

The Mediating Roles of Strain Facets and Coping Strategies in Translating Techno-Stressors into Adverse Job Outcomes

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Abstract

The aim of this study is to explain how techno-stressors, such as techno-invasion and techno-overload, translate through strain facets and coping strategy choices into negative workplace outcomes, such as work exhaustion. Understanding these mediating mechanisms is important since it allows the development of interventions targeting such translational factors and possibly alleviating the negative outcomes of inevitable techno-stressors in the workplace. To this end, we develop a stress dynamics and coping model based on Lazarus' work and test it with structural equation modeling techniques applied to survey data from a sample of 242 employees of a large organization in the United States. The findings lend support to the application of the stress dynamics and coping theory to the case of techno-stress. The findings specifically reveal that techno-invasion and techno-overload drive respectively the strain facets of work-family conflict and distress, and that people respond to these strain facets with a mix of adaptive and maladaptive coping strategies, but mostly with maladaptive ones. The findings further reveal that adaptive coping strategies reduce work exhaustion, and maladaptive ones increase it. Hence, one's choice of coping strategies is a possibly modifiable target that influences and conceivably controls the translations of techno-stressors into adverse job outcomes.

Highlights

- Coping strategies can reduce adverse job outcomes related to techno-stressors.
- Techno-invasion and techno-overload predicted work-family conflict and distress.
- These strain facets drove both adaptive and maladaptive coping strategies.

- Adaptive ones reduced work exhaustion and maladaptive ones increased it.
- This study provides a clear classification of IT-related coping strategies.

Keywords: Technostress, Coping, Stress, Information systems, Work-family conflict, Work exhaustion.

1. Introduction

Technostress is “a modern disease of adaption caused by an inability to cope with the new computer technologies in a healthy manner” (Brod, 1984). It captures a psychological state of stress associated with information technology (IT) use or IT use demands (Maier, Laumer, Weinert, & Weitzel, 2015). This psychological state is accompanied by physical and biological manifestations (Riedl, 2013), including increased arousal in employees who use computers for work (Arnetz & Wiholm, 1997). It emerged as an important research topic in recent years, given its common adverse consequences for employees, their families and firms (D’Arcy, Gupta, Tarafdar, & Turel, 2014; Tarafdar, Gupta, & Turel, 2013).

Technostress is formed, in part, through the presence and intensity of technostress creators (or techno-stressors), which exist to some extent in any workplace that uses computers (Srivastava, Chandra, & Shirish, 2015). For instance, the invasive nature of some technologies can lead employees to sense techno-invasion (a sense of technology intrusiveness, which blurs desired boundaries between work and other life domains). Similarly, some employees may sense that work overwhelms them given the efficiency through which work demands are communicated via modern technologies such as smartphones; this techno-stressor is known as techno-overload. It is important to study such techno-stressors because they can create a general sense of perturbation or distress and indirectly have adverse outcomes for individuals and firms. For instance, they can indirectly

lead to higher work pressures, perceptions of work overload, information fatigue, frustration, demoralization, loss of motivation, job burnout, poor job performance, intentions to quit a job and dissatisfaction at work (Tarafdar, D'Arcy, Turel, & Gupta, 2015; Tarafdar, Gupta, & Turel, 2015; Tarafdar, Pullins, & Raghu-Nathan, 2014; Tarafdar, Pullins, & Ragu-Nathan, 2015; Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007). It is specifically important to study the mechanisms through which techno-stressors lead to adverse job outcomes, since future research can devise ways (i.e., interventions) to alter these factors and mechanisms and reduce the harms of techno-stressors in the workplace.

One way through which the translation of techno-stressors into negative job outcomes can be prevented, is to theorize on, understand and target factors and mechanisms which buffer this processes (i.e., mediate; serve as "gate keepers" that block some effects). The literature has provided ample support for the idea that the translation of stressors into workplace outcomes is not necessarily direct (Beehr, 2001). There are likely mediation processes, including the development and sense of strain outcomes (i.e., various facets that represent different aspects of perceived psychological suffering), that are followed by attempts to cope with the strain. In response to sensing strain, people typically engage in select coping approaches that can facilitate or can block (mediate) this translation of stressors and strain into adverse outcomes (Beaudry & Pinsonneault, 2005; Lazarus & Folkman, 1984). For instance, by suppressing the thoughts about a stressful situation, a person may avert, at least temporarily, the formation of negative attitudes toward the workplace. This process model is delineated in Lazarus' stress dynamics and coping theory (Lazarus, 1993a, 1993b; Lazarus & Folkman, 1984). This theory suggests that stressors translate into strain outcomes that can then be blocked by stress coping strategies before they result in negative job outcomes.

