	0.956	0.954	0.955
RMSEA	0.065	0.064	0.062
RMSEA 90% conf. interval	[0.056;0.074]	[0.056; 0.073]	[0.054; 0.070]
SRMR	0.048	0.058	0.058
Model comparison		1 versus 2	2 versus 3
χ^2 difference		n.s.	n.s.

employees, and (2) use IT applications and devices for work at least two or three times a week.[9] Panels are a way of securing the participation of individuals from multiple organisations, resulting in high levels of respondent diversity (Hauser & Schwarz, 2016; Lowry et al., 2016; Steelman et al., 2014). Three attention checks were placed in the survey. Failure to answer these attention checks correctly, automatically led to rejection. The first attention check ("please click on agree") was placed toward the beginning of the survey and the second ("please click on neutral") toward the end. Thirty-one surveys failed the attention checks and were deleted. In total, 400 valid surveys were collected. Sample demographics are detailed in Table A3.

IT strain (Ayyagari et al., 2011) and user satisfaction (Turel, 2015) were assessed using previously validated instruments. Techno-distress creators was measured as a second-order construct based on the technostress creators instrument (Ragu-Nathan et al., 2008). As control variables, we used IT self-efficacy (Compeau & Higgins, 1995; Tarafdar et al., 2015) and personal innovativeness with IT (Agarwal & Prasad, 1998). We expected them to be positively (negatively) related to techno-eustress creators (techno-distress creators). We used existing scales for them. Table 11 shows the construct items, Table 12 the item loadings and Table A4 the correlation matrix, reliability and AVE values.

4.4.1 | Nomological validity for H1 and H2

We tested the hypotheses using a covariance-based structural model (CBSEM) with maximum likelihood estimation. The fit of the structural model conformed to the suggested parameter values (see Table 13). Techno-eustress creators were positively related to user satisfaction ($\beta = 0.600$, $p < 0.001$) and negatively related to IT strain ($\beta = -0.287$, $p < 0.001$), and techno-distress creators were negatively related to user satisfaction ($\beta = -0.205$, $p < 0.001$) and positively related to IT strain ($\beta = 0.600$, $p < 0.001$) (see Table 14 and Figure 3). Therefore, hypotheses 1a, 1b, 2a and 2b were supported. With regard to the control variables, personal innovativeness with IT was significantly positively related with techno-eustress creators, and IT self-efficacy was significantly negatively related to techno-distress creators.

4.4.2 | Nomological validity for H3 and H4

Hypothesis 3a (and 3b) stated that the positive effect of techno-eustress creators (and techno-distress creators) on user satisfaction (and IT strain) will be greater than the negative effect of techno-eustress creators

[9]They were asked the following question. Please think about a specific technology (e.g., software) that you are required to use at work. How often do you use it? The options were: Not at all; Less than once a week; About once a week (participant excluded); 2 or 3 times a week; 4 or 6 times a week; About once a day; More than once a day (participant included).

TABLE 11 Construct items.

The following questions are about your experiences related to the use of information technology. The term 'information technology' refers to the day-to-day computer-based applications and devices you use, such as email, work applications, communication applications, laptops, mobile devices and so forth. Please read each statement carefully and select the option that corresponds best to how you feel using the scale "strongly agree", "agree", "neutral", "disagree" and "strongly disagree", or selecting the "not applicable" option if the statement does not apply to you.	
Constructs	Items
Techno-distress creators (adapted from Ragu-Nathan et al., 2008)	
Techno-overload	1. I am forced by information technology to work much faster. 2. I am forced by information technology to do more work than I can handle. 3. I am forced by information technology to work with very tight time schedules. 4. I am forced to change my work habits to adapt to new information technology. 5. I have a higher workload because of increased information technology complexity.
Techno-invasion	1. I spend less time with my family due to information technology. 2. I have to be in touch with my work even during my vacation due to information technology. 3. I have to sacrifice my vacation and weekend time to keep current on new information technology. 4. I feel my personal life is being invaded by information technology.
Techno-complexity	1. I do not know enough about information technology to handle my job satisfactorily. 2. I need a long time to understand and use new information technology. 3. I do not find enough time to study and upgrade my information technology skills. 4. I find new recruits to this organisation know more about information technology than I do. 5. I often find it too complex for me to understand and use new information.
Techno-insecurity	1. I feel constant threat to my job security due to new information technology. 2. I have to constantly update my skills to avoid being replaced. 3. I am threatened by coworkers with newer information technology skills. 4. I do not share my knowledge with my coworkers for fear of being replaced. 5. I feel there is less sharing of knowledge among coworkers for fear of being replaced.
Techno-uncertainty	1. There are always new developments in the information technology we use in our organisation. 2. There are constant changes in computer software in our organisation. 3. There are constant changes in computer hardware in our organisation. 4. There are frequent upgrades in computer networks in our organisation.

(Continues)

TABLE 11 (Continued)

IT strain (adapted from Ayyagari et al., 2011)	1. I feel tired from activities that require me to use IT applications and devices. 2. Working all day with IT applications and devices is a strain for me. 3. I feel burned out from activities that require me to use IT applications and devices.
User satisfaction (adapted from Turel, 2015)	How do you feel about your overall experience of using IT applications and devices for work? 1. Dissatisfied (1) … Satisfied (7) 2. Displeased (1) … Pleased (7) 3. Frustrated (1) … Contented (7) 4. Terrible (1) … Delighted (7)
Personal innovativeness with IT (adapted from Agarwal & Prasad, 1998)	1. If I heard about a new information technology, I would look for ways to experiment with it. 2. Among my peers, I am usually the first to try out new information technologies. 3. I like to experiment with new information technologies.
IT self-efficacy (adapted from Compeau & Higgins, 1995; Tarafdar et al., 2015)	I could use my work IT to do my work if: 1. I had seen someone else using it before trying it myself. 2. I could call someone for help if I got stuck. 3. Someone else had helped me get started.

TABLE 12 Standardised item loadings (Sample 4, $n = 400$).

	Item 1	Item 2	Item 3	Item 4	Item 5
Techno-mastery	0.715	0.866	0.874	0.759	
Techno-autonomy	0.765	0.678	0.762	0.813	
Techno-relatedness	0.777	0.782	0.793	0.821	
Techno-enrichment	0.737	0.796	0.696	0.737	
Techno-overload	0.743	0.804	0.824	0.628	0.793
Techno-invasion	0.623	0.815	0.814	0.726	
Techno-complexity	0.689	0.796	0.727	0.642	0.783
Techno-insecurity	0.766	0.679	0.766	0.776	0.829
Techno-uncertainty	0.742	0.859	0.776	0.748	
IT strain	0.874	0.889	0.937		
User satisfaction	0.858	0.910	0.873	0.840	
Personal innovativeness with IT	0.792	0.788	0.857		
IT self-efficacy	0.754	0.819	0.899		

(and techno-distress creators) on IT strain (and user satisfaction). To test these hypotheses, we compared the previous structural model to a similar nested model (Kline, 2015) in which we constrained the corresponding paths to be equal in size but opposite in direction as follows. The path from techno-eustress creators to user satisfaction was set to minus the path techno-eustress creators to IT strain. Similarly, the path techno-distress creators to IT strain was set to minus the path techno-distress creators to user satisfaction. The fit of the constrained model was good (see Table 15), and the paths remained significant. However, the original unconstrained model had a significantly better χ^2 fit than the constrained model (χ^2 difference = 48.818, $p < 0.001$). Therefore, we established that the effects of

TABLE 13 Fit indices for nomological validity (Sample 4, $n = 400$).

Fit indices	Recommended values (Bentler, 1990; Kline, 2015; Salisbury et al., 2002)	Structural model
Sig. (p value)		0.000
χ^2/d.f.	[1; 5]	1.810
CFI	≥0.900	0.916
RMSEA	<0.100	0.045
RMSEA 90% conf. interval	[0; 0.100[	[0.042;0.048]
SRMR	<0.100	0.080

TABLE 14 Path coefficients for nomological validity (Sample 4, $n = 400$).

Paths	Standardised path coefficients	Hypotheses
Hypotheses		
Techno-eustress creators → IT strain	−0.287***	H1a: Supported
Techno-eustress creators → User satisfaction	0.600***	H2a: Supported
Techno-distress creators → IT strain	0.600***	H1b: Supported
Techno-distress creators → User satisfaction	−0.205***	H2b: Supported
Control Variables		
IT self-efficacy → Techno-eustress creators	n.s.	
Personal innovativeness with IT → Techno-eustress creators	0.474***	
IT self-efficacy → Techno-distress creators	−0.166*	
Personal innovativeness with IT → Techno-distress creators	n.s.	

Note: n.s. > 0.05.
*p < 0.05; **p < 0.01; ***p < 0.001.

techno-eustress creators and techno-distress creators on user satisfaction and IT strain were not of the same magnitude. Specifically, for techno-eustress creators, the positive effect on user satisfaction was greater than the negative effect on IT strain. For techno-distress creators the positive effect on IT strain was larger than the negative effect on user satisfaction (Table 14). Thus, Hypotheses 3a and 3b are supported.

We tested hypotheses 4a and 4b using a similar analytical strategy of constraining the corresponding paths to be equal in size but opposite in direction as follows. The path from techno-distress creators to IT strain was set to minus the path from techno-eustress creators to IT strain. The path from techno-eustress creators to user satisfaction was set to minus the path from techno-distress creators to user satisfaction. Again, the fit of the constrained model was good (Table 16) and the paths remained significant. Again, the unconstrained model had a significantly better χ^2 fit than the constrained model (χ^2 difference = 47.886, p < 0.001). Thus, the positive effect of techno-distress creators on IT strain is greater than the negative effect of techno-eustress creators on IT strain. The positive effect of techno-eustress creators on user satisfaction is less than the negative effect of techno-distress creators on user satisfaction. Hypotheses 4a and 4b are thus supported.[10]

[10]For further verification, we used t-tests to compare path coefficients as follows- (1) techno-eustress creators to user satisfaction and IT strain; (2) techno-distress creators to user satisfaction and IT strain; (3) techno-eustress creators and techno-distress creators to user satisfaction; and (4) techno-eustress creators and techno-distress creators to IT strain. The t-tests for all were significant, showing that the difference in path coefficients is statistically significant.

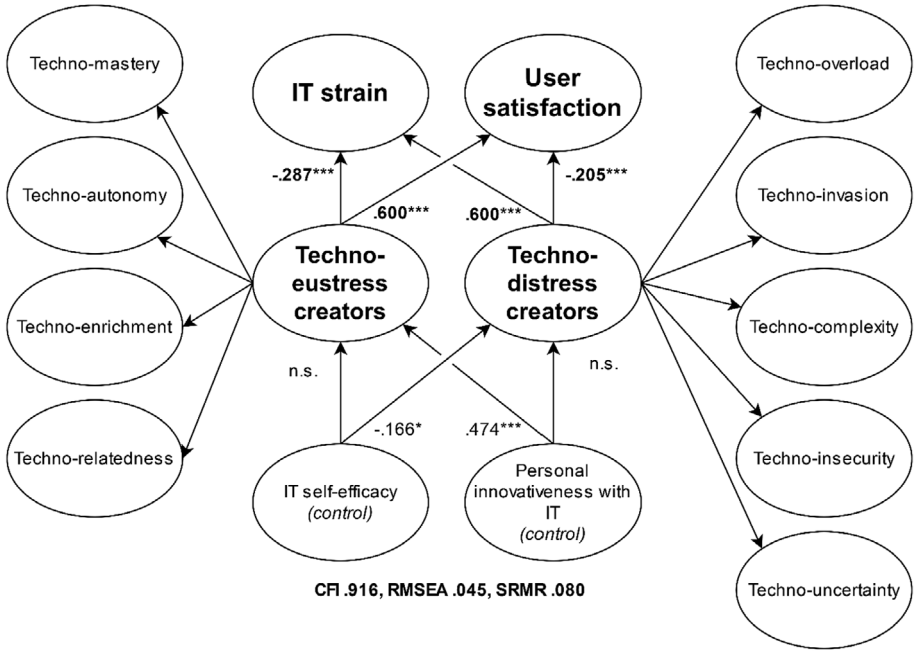

FIGURE 3 Nomological Model (Sample 4, $n = 400$). p values are *: <0.05; **: <0.01; ***: <0.001; n.s. > 0.05.

TABLE 15 Model comparison for hypotheses 3a and 3b (Sample 4, $n = 400$).