This study seeks to examine such a stress dynamics and coping model in the context of techno-stress, as a way to point to possible interventions that can potentially impede the

translation of techno-stressors into adverse workplace outcomes. Hence, the research question we address is:

RQ: *Do information strain facets and coping strategies mediate the influence of techno-stressors on adverse work outcomes?*

Relying on Lazarus' stress dynamics and coping theory (Lazarus, 1993a, 1993b; Lazarus & Folkman, 1984) we first suggest that specific techno-stressors, techno-invasion and techno-overload, produce different and specific strain outcomes, namely work-family conflict and perceived distress on the job, respectively. We posit that people partially associate these strain facets with their use of work IT and naturally cope with them by using both adaptive and maladaptive IT-specific coping strategies (i.e., coping strategies focused on dealing with the technology and its use as a stressor). Lastly, we argue that while adaptive strategies manage to reduce work exhaustion and in essence "block" the translation of techno-stressors into adverse work outcomes, maladaptive ones increase work exhaustion and essentially allow the translation of techno-stressors into negative outcomes.

Ultimately, this study extends research on techno-stressors and their outcomes, by theorizing on and testing a model that captures key mediating factors and mechanisms between the sense of techno-stressors and negative job outcomes. The findings allow for a better understanding of this translation processes and set the ground for future examination of interventions that may partially prevent or at least reduce negative work outcomes, especially in situations where techno-stressors exist in the workplace and cannot be modified.

2. Theoretical Background and Hypotheses

2.1 Theoretical framework

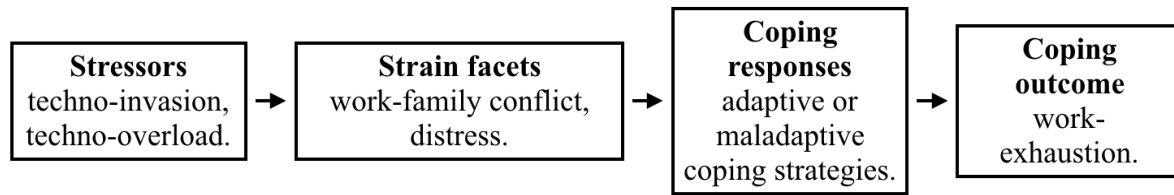
In this study, we follow the general coping theory (Lazarus, 1996; Lazarus & Folkman, 1984). This framework holds that individuals follow two different and parallel paths to

determine whether a particular condition or situation is perceived as stressful or not. The first one, primary appraisal, includes an evaluation of the situation's relevance as well as the level of threat. In this path, situations (e.g., being bombarded by emails) may be judged as not important or not bothering at all on one extreme, and on the other, as extremely harmful and threatening. In the second path (secondary appraisals), in contrast, the person evaluates his or her capacity to control and deal with the potentially stressful situation. Both of these processes often operate in synchrony (Lazarus & Folkman, 1984). According to Lazarus' stress dynamics model, the strain that people feel is assessed in these appraisal phases in response to the observation or perception of stressors in the environment (Lazarus, 1993a, 1993b; Lazarus, 1996). As such, strain facets mediate the effect of stressors on coping strategy selection. For instance, when a dog barks at a person (a stressor) he or she will develop strain facets (e.g., a sense of distress, conflict with the need to do something else). He or she will then consider how to cope with the situation in order to alleviate stress and its effects (e.g., run away, calm down the dog, or simply ignore the dog). Some of these coping strategies are more efficacious than others (hence the distinction between adaptive and maladaptive strategies) and can have different effects of outcomes such as being attacked by the dog or reducing the threat.