Fit indices	Recommended values (Bentler, 1990; Kline, 2015; Salisbury et al., 2002)	Unconstrained structural model	Constrained structural model
Sig. (p value)		0.000	0.000
χ^2/d.f.	[1; 5]	1.810	1.846
CFI	≥0.900	0.916	0.912
RMSEA	< 0.100	0.045	0.046
RMSEA 90% conf. interval	[0; 0.100]	[0.042; 0.048]	[0.043; 0.049]
SRMR	<0.100	0.080	0.086
χ^2 difference			48.818 (p < 0.001)

5 | DISCUSSION

This study investigates techno-eustress creators theoretically and empirically. We conceptualised techno-eustress creators as a second-order construct with four first-order dimensions, and validated it through item generation, and analysis of reliability, convergent and discriminant validity, dimensionality, measurement invariance across time, and nomological validity. Our results are based on multi-wave data collected from Europe at different points in time, from working professionals who used IT for their work. Our study contributes the following novel insights to the techno-stress literature.

Firstly, we theorise how and that the use of IS is a source of cognitions of challenge and motivation that enhance work. The technostress literature has focused primarily on creators of techno-distress. We take this literature forward by conceptualising techno-eustress creators as constituting four cognitions experienced by IS users, that IS positively challenge and motivate them to enhance their work. Drawing from studies on psychological eustress, we take a deep dive and holistic approach to theorise the multi-dimensional concept of techno-eustress creators. Techno-mastery, techno-autonomy, techno-relatedness and techno-enrichment respectively embody how IS can

TABLE 16 Model comparison for hypotheses 4a and 4b (Sample 4, $n = 400$).

Fit indices	Recommended values (Bentler, 1990; Kline, 2015; Salisbury et al., 2002)	Unconstrained structural model	Constrained structural model
Sig. (p value)		0.000	0.000
χ^2/d.f.	[1; 5]	1.810	1.845
CFI	≥0.900	0.916	0.912
RMSEA	<0.100	0.045	0.046
RMSEA 90% conf. interval	[0; 0.100]	[0.042; 0.048]	[0.043; 0.049]
SRMR	<0.100	0.080	0.086
χ^2 difference			47.886 ($p < 0.001$)

propel users to experience work-related mastery and autonomy, enhance their social connectedness and make their work more enriching. Our investigation focuses on use of IS in the general work context, and to that extent, has broad applicability. Techno-eustress creators signify a new way to view IS, namely, that use of IS can be a creating force for cognitions of challenge and motivation for individuals. Our study bolsters and theoretically broadens initial empirical studies that examine IS demands that can positively challenge IS users. Such demands have been examined and measured in more specific and narrow contexts such as role of IS in work-home spill-overs (Benlian, 2020); routine/innovative use of IS (Maier et al., 2021); and the work of Uber drivers (Cram et al., 2022).

Second, we holistically examine technostress through simultaneous effects of techno-eustress creators and techno-distress creators. The literature shows that techno-distress creators leads to negative outcomes such as burnout and exhaustion (Ayyagari et al., 2011; Maier et al., 2015; Srivastava et al., 2015). We examined the simultaneous effects of techno-eustress creators and techno-distress creators on both negative (IT strain) and positive (user satisfaction) outcomes. Our investigation of corresponding and comparative relationships involving these two constructs in a shared nomological network enables us to establish their concurrent, yet contrasting effects. It demonstrates that techno-distress creators (techno-eustress creators) are comparatively more salient for tackling negative (positive) outcomes respectively. This is a theoretically novel step at developing a holistic understanding of the comparative effects of both types of technostress on positive and negative outcomes associated with the organisational use of IS.

Third, we unpack how the bright side of technostress comes about. Research on techno-distress creators provides extensive evidence of the dark side of technostress, and links it to other negative psychological phenomena such as technology addiction (Tarafdar et al., 2020) and exhaustion and strain (Ayyagari et al., 2011; Maier et al., 2015). Through the conceptualization and validation of techno-eustress creators, we unpack how the bright side of technostress comes about. In so doing, we link technostress to concepts of positive psychology (Seligman & Csikszentmihalyi, 2000) such as self-determination and proactive work orientation, suggesting that use of IS creates difficult demands that can yet be the seed from which spring positive facets of work-life, in the form of work related autonomy, mastery, social connectedness and enrichment. Techno-eustress creators illustrate how IS can challenge and motivate employees to elevate their psychological experiences at work to achieve better work-related outcomes, representing a contrarian view to what IS scholars have come to term as the 'dark side' of IT use. We believe that this is a novel step forward in the continuing understanding of technostress.

6 | CONCLUSION: IMPLICATIONS AND LIMITATIONS

6.1 | Implications for scholarly research

Our study opens up several implications for research. Firstly, IS scholars could further theorise on the concept of techno-eustress creators, by examining it in different contexts such as hybrid work and voluntary use of IS, and for specific types of applications such as the rapidly emerging applications based on large language models, virtual reality

applications and robotic applications. Secondly, it is worthwhile and important to consider individual and organisational factors predicting techno-eustress creators. These could include traits such as IT mindfulness, IT literacy and engagement toward one's work, and organisational factors such as user involvement in IS and job rewards/incentives. Such factors can be situated as stimuli to techno-eustress creators, in the framing of the stimulus-organism-response model. Thirdly, studies could look at outcomes of techno-eustress creators, such as job satisfaction, job performance, job crafting, and innovative IS use. This will help to develop understanding of its consequences. Fourthly, it is important to consider empirical treatment of different parts of the transaction model of techno-eustress. Fifth, future research could develop links between techno-eustress creators and concepts such as motivation (Deci & Ryan, 1985), flow (Csikszentmihalyi, 1990), and self-determination (Gagné & Deci, 2005). Finally, future research could also examine techno-eustress creators with greater granularity, such as by investigating the nomological nets of its first-order dimensions.

6.2 | Implications for managerial practice

There is little practical guidance on identifying conditions that can enhance employees' experience of techno-eustress. Organisations can use the four dimensions of techno-eustress creators to audit if and to what extent employees experience these, which can then help them develop programs that enhance these aspects. Such programs should challenge and motivate employees to identify ways in which they can use work IS (e.g., email and video conferencing applications, enterprise social media, analytics applications and search engines and chatbots) to be more in control of their work, get better at it, make it intellectually more challenging, and work better with colleagues. This can be done through a two-pronged set of actions.

The first includes those that encourage employees to better understand the features and functions of their work IS. Workplace IS applications have many features and continually evolve. For example, a commonly used application, Slack, has instant messaging, forums, bots, web-hooks, reminders and RSS feeds. Rather than employees understanding in one shot how they can be used, it is more a matter of them continually discovering new features, through the process of use. While designed activities such as technology training workshops are important and should be organised, it is equally, if not more important, to create a culture that encourages and empowers employees to proactively explore, experiment and learn how to use their work IS on an ongoing basis. This could, for example, be done through regular informal brown bag type meetings to discuss different applications, through technology-related podcasts created by employees themselves and shared enterprise-wide, or by institutionalising proactive exploration with events such as innovation hackathons. Doing so creates more chances for employees to feel motivated to use IS for work expertise or autonomy or social support, pervasively and in the trenches so to speak, at their own pace and in their own time.

The second set of actions should encourage employees to understand and reflect on their own needs and goals vis-à-vis work expertise or autonomy or social support or doing cognitively more enriched work, as the case may be. This can be done through skill development programs that provide opportunities and recognition for employees to master new work skills. Or by incentivising employees to re-imagine their work, for instance, automating the mundane activities and focusing their efforts on the cognitively enhanced ones (Tarafdar & Beath, 2018). Or, by creating opportunities for collaboration and teamwork, to foster social connections, and for hybrid work and flexible work hours, to engender a sense of control. Doing so, would motivate employees to use IS to fulfil their own particular needs and goals. For example, an employee seeking to improve their mastery over a difficult task such as predicting demand for a product in an uncertain market, when chancing upon relevant analytics and visualisation features of a forecasting application, would challenge themselves to learn how to use the features to make better forecasts, thus experiencing techno-mastery. Through such programs, companies can create an organisational focus that emphasises technostress as something to be harnessed and leveraged (i.e., techno-eustress) to give meaning to work, and not just as something to be dreaded or be apprehensive about (i.e., techno-distress).

Further, our findings can spur organisations to leverage the positive effects of techno-eustress creators to counter the negative effects of techno-distress creators. For positive outcomes, the effects of techno-distress creators do not overshadow the effects of techno-eustress creators, whereas for negative outcomes it is the opposite. Organisations interested in enhancing positive outcomes, such as user satisfaction, should develop an environment in which users experience techno-eustress creators. Those interested in diminishing negative outcomes, such as IT strain, should focus on assessing and decreasing techno-distress creators. By highlighting these relative effects, we help managers understand conditions under which they should strengthen techno-eustress creators or weaken techno-distress creators, and direct resources accordingly.

6.3 | Limitations and concluding remarks

The paper's contributions should be looked at in the light of certain limitations. Firstly, the data was collected in countries from western Europe; generalizability to other contexts should be further assessed. Secondly, given participants chose to enrol in our surveys (either by clicking the link received on their business email or by entering in it through Prolific), self-selection bias may have occurred. Thirdly, the survey items were self-reported; despite our efforts to minimise common methods bias (measuring different constructs at different points in time and using both negative and positive outcomes), it cannot be ruled out. Finally, our focus was to conceptualise techno-eustress creators and empirically understand their relationships with specific variables of nomological interest as a first step. In doing so, we examine the front-end of the transaction model of techno-eustress (Tarafdar, Cooper, & Stich, 2019) and provide early evidence of a link between techno-eustress creators and positive outcomes. We do not claim to test the entire model of techno-eustress.

In conclusion, technostress is an inevitable part of work life. The point, perhaps, is not to abolish it, but to master it. Our study takes a step toward the latter, by identifying factors that create techno-eustress, the good aspect of technostress. We hope that our results will spur scholars to further examine the phenomenon of techno-eustress and enable practitioners to be challenged and motivated by IS—an urgent need in the current times.

ACKNOWLEDGMENT

Open Access funding enabled and organized by Projekt DEAL.

DATA AVAILABILITY STATEMENT

Research data are not shared.

ORCID

Monideepa Tarafdar https://orcid.org/0000-0003-2831-1364
Jean-François Stich https://orcid.org/0000-0003-2798-5543
Christian Maier https://orcid.org/0000-0001-8328-2493
Sven Laumer https://orcid.org/0000-0002-9430-5774

REFERENCES

Addas, S., & Pinsonneault, A. (2018). E-mail interruptions and individual performance: Is there a silver lining? *MIS Quarterly*, *42*(2), 381–405.

Agarwal, R., & Karahanna, E. (2000). Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, *24*(4), 665–694.

Agarwal, R., & Prasad, J. (1998). A conceptual and operational definition of personal innovativeness in the domain of information technology. *Information Systems Research*, *9*(2), 204–215.

Ahuja, M. K., & Thatcher, J. B. (2005). Moving beyond intentions and toward the theory of trying: Effects of work environment and gender on post-adoption information technology use. *MIS Quarterly*, *29*(3), 427–459.

Aral, S., Brynjolfsson, E., & Van Alstyne, M. (2012). Information, technology, and information worker productivity. *Information Systems Research*, *23*(3), 849–867.

Aspinwall, L. G., & Taylor, S. E. (1997). A stitch in time: Self-regulation and proactive coping. *Psychological Bulletin*, *121*(3), 417–436.

Avey, J. B., Reichard, R. J., Luthans, F., & Mhatre, K. H. (2011). Meta-analysis of the impact of positive psychological capital on employee attitudes, behaviors, and performance. *Human Resource Development Quarterly*, *22*(2), 127–152.

Ayyagari, R., Grover, V., & Purvis, R. (2011). Technostress: Technological antecedents and implications. *MIS Quarterly*, *35*(4), 831–858.

Bala, H., & Venkatesh, V. (2013). Changes in employees' job characteristics during an enterprise system implementation: A latent growth modeling perspective. *MIS Quarterly*, *37*, 1113–1140.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, *50*(2), 248–287.

Bandura, A. (2015). On deconstructing commentaries regarding alternative theories of self-regulation. *Journal of Management*, *41*(4), 1025–1044.

Bélanger, F., & Crossler, R. E. (2011). Privacy in the digital age: A review of information privacy research in information systems. *MIS Quarterly*, *35*(4), 1017-A36.

Benlian, A. (2020). A daily field investigation of technology-driven spillovers from work to home. *MIS Quarterly*, *44*, 1259–1300.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238–246.

Bertin, E., Colléaux, A., & Leclercq-Vandelannoitte, A. (2020). Collaboration in the digital age: From email to enterprise social networks. *Systèmes d'information & Management*, *25*(1), 7–46.

Bloom, N., Garicano, L., Sadun, R., & Van Reenen, J. (2014). The distinct effects of information technology and communication technology on firm organization. *Management Science*, *60*(12), 2859–2885.

Bornet, P. (2020). *Building the future of work with artificial intelligence.* Forbes. https://www.forbes.com/sites/forbestechcouncil/2020/07/28/building-the-future-of-work-with-artificial-intelligence/

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, *56*(2), 267–283.