We specifically follow this logic and suggest that employees who perceive particular techno-stressors (techno-invasion and techno-overload) will develop strain facets that are relevant to these stressors: work-family conflict in the case of techno-invasion and distress on the job in the case of techno-overload. We assume specific strain facets as outcomes, since techno-invasion targets primarily home or out-of-the-office life, whereas techno-overload targets the job domain. Hence, the strain facets match the techno-stressors in terms of the life domain they presumably influence the most. The model then posits that the strain facets people feel drive coping responses, some of which are adaptive (i.e., problem focused, for

example trying to control the situation by learning to work with new IT) and others are maladaptive (i.e., dysfunctional, for example denial or giving up). Lastly, the model suggests that adaptive strategies are efficacious in reducing and blocking the translation of technostressors into negative job outcomes and maladaptive ones are not. See figure 1.

Figure 1. Overarching research framework



2.2. Effects of techno-stressors on work-family conflict and distress on the job

Techno-stressors are conditions experienced within the extended organizational environment and create dynamics that can foster strain (Cartwright and Cooper, 1997). The literature has pointed to five key techno-stressors in organizations, namely techno-overload, techno-invasion, techno-insecurity, techno-uncertainty, and techno-complexity (Tarafdar, et al., 2007). For this study, we decided to focus on two of these techno-stressors (i.e., techno-overload and techno-invasion) for two prime reasons. First, they specifically align with the job- versus home-related strain facets we focus on. Second, we considered them to be most relevant for our sample (government organization administrators), which includes employees with job security and fairly stable IT environments (i.e., we expected negligible variation in techno-insecurity, techno-uncertainty, and techno-complexity).

Techno-overload is a sense that the use of technologies forces people to work more and faster because of the high amount of work requests mediated by these technologies; it focuses on the work environment. Techno-invasion, in contrast, captures perceptions regarding being ‘always exposed’ so that people can be reached anywhere and anytime and feel the need to be constantly connected; it focuses on spillover of work technologies to the family environment (Turel, Serenko, & Bontis, 2011). In essence, with modern technologies, the regular workday is often extended in a way that office work is done at all times and is almost impossible to ‘break away’ from it (Tarafdar, D’Arcy, et al., 2015). Both of these factors seem to be relevant in our sample. Given government pressures for increased efficiencies, employees in

this organization tend to take work home, connect to work applications remotely, work on weekends, and are exposed to increasing job demands mediated by technologies.

Stressors related to the family/home life domain as afforded by technologies are expected to result in distress primarily in the same domain. Hence, one key outcome of technology invasion is arguably work-family conflict, since the intrusiveness of new technologies can create irreconcilable differences between what a person is expected to do during ‘family time’ and the job demands as mediated through technology (e.g., via mobile email). Work family conflict is an inter-role conflict in which demands from family and work are conflicting (Kahn et al., 1964). Work technology (e.g., remote access to work apps) can play a key role in work-family conflict; it can produce technology-family conflict and ultimately work-family conflict (Turel, Serenko and Bontis, 2011). Consistent with this view, we expect that when work technology heavily penetrates the home boundaries (i.e., techno-invasion is high) people will develop higher work-family conflict since they will have less time and devote less attention to their family-domain duties. It is a zero-sum game, after all; after-work time devoted to work via work technologies cannot be applied to family or home duties. Hence, we hypothesize:

H1: Techno-invasion levels are positively associated with work-family conflict.

Stressors related to the work domain, as afforded by technologies, are expected to result in distress primarily in the same domain. It is therefore reasonable to expect that one key outcome of technology overload is distress on the job. Employees feel distressed when their perceived job demands threaten to exceed their capabilities and resources required for meeting these demands (McGrath, 1976). In such situations, they feel unable to respond adequately to job demands and this often comes with anticipation of negative consequences (e.g., demotion, frowning) (Shaw & BarrettPower, 1997). As such, job distress is a specific

strain experience that stems from exposure to stressors in the work environment (Cooper, Dewe, & O'Driscoll, 2001).

Technology-overload is argued to be a key techno-stressor that drives distress on the job. Techno-overload implies that employees have to take on additional assignments, prioritize them, multitask, and deal with technology-mediated task interruptions. Hence, it represents a job-related stressor that can drive job-related strain facets such as distress on the job. Indeed, similar associations have been documented in prior research. For instance, technology overload can increase role stress (Tarafdar, et al., 2014; Tarafdar, et al., 2007) and reduce job satisfaction (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008). Therefore, we hypothesize that:

H2: Techno-overload levels are positively associated with job distress.