Cavanaugh, M. A., Boswell, W. R., Roehling, M. V., & Boudreau, J. W. (2000). An empirical examination of self-reported work stress among U.S. managers. *Journal of Applied Psychology*, *85*(1), 65–74.

Cenfetelli, R. T., & Schwarz, A. (2011). Identifying and testing the inhibitors of technology usage intentions. *Information Systems Research*, *22*(4), 808–823.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *19*(2), 189–211.

Cooper, C. L., Dewe, P. J., & O'Driscoll, M. P. (2001). *Organizational stress: A review and critique of theory, research, and applications*. SAGE Publications.

Cram, W. A., Wiener, M., Tarafdar, M., & Benlian, A. (2022). Examining the impact of algorithmic control on uber drivers' technostress. *Journal of Management Information Systems*, *39*(2), 426–453.

Crawford, E. R., LePine, J. A., & Rich, B. L. (2010). Linking job demands and resources to employee engagement and burnout: A theoretical extension and meta-analytic test. *Journal of Applied Psychology*, *95*(5), 834–848.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. Harper Perennial.

Cummings, T. G., & Cooper, C. L. (1979). A cybernetic framework for studying occupational stress. *Human Relations*, *32*(5), 395–418.

Davenport, T. H. (2018). *The AI advantage: How to put the artificial intelligence revolution to work* (1st ed.). MIT Press.

Day, A., Paquet, S., Scott, N., & Hambley, L. (2012). Perceived information and communication technology (ICT) demands on employee outcomes: The moderating effect of organizational ICT support. *Journal of Occupational Health Psychology*, *17*(4), 473–491.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer US.

Deci, E. L., & Ryan, R. M. (2014). The importance of universal psychological needs for understanding motivation in the workplace. In M. Gagné (Ed.), *The Oxford handbook of work engagement, motivation, and self-determination theory*. Oxford University Press.

Delone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems*, *19*(4), 9–30.

Diamantopoulos, A. (2011). *Incorporating formative measures into covariance-based structural equation models* (pp. 335–358). MIS Quarterly.

Diaz, I., Chiaburu, D. S., Zimmerman, R. D., & Boswell, W. R. (2012). Communication technology: Pros and cons of constant connection to work. *Journal of Vocational Behavior*, *80*(2), 500–508.

Domahidi, E. (2018). The associations between online media use and Users' perceived social resources: A meta-analysis. *Journal of Computer-Mediated Communication*, *23*(4), 181–200.

Edwards, J. R. (2011). The fallacy of formative measurement. *Organizational Research Methods*, *14*(2), 370–388.

Edwards, J. R., Cable, D. M., Williamson, I. O., Lambert, L. S., & Shipp, A. J. (2006). The phenomenology of fit: Linking the person and environment to the subjective experience of person-environment fit. *Journal of Applied Psychology*, *91*(4), 802–827.

Edwards, J. R., & Cooper, C. L. (1988). The impacts of positive psychological states on physical health: A review and theoretical framework. *Social Science & Medicine*, *27*(12), 1447–1459.

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, *18*(3), 382–388.

French, J. R., Caplan, R. D., & Van Harrison, R. (1982). *The mechanisms of job stress and strain* (Vol. 8). Wiley.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362.

Gerlach, J. P., & Cenfetelli, R. T. (2020). Constant checking is not addiction: A grounded theory of IT-mediated state-tracking. *MIS Quarterly*, *44*(4), 1705–1732.

Grant, A. M., & Ashford, S. J. (2008). The dynamics of proactivity at work. *Research in Organizational Behavior*, *28*, 3–34.

Grant, A. M., & Parker, S. K. (2009). Redesigning work design theories: The rise of relational and proactive perspectives. *Academy of Management Annals*, *3*(1), 317–375.

Hauser, D. J., & Schwarz, N. (2016). Attentive Turkers: MTurk participants perform better on online attention checks than do subject pool participants. *Behavior Research Methods*, *48*(1), 400–407.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*, 115–135.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research*, *30*(2), 199–218.

Kahn, R. L., Wolfe, D. M., Quinn, R. P., Snoek, J. D., & Rosenthal, R. A. (1964). *Organizational stress: Studies in role conflict and ambiguity*. John Wiley & Sons.

Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly*, *24*(2), 285–308.

Katz, D., & Kahn, R. L. (1978). *The social psychology of organizations* (2nd ed.). John Wiley & Sons.

Kim, S. S., & Son, J.-Y. (2009). Out of dedication or constraint? A dual model of post-adoption phenomena and its empirical test in the context of online services. *MIS Quarterly*, *33*(1), 49–70.

Kline, R. B. (2015). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Lal, B., Dwivedi, Y. K., & Haag, M. (2021). Working from home during Covid-19: Doing and managing technology-enabled social interaction with colleagues at a distance. *Information Systems Frontiers*, *25*, 1333–1350. https://doi.org/10.1007/s10796-021-10182-0

Law, K. S., Wong, C.-S., & Mobley, W. M. (1998). Toward a taxonomy of multidimensional constructs. *Academy of Management Review*, *23*(4), 741–755.

Lazarus, R. S. (1966). *Psychological stress and the coping process*. McGraw-Hill.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company.

Le Fevre, M., Matheny, J., & Kolt, G. S. (2003). Eustress, distress, and interpretation in occupational stress. *Journal of Managerial Psychology*, *18*(7), 726–744.

Leonardi, P. M. (2018). Social media and the development of shared cognition: The roles of network expansion, content integration, and triggered recalling. *Organization Science*, *29*(4), 547–568.

LePine, J. A., LePine, M. A., & Jackson, C. L. (2004). Challenge and hindrance stress: Relationships with exhaustion, motivation to learn, and learning performance. *Journal of Applied Psychology*, *89*(5), 883–891.

Leung, L. (2011). Effects of ICT connectedness, permeability, flexibility, and negative spillovers on burnout and job and family satisfaction. *Human Technology*, *7*(3), 250–267.

Leyens, J.-P., Yzerbyt, V. Y., & Rogier, A. (1997). Personality traits that distinguish you and me are better memorized. *European Journal of Social Psychology*, *27*(5), 511–522.

Li, H., Gupta, A., Luo, X., & Warkentin, M. (2011). Exploring the impact of instant messaging on subjective task complexity and user satisfaction. *European Journal of Information Systems*, *20*(2), 139–155.

Lowry, P. B., D'Arcy, J., Hammer, B., & Moody, G. D. (2016). "Cargo cult" science in traditional organization and information systems survey research: A case for using nontraditional methods of data collection, including mechanical Turk and online panels. *The Journal of Strategic Information Systems*, *25*(3), 232–240.