2.3. Effects of strain facets on adaptive and maladaptive coping strategies

When people feel unpleasant strain facets, they try, consciously or subconsciously, to cope with them and ultimately alleviate them and their adverse consequences through select actions (Lazarus & Folkman, 1984). People can apply many possible actions (coping behaviors). These can be classified into two key groups based on their efficacy in and focus on solving the underlying stressing issues. The first group includes problem focused and functional (i.e., adaptive) coping strategies. The second one includes strategies that focus on inaction, disengagement and denial, which tend to be dysfunctional (i.e., maladaptive) in the sense that they do not actually solve one's problems (Carver, Scheier, & Weintraub, 1989). Problem-focused coping encapsulates efforts to improve the distressed person-environment relationship by modifying elements in the environment that can solve the root causes of distress. for instance, confronting a situation or a person that causes the distress is considered to be an adaptive (functional) coping strategy. In the context of techno-stressors, adaptive

strategies include active coping (dealing directly with the problem, e.g., by learning how to control the use of a technology at home), asking for technical support, and planning. In contrast, dysfunctional (maladaptive) coping strategies emphasize ignoring (disengagement and denial) the stressors. Such approaches do not actually alter the threatening or damaging conditions, but just make the person feel better, at least temporarily (Monat & Lazarus, 1991). In the context of techno-stressors, such maladaptive strategies may include, for instance, the suppression of thoughts regarding one's inability to learn to work with new work technologies.

Although problem-focused coping tends to predominate when people feel that something constructive can be done, and dysfunctional coping tends to be more predominant when people feel that stressors must be endured, most stressors elicit both types of coping and there seems to be no coping style that is more prevalent across all situations (Susan Folkman & Lazarus, 1980; S. Folkman & Moskowitz, 2004). Both types of coping strategies are often simultaneously applied and the emphasis people put on each of these strategies (i.e., the mix of coping approaches they chose to apply) is often defined by contextual factors and by the magnitudes of strain facets they experience (Roth & Cohen, 1986). Thus, it is reasonable to expect that people who face strain facets associated with technology use for work will exhibit a mix of adaptive and maladaptive coping strategies.

Consistent with Roth and Cohen (1986), we suggest that people will have stronger motivation to engage in coping strategies (adaptive or maladaptive). Hence, the endorsement in coping strategies should be determined, at least in part, by the magnitude of strain facets they feel. When the strain is high, we expect people to engage in stronger (adaptive and/or maladaptive) coping strategies. This is reasonable to expect since the response people employ is a function of the 'pain' they try to alleviate or avoid (Monat & Lazarus, 1991). We therefore hypothesize that:

H3a and H3b: Work-family conflict is positively associated with (a) adaptive and (b) maladaptive coping strategies.

H4 and H4b: Perceived distress on the job is positively associated with (a) adaptive and (b) maladaptive coping strategies.

2.4. Effects of coping strategies on work exhaustion

Work exhaustion is a key facet of employee burnout, and is defined as the “depletion of mental resources” experienced by employees (Schaufeli, Leiter, Maslach, & Jackson, 1996). It is an important job outcome because it adversely influences many aspects of employee work, including productivity, morale, intentions to leave the job, reduced job satisfaction and reduced organizational commitment (Nahrgang, Morgeson, & Hofmann, 2011; Swider & Zimmerman, 2010). In the information systems research field, it has been demonstrated that techno-stressors increase job burnout and its work exhaustion facet presumably because they create a sense of stress and a need to cope with the stressors, which depletes employees' resources and makes them feel burned-out (Ragu-Nathan, et al., 2008). In this study, we posit that this effect is not direct and may be mediated by the strain employees feel and their coping strategies; a view which is consistent with Lazarus' stress dynamics and coping theories (Lazarus, 1993a, 1993b; Lazarus & Folkman, 1984).

We specifically suggest that the coping strategies employees engage in determine, at least in part, the work exhaustion they feel. Because problem-focused coping is efficacious at changing stressful situations (Lazarus, 1966; Lazarus and Folkman, 1984; D'Arcy et al., 2014), it is likely that engagement in such strategies will refurbish employees' mental resources and consequently result in diminished work exhaustion. In contrast, disengaging and ignoring stressors requires mental effort, which may further deplete employees' mental resources and consequently can be detrimental to one's performance and wellbeing (Carver,

et al., 1989; Lazarus & Folkman, 1984). Hence, maladaptive coping tends to be dysfunctional and can create a snowball effect that may results in greater work exhaustion; people will feel that their resources are further limited since they now utilize them to suppress thoughts and emotions related to coping with the stressors, in addition to having to deal with their diminished job performance and wellbeing. Hence, we hypothesize that:

H5: Adaptive (problem-focused) coping strategies related to work technologies are negatively associated with work exhaustion levels.

H6: Maladaptive (dysfunctional) coping strategies related to work technologies are positively associated with work exhaustion levels.

Consistent with Lazarus' stress dynamics and coping theory (Lazarus, 1993a, 1993b; Lazarus & Folkman, 1984) as portrayed in figure 1, its application to techno-stress as described in the above paragraphs, and synthesizing H1-H6, we hypothesize the following:

H7: The effects of techno-stressors on work exhaustion are mediated through strain facets and coping strategies.

3. Methodology

3.1 Data collection

Data were collected at a large government-related organization in the United States of America. Participants were full-time employees in all roles (administration, finance, professional trades, IT, etc.) who use IT for their job. They received an invitation via e-mail from the Chief Information Officer (using work e-mail distribution lists) to voluntarily participate in this study and complete an online survey. Individuals were asked to click on a link, sign the consent form, and then complete the online survey. No compensation was provided for completing the surveys. We sent 1,512 invitations; 242 were returned, representing a response rate of around 16%. The sample included 28.1% males and 71.9%

females with a modal age bracket of 45-54 years old (from 18-24 years old to 65-74 years old). The modal bracket of IT use for work was 7-8 hours a day, ranging from less than 1 hour of IT use for work to more than 8 hours of IT use for work.

Questionnaire items were adapted to the context of IS use on the job from presumably valid and reliable scales. Given the different job roles that were surveyed and the different IT they use, items pertained to the general use of information technologies for work and not to the use of a specific technology. Techno-invasion and techno-overload were captured with items from Ragu-Nathan, et al. (2008). Work-family conflict was captured with items from Adams, King, and King (1996). Job distress was adapted from the perceived stress scale (Cohen, Kamarck, & Mermelstein, 1983). Coping strategies were adapted from Carver, et al. (1989). Lastly, work exhaustion was adapted from the Maslach Burnout Inventory-General Survey (MBI-GS, see Schaufeli, et al., 1996). The survey also captured key control variables: age, gender, and daily hours of work. The items are outlined in Appendix A.

3.2 Reliability and validity analysis

Correlations among constructs (see Table 1), descriptive statistics, reliability scores (coefficients alpha) and Average Variance Extracted values for each construct (see square root of AVE on the diagonal of Table 1) were calculated. All coefficients alpha were higher than the recommended value of 0.7, which indicated reasonable reliability. In addition, all square roots of the AVE values were above 0.7 and higher than the corresponding correlations with all other constructs. These results support acceptable convergent and discriminant validity of the constructs.

We also checked for possible common method bias influences. Harman's single factor test indicated that multiple factors exist in the data with the first component explaining only 36% of the variance in the data. In addition, including a common-method latent factor

(Podsakoff, MacKenzie, & Podsakoff, 2012) only marginally changed the loadings (less than 0.14 difference; below the recommended cut-off of 0.2). Hence, it was concluded that common method variance is not a major issue in these data. Lastly, skewness (0.05-0.54) and kurtosis (-0.11--0.87) values were low, indicating reasonable normality.