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, *35*(2), 293.

Maier, C., Laumer, S., & Eckhardt, A. (2015). Information technology as daily stressor: Pinning down the causes of burnout. *Journal of Business Economics*, *85*(4), 349–387.

Maier, C., Laumer, S., Tarafdar, M., Mattke, J., Reis, L., & Weitzel, T. (2021). Challenge and hindrance IS use stressors and appraisals: Explaining contrarian associations in post-acceptance IS use behavior. *Journal of the Association for Information Systems*, *22*(6), 1590–1624.

Mano, R. S., & Mesch, G. S. (2010). E-mail characteristics, work performance and distress. *Computers in Human Behavior*, *26*(1), 61–69.

Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: First-and higher order factor models and their invariance across groups. *Psychological Bulletin*, *97*(3), 562–582.

Mazmanian, M., Orlikowski, W. J., & Yates, J. (2013). The autonomy paradox: The implications of mobile email devices for knowledge professionals. *Organization Science*, *24*(5), 1337–1357.

McGonigal, K. (2016). *The upside of stress: Why stress is good for you, and how to get good at it (reprint édition)*. Avery.

Melendez, S. (2020). *Sick of zoom happy hour? Try these virtual team-building activities instead*. https://www.fastcompany.com/90533480/sick-of-zoom-happy-hour-try-these-virtual-team-building-activities-instead

Monzani, L., Ripoll, P., Peiró, J. M., & Van Dick, R. (2014). Loafing in the digital age: The role of computer mediated communication in the relation between perceived loafing and group affective outcomes. *Computers in Human Behavior*, *33*, 279–285.

Müller-Wienbergen, F., Müller, O., Seidel, S., & Becker, J. (2011). Leaving the beaten tracks in creative work–a design theory for systems that support convergent and divergent thinking. *Journal of the Association for Information Systems*, *12*(11), 714–740.

Nahm, A. Y., Rao, S. S., Solis-Galvan, L. E., & Ragu-Nathan, T. S. (2002). The Q-Sort method: Assessing reliability and construct validity of questionnaire items At a pre-testing stage. *Journal of Modern Applied Statistical Methods*, *1*(1), 114–125.

Nambisan, S., Agarwal, R., & Tanniru, M. (1999). Organizational mechanisms for enhancing user innovation in information technology. *MIS Quarterly*, *23*, 365–395.

Nastjuk, I., Trang, S., Grummeck-Braamt, J.-V., Adam, M. T. P., & Tarafdar, M. (2023). Integrating and Synthesising technostress research: A meta-analysis on technostress creators, outcomes, and IS usage contexts. *European Journal of Information Systems*, 1–22. https://www.tandfonline.com/doi/full/10.1080/0960085X.2022.2154712

Nelson, D. L., & Simmons, B. L. (2003). Health psychology and work stress. In J. C. E. Quick & L. E. Tetrick (Eds.), *Handbook of occupational health psychology* (pp. 97–119). American Psychological Association.

Nunnally, J. (1978). *Psychometric theory*. McGraw-Hill.

Ohly, S., & Latour, A. (2014). Work-related smartphone use and well-being in the evening: The role of autonomous and controlled motivation. *Journal of Personnel Psychology*, *13*(4), 174–183.

Olafsen, A. H., Niemiec, C. P., Halvari, H., Deci, E. L., & Williams, G. C. (2016). On the dark side of work: A longitudinal analysis using self-determination theory. *European Journal of Work and Organizational Psychology*, *26*(2), 275–285.

Parker, S. K., Williams, H. M., & Turner, N. (2006). Modeling the antecedents of proactive behavior at work. *Journal of Applied Psychology*, *91*(3), 636–652.

Patton, M. Q. (2002). Two decades of developments in qualitative inquiry: A personal, experiential perspective. *Qualitative Social Work*, *1*(3), 261–283.

Peeters, M. C., Buunk, B. P., & Schaufeli, W. B. (1995). Social interactions, stressful events and negative affect at work: A micro-analytic approach. *European Journal of Social Psychology*, *25*(4), 391–401.

Polites, G. L., Roberts, N., & Thatcher, J. (2012). Conceptualizing models using multidimensional constructs: A review and guidelines for their use. *European Journal of Information Systems*, *21*(1), 22–48.

Proffitt, S. (2020). *Four reasons people don't want to return to the office*. BBC News https://www.bbc.com/news/uk-53580656

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., & Qiang, T. (2008). The consequences of technostress for end users in organizations: Conceptual development and empirical validation. *Information Systems Research*, *19*(4), 417–433.

Rahrovani, Y., & Pinsonneault, A. (2020). Innovative IT use and innovating with IT: A study of the motivational antecedents of two different types of innovative behaviors. *Journal of the Association for Information Systems*, *21*(4), 936–970.

Russell, E., Woods, S. A., & Banks, A. P. (2017). Examining conscientiousness as a key resource in resisting email interruptions: Implications for volatile resources and goal achievement. *Journal of Occupational and Organizational Psychology*, *n/a-n/a.*, *90*, 407–435.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78.

Salisbury, W. D., Chin, W. W., Gopal, A., & Newsted, P. R. (2002). Research report: Better theory through measurement—Developing a scale to capture consensus on appropriation. *Information Systems Research*, *13*(1), 91–103.

Seligman, M. E., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist*, *55*(1), 5–14.

Selye, H. (1976). Stress without distress. In G. Serban (Ed.), *Psychopathology of human adaptation* (pp. 137–146). Springer.

Selye, H. (1983). The stress concept: Past, present, and future. In C. L. Cooper (Ed.), *Stress research: Issues for the eighties* (pp. 1–20). John Wiley & Sons.

Simmons, B. L., & Nelson, D. L. (2001). Eustress at work: The relationship between hope and health in hospital nurses. *Health Care Management Review*, *26*, 7–18.

Spreitzer, G. M., & Porath, C. (2014). Self-determination as nutriment for thriving: Building an integrative model of human growth at work. In M. Gagné (Ed.), *The Oxford handbook of work engagement, motivation, and self-determination theory* (pp. 245–258). Oxford University Press.

Srivastava, S. C., Chandra, S., & Shirish, A. (2015). Technostress creators and job outcomes: Theorising the moderating influence of personality traits. *Information Systems Journal*, *25*(4), 355–401.

Steelman, Z. R., Hammer, B. I., & Limayem, M. (2014). Data collection in the digital age: Innovative alternatives to student samples. *MIS Quarterly*, *38*(2), 355–378.