Table 1. Correlation matrix, Descriptive Statistics, Cronbach α and AVE

	Mean (Std. Dev.)	Cronbach α	Techno- invasion	Techno- overload	Work- family conflict	Job Distress	Adaptive coping strategies	Maladaptive coping strategies	Work exhaustion
Techno-invasion	4.10 (1.80)	0.89	0,78						
Techno-overload	4.52 (1.51)	0.91	0,54**	0,82					
Work-family conflict	3.42 (1.64)	0.97	0,66**	0,51**	0,91				
Job Distress	3.41 (1.14)	0.84	0,30**	0,51**	0,42**	0,73			
Adaptive coping strategies	2.74 (1.28)	0.84	0,17**	0,35**	0,18**	0,23**	0,78		
Maladaptive coping strategies	2.61 (1.09)	0.84	0,17**	0,35**	0,17**	0,26**	0,52**	0,83	
Work exhaustion	3.94 (1.68)	0.93	0,35**	0,50**	0,53**	0,58**	0,25**	0,27**	0,84

** = p-value < 0.01 (two-tail).

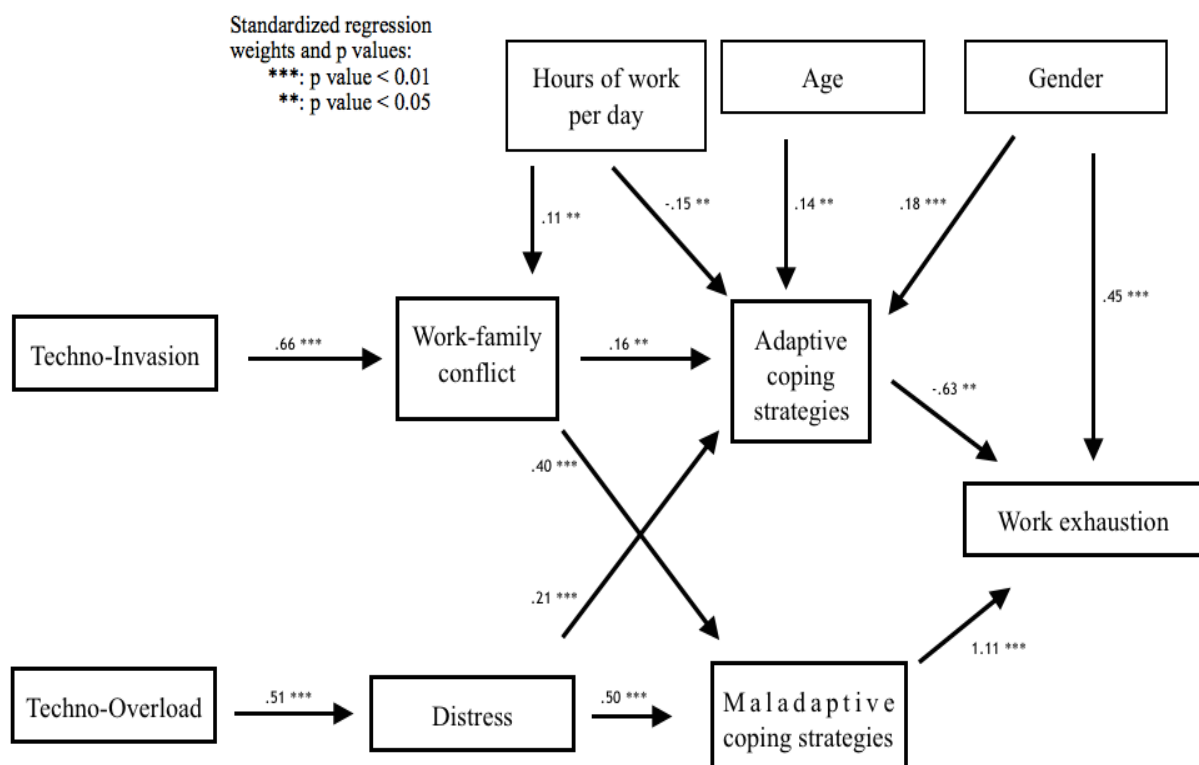
Square root of AVE values bolded on the diagonal.

4. Results

As per the two-step approach for model estimation (Anderson & Gerbing, 1988), the first step included fitting a confirmatory factor analysis (CFA) model to the data. AMOS 23 with Maximum Likelihood estimates was used for this. The model had acceptable fit indices [$\chi^2(175) = 313.5$; $\chi^2/\text{df} = 1.79$; CFI = 0.96; IFI = 0.96; GFI = 0.89; RMSEA = 0.057; and SRMR = 0.078]. All loadings were above 0.74 and significant ($P < 0.001$). Consequently, as the second step, a structural model that included hours of work per day, age, and gender (0: male; 1: female) as control variables was estimated. The structural model presented good fit [$\chi^2(222) = 397.67$; $\chi^2/\text{df} = 1.79$; CFI = 0.95; IFI = 0.95; GFI = 0.89 RMSEA = 0.057; SRMR = 0.072]; the significance of the path coefficients provided support to hypotheses 1-6 and

initial support for H7. Furthermore, gender was positively related (0.45) to work exhaustion and adaptive coping strategies (0.18), implying that women felt stronger work exhaustion and engaged in more adaptive coping strategies compared with men. In addition, older employees engaged in more adaptive coping strategies (0.14) compared with younger ones. Lastly, hours of work per day increased the work-family conflict employees perceived (0.11), and reduced engagement in adaptive coping strategies (-0.15). In order to alleviate concerns regarding distributional assumption, the model was also estimated with bootstrapping techniques with 200 re-samples; this approach imposes no distributional assumptions (Cheung & Lau, 2008). The results remained the same.

Figure 2. Structural Model



H7 suggests, consistent with Lazarus' stress dynamics and coping theory, that the effects of techno-invasion and techno-overload on work exhaustion is mediated by strain facets and coping strategies. To test the significance of the mediated paths, we examined the bias-

corrected indirect path coefficients as produced with a bootstrapping procedure with 200 subsamples using AMOS 23. The findings suggest that the indirect effects of the examined techno-stressors on work exhaustion are significant (95% confidence intervals of 0.154-0.338, $p < 0.004$ for techno-overload indirect effect and 0.128-0.356, $p < 0.012$ for techno-invasion indirect effect). Hence, our findings support H7 and the proposed mediational process in the context of technology and technology stressors.

4.1 Post-hoc analyses

We sought to examine post-hoc the relative strength of work-family conflict and distress on the job effects on adaptive and maladaptive coping strategies; and the relative strength of adaptive and maladaptive coping strategy effects on work exhaustion. To do so, we first constrained the work-family conflict effects (on adaptive and maladaptive coping strategies) to be equal. The Chi-Square difference between the constrained and unconstrained model was not significant ($p = 0.43$). Hence, adding the equality constraint did not significantly worsen the model fit; this indicates that the examined effects do not statistically differ. Next, we constrained distress on the job effects on adaptive and maladaptive strategies to be equal. The chi-square difference test was not significant ($p = 0.27$), indicating similar effects of distress on adaptive and maladaptive coping strategies. Lastly, the effect of adaptive coping strategies on work exhaustion was constrained to be equal to the negative of the effect of maladaptive coping strategies on work exhaustion. The chi-square difference test was significant ($p = 0.001$), indicating that maladaptive strategies exert stronger positive (promotion) effect on work exhaustion, compared with the negative (prevention) effect of adaptive coping strategies. Thus, while both families of strategies influence work exhaustion, maladaptive strategies have significantly stronger influence on this aversive outcome. This is consistent

with prospect theory (Tversky & Kahneman, 1992) according to which negative phenomena tend to be more influential than positive ones.

5. Discussion

This study sought to examine possible mediating processes that translate techno-stressors into adverse work outcome. It specifically examined how different coping strategies targeted at work technology stressors influence one's work exhaustion levels by mediating the influence of techno-stressors and strain facets on negative work outcomes. Techno-stressors are inevitable in many work environments; for instance, the stream of work demands transmitted via technology (e.g., emails, application notifications) during and after working hours is unlikely to diminish for many employees in the near future (Turel & Serenko, 2010). Thus, focusing on possibly controllable mediating variables (i.e., coping strategies) that can prevent or weaken the translation of techno-stressors into adverse work outcomes is important; it can lead to efficacious interventions in the future. Structural equation modeling results lend support to the application of Lazarus' overarching theory of stress dynamics and coping to the technostress context. This model suggests and demonstrates that techno-invasion and techno-overload are techno-stressors that drive strain facets, including work-family conflict and distress; and that these strain facets determine, in part, one's choice of adaptive and maladaptive coping strategies. These coping strategies, in turn, serve as gatekeepers and help translating techno-stressors and strain facets into adverse job outcomes. The results shed more light on the processes that drive the negative effects of techno-stressors; they point to possible ways to control, by either individuals or firms, the translation of largely inevitable techno-stressors into negative job outcomes.