Strauss, K., & Parker, S. K. (2014). Effective and sustained proactivity in the workplace: A self-determination theory perspective. In M. Gagné (Ed.), *The Oxford handbook of work engagement, motivation, and self-determination theory*. Oxford University Press.

Sun, H. (2012). Understanding user revisions when using information system features: Adaptive system use and triggers. *MIS Quarterly*, *36*(2), 453–478.

Tao, F., Cheng, J., Qi, Q., Zhang, M., Zhang, H., & Sui, F. (2018). Digital twin-driven product design, manufacturing and service with big data. *The International Journal of Advanced Manufacturing Technology*, *94*(9), 3563–3576.

Tarafdar, M., & Beath, C. (2018). Wipro limited: Developing a cognitive DNA. ICIS 2018 Proceedings. https://aisel.aisnet.org/icis2018/education/Presentations/3

Tarafdar, M., Beath, C. M., & Ross, J. W. (2019). Using AI to enhance business operations. *MIT Sloan Management Review*, *60*(4), 37–44.

Tarafdar, M., Cooper, C. L., & Stich, J.-F. (2019). The technostress trifecta-techno eustress, techno distress and design: An agenda for research. *Information Systems Journal*, *29*(1), 6–42.

Tarafdar, M., Maier, C., Laumer, S., & Weitzel, T. (2020). Explaining the link between technostress and technology addiction for social networking sites: A study of distraction as a coping behavior. *Information Systems Journal*, *30*(1), 96–124.

Tarafdar, M., Pullins, E. B., & Ragu-Nathan, T. S. (2015). Technostress: Negative effect on performance and possible mitigations. *Information Systems Journal*, *25*(2), 103–132.

Tarafdar, M., Tu, Q., & Ragu-Nathan, T. S. (2010). Impact of technostress on end-user satisfaction and performance. *Journal of Management Information Systems*, *27*(3), 303–334.

Turel, O. (2015). Quitting the use of a habituated hedonic information system: A theoretical model and empirical examination of Facebook users. *European Journal of Information Systems*, *24*(4), 431–446.

van den Broeck, A., Ferris, D. L., Chang, C.-H., & Rosen, C. C. (2016). A review of self-determination theory's basic psychological needs at work. *Journal of Management*, *42*(5), 1195–1229.

van den Broek, E., Sergeeva, A., & Huysman, M. (2021). When the machine meets the expert: An ethnography of developing Ai for hiring. *MIS Quarterly*, *45*(3), 1557–1580.

van der Aalst, W. (2012). Process mining: Overview and opportunities. *ACM Transactions on Management Information Systems*, *3*(2), 1–7.

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, *3*(1), 4–70.

Wan, Z., Compeau, D., & Haggerty, N. (2012). The effects of self-regulated learning processes on E-learning outcomes in organizational settings. *Journal of Management Information Systems*, *29*(1), 307–340.

Wang, Y., & Haggerty, N. (2011). Individual virtual competence and its influence on work outcomes. *Journal of Management Information Systems*, *27*(4), 299–334.

Waytz, A., & Gray, K. (2018). Does online technology make us more or less sociable? A preliminary review and call for research. *Perspectives on Psychological Science*, *13*(4), 473–491.

Webster, J. R., Beehr, T. A., & Christiansen, N. D. (2010). Toward a better understanding of the effects of hindrance and challenge stressors on work behavior. *Journal of Vocational Behavior*, *76*(1), 68–77.

Webster, J. R., Beehr, T. A., & Love, K. (2011). Extending the challenge-hindrance model of occupational stress: The role of appraisal. *Journal of Vocational Behavior*, *79*(2), 505–516.

Wheatley, D., & Bickerton, C. (2016). Time-use and well-being impacts of travel-to-work and travel-for-work. *New Technology, Work and Employment*, *31*(3), 238–254.

Wilson, H. J., & Daugherty, P. R. (2018). Collaborative intelligence: Humans and AI are joining forces. *Harvard Business Review*. https://hbr.org/2018/07/collaborative-intelligence-humans-and-ai-are-joining-forces

Yeo, G., Loft, S., Xiao, T., & Kiewitz, C. (2009). Goal orientations and performance: Differential relationships across levels of analysis and as a function of task demands. *Journal of Applied Psychology*, *94*(3), 710–726.

Zhang, N., Wang, C., Karahanna, E., & Xu, Y. (2022). Peer privacy concerns: Conceptualization and measurement. *MIS Quarterly*, *46*(1), 491–530.

Zhang, P., & Von Dran, G. M. (2000). Satisfiers and dissatisfiers: A two-factor model for website design and evaluation. *Journal of the American Society for Information Science*, *51*(14), 1253–1268.

Zhang, X., & Venkatesh, V. (2013). Explaining employee job performance: The role of online and offline workplace communication networks. *MIS Quarterly*, *37*, 695–722.

AUTHOR BIOGRAPHIES

Monideepa Tarafdar is the Charles J. Dockendorff Endowed Professor of Information Systems at the Isenberg School of Management, University of Massachusetts Amherst. She has held appointments as Visiting Scholar at MIT Sloan CISR, Visiting Professor at Indian Institute of Management Calcutta, and Senior Research Fellow at Weizenbaum Internet Institute, Berlin. She has published extensively in the area of technostress. Her work has been published in top-tier journals in Information Systems and Operations Management Her research has been funded by the Leverhulme Trust (UK) and the Economic and Social Science Research Council (ESRC-UK), as Principal Investigator of secured funding of over 1 million USD, and supported by organisations in the US, UK, EU and India. She is Scientific Adviser to a Dublin start-up that designs programs in wellbeing-oriented use of technology. She serves as Senior Editor at Information Systems Research and Information Systems Journal, and as Editorial Board member at Journal of MIS, Journal of the AIS, and Journal of Strategic Information Systems.

Jean-François Stich is an Associate Professor at ICN Business School (France), a research fellow at CEREFIGE, research lab in Management at Université de Lorraine (France), and deputy head of the Organizations and Human Resources research team of the CEREFIGE. He holds an HDR (Habilitation) from University of Strasbourg, a PhD in Management from Lancaster University, a Master's degree in Business Management from EDHEC Business School and an MSc in Organizational Behavior from Aston Business School. His research interests gravitate around the psychology and management of virtualised work, covering areas such as technostress, telecommuting, ICT use or digital recruitment. He has published in journals such as Information Systems Journal, Journal of the AIS, Information Technology & People, Personnel Review or New Technology, Work and Employment.

Christian Maier is a professor at the University of Bamberg in Germany. His research interests include the IS use life cycle, especially the adoption, usage, and discontinuous usage of digital technologies in the private and organizational use contexts. His research has been published, among others, in MIS Quarterly and Information Systems Research. He was awarded the Schmalenbach prize, the Early Career Awards by the AIS and the ACM SIGMIS, and the Heinz Maier-Leibnitz price.

Sven Laumer is the Schöller Endowed Professor and Chair of Information Systems in the School of Business, Economics and Society at Friedrich-Alexander-Universität Erlangen-Nürnberg, Head of the Dr. Theo and Friedl Schöller Research Lab "Future of Work", and Deputy Director of the Dr. Theo und Friedl Schöller Research Center for Business and Society. His research focuses on digital collaboration, digitalization challenges, and people analytics. The results of his work have been published or will appear among others in all journals of the AIS Senior Scholars' Basket (incl. MISQ, ISR, JMIS). He serves on editorial boards of Information Systems Journal and The DATA BASE for Advances in Information Systems. He has been awarded the Young Talent Award 2018 by the German Academic Association of Business Research (VHB). When he does not research and teach digital work and life, he enjoys being a soccer referee, hiking in the Alps, and spending time with friends and family.

How to cite this article: Tarafdar, M., Stich, J.-F., Maier, C., & Laumer, S. (2024). Techno-eustress creators: Conceptualization and empirical validation. *Information Systems Journal*, 1–35. https://doi.org/10.1111/isj.12515

APPENDIX A

TABLE A1 Demographics for interviews.

Participant	Age (year)	Gender	Manager
1	26	Female	No
2	40	Female	No
3	55	Female	No
4	40	Male	No
5	32	Male	No
6	44	Male	No
7	55	Male	Yes

TABLE A2 Interview Guide.

Could you describe your use of work IT?
Could you describe the situations and circumstances in which the use of work IT motivates you?
Could you describe the situations and circumstances in which the use of work IT stimulates you?
Could you describe the situations and circumstances in which the use of work IT helps you to develop your skills?
Could you describe the situations and circumstances in which the use of work IT enriches your work, or makes it more interesting and fulfilling?
Could you describe the situations and circumstances in which the use of work IT gives you autonomy and control?
Could you describe the situations in which you appreciate the use of work IT?

TABLE A3 Demographics for Samples 1, 2, 3 and 4 (percentages of the samples).

		Sample 1 ($n = 341$)	Sample 2 ($n = 175$)	Sample 3 at T1/T2 ($n = 121 \times 2$)	Sample 4 ($n = 400$)
Age (in years)	20–24	0.3	1.1	0.8	3.8
	25–34	10.9	12.6	9.1	36.0
	35–44	30.8	28.6	28.9	32.8
	45–54	34.6	29.7	33.1	16.3
	55–64	23.2	28	27.3	9.0
	>64+	0.3	1.1	0.8	2.0
Gender	Male	26.1	30.3	28.9	49.9
	Female	73.9	69.7	71.1	50.1
Education	Completed some high school	0.3	0.6	0.8	1.8
	High school graduate	1.8	1.1	24.8	13.0
	Completed some college	25.2	24	37.2	16.5
	College degree	35.8	39.4	20.7	36.8
	Completed some postgraduate	17.9	16	12.4	5.3
	Master's Degree	15.8	14.3	4.1	20.6
	Doctorate, law or professional degree	3.2	4.6	0.8	6.0
Company tenure (in years)	Less than a year	1.5	0.6	0	9.3
	1–4	15.2	10.9	13.2	36.3
	5–9	10.6	13.1	7.4	22.1
	10–14	17.3	21.1	20.7	13.3
	15–19	17.6	12.6	16.5	10.8
	More than 19	37.8	41.7	42.1	8.3
Managerial level	None, junior and middle	83.9	81.7	82.6	90.6
	senior	16.1	18.3	17.4	9.4
Industry	Samples 1, 2 and 3: Public administration = 100%				
	Sample 4: Agriculture, forestry, fishing, and hunting = 0.5; Mining, quarrying, and oil and gas extraction = 0.3; Construction = 4.3; Manufacturing = 5.5; Wholesale and retail trade = 7.3; Transportation and utilities = 2.8; Information = 6.0; Financial activities = 9.8; Professional and business services = 9.0; Education and health services = 28.1; Leisure and hospitality = 4.5; Public administration = 10.5; Other services = 11.5				

TABLE A4 Correlation matrix for first-order constructs (Sample 4, $n = 400$).

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Techno-mastery (CR = 0.855/α = 0.873)	0.798												
2. Techno-autonomy (CR = 0.823/α = 0.839)	0.519***	0.760											
3. Techno-relatedness (CR = 0.859/α = 0.868)	0.390***	0.451***	0.792										
4. Techno-enrichment (CR = 0.811/α = 0.829)	0.557***	0.512***	0.395***	0.744									
5. Techno-overload (CR = 0.806/α = 0.807)	−0.108*	0.001	−0.022	−0.035	0.758								
6. Techno-invasion (CR = 0.824/α = 0.815)	−0.158***	−0.075	−0.049	−0.095	0.412***	0.745							
7. Techno-complexity (CR = 0.802/α = 0.797)	−0.172***	−0.212***	−0.136**	−0.083	0.205***	0.318***	0.722						
8. Techno-insecurity (CR = 0.846/α = 0.838)	−0.014	0.025	−0.015	0.020	0.336***	0.352***	0.422***	0.759					
9. Techno-uncertainty (CR = 0.843/α = 0.842)	0.209***	0.254***	0.276***	0.249***	0.181***	0.089	0.075	0.275***	0.784				
10. IT strain (CR = 0.925/α = 0.927)	−0.266***	−0.224***	−0.140**	−0.208***	0.398***	0.378***	0.346***	0.321***	0.020	0.895			
11. User satisfaction (CR = 0.914/α = 0.925)	0.505***	0.384***	0.318***	0.401***	−0.150**	−0.167***	−0.205***	−0.153**	0.134**	−0.335***	0.869		
12. IT innovativeness (CR = 0.852/α = 0.852)	0.328***	0.318***	0.266***	0.323***	0.000	−0.042	−0.320***	0.040	0.239***	−0.230***	0.261***	0.811	
13. IT self-efficacy (CR = 0.865/α = 0.862)	0.093	0.061	0.141**	0.029	−0.079	−0.121*	−0.037	−0.058	−0.004	−0.163***	0.052	0.087	0.827

Note: The diagonal shows the square root of the average variance extracted.