5.1 Contribution of the present study and future research

Technostress is an important organizational phenomenon with immense consequences for individuals and organizations. As such, its antecedents and consequences have been explored in recent years (D'Arcy, et al., 2014). Our work extends the current body of work in at least three ways. First, while prior research shows that techno-stressors drive adverse job outcomes (Ragu-Nathan, et al., 2008), we suggest that as per Lazarus' stress dynamics and coping theories (Lazarus, 1993a, 1993b; Lazarus & Folkman, 1984) this effect is actually a black-box that should be opened; it is mediated through various relevant strain facets and coping strategy choices. This extension, which we validate in this study, adheres to recent calls to further study how organizations and individuals can prevent or alleviate the adverse outcomes of techno-stressor (Tarafdar, et al., 2013; Tarafdar, Gupta, et al., 2015; Tarafdar, Pullins, et al., 2015). Identifying the abovementioned mediation variables (strain facets and coping strategies) is a first step before the design of intervention studies that can target such mediators.

Second, the extant body of research points to a limited set of techno-stress inhibitors. The focus has been primarily on organizational mechanisms and company rules, including the provision of technical and innovation support (e.g., through help desk services) and the facilitation of IS literacy and involvement (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2011). Several psychological factors such as locus of control, social interaction anxiety, materialism and need for touch (Lee, Chang, Lin, & Cheng, 2014) as well as personality traits (Srivastava, et al., 2015) have also been proposed to serve as techno-stress inhibitors. This study extends the known list of techno-stress inhibitors to include adaptive coping strategies. Such strategies, as per our model and consistent with Lazarus' stress dynamics and coping theories (Lazarus, 1993a, 1993b; Lazarus & Folkman, 1984), "buffer" the translation of techno-stressors into adverse outcomes.

Lastly, this work contributes to theory by conceptualizing and measuring different groups of coping strategies that can exert unique influences on the job outcomes of techno-stress. Our findings show that people engage in both types of strategies. Nevertheless, the adaptive strategies reduce work exhaustion while the maladaptive ones require additional mental resources and increase work exhaustion. Since one family of strategies (adaptive) "buffers" the translation of techno-stressors into work exhaustion and the other (maladaptive) drives it, the choice of strategies is important. These insights can serve as a springboard for intervention studies (e.g., training people to focus on adaptive coping strategies) as a means to examine whether the negative outcomes of techno-stressors can be diminished.

5.2 Practical implications

Several implications are noteworthy. First, employers may control possible negative job outcomes by making better choices regarding the coping strategies they chose to employ. Employers may help employees make these choices. Our findings show that maladaptive strategies have a stronger influence on work exhaustion compared with this of adaptive strategies. Hence, the focus of employers and employees would be first to eliminate maladaptive coping strategies and then to increase the use of adaptive ones. This can be achieved with training modules that explain techno-stressors, common coping strategies, and which ones work and which one's do not. Increasing employee awareness to the need to make advantageous coping choices is also desirable and can be achieved through training, peer pressure and reward mechanisms. For example, employers may reward adaptive strategies (e.g., learning to use a new system and teaching others how to use it). There is some evidence that such coping behaviors are trainable (Bala & Venkatesh, 2016). Hence, it is important for organizations to work on both employees' and managers' training to improve skills needed for reducing maladaptive coping strategies and ultimately negative job outcomes (e.g., work exhaustion). In addition, organizations can improve employees' knowledge regarding

information systems, hence making adaptive strategies more feasible, by providing technical support.

Second, our findings suggest that another way to reduce work exhaustion is by reducing the techno-stressors in one's environment. This can be done in many ways. For example, banning emails after working hours or paying people for after-hour work can be a viable means for reducing techno-invasion; creating a culture of copying only relevant employees on emails and automating processes such that fewer humans are involved may reduce techno-overload.

5.3 Limitations

Several limitations should be acknowledged. First, the study was conducted in a single professional context and focused on a limited set of predictors and mediator variables. Future research can replicate this study in different settings in order to increase its generalizability. Similarly, such studies can extend our model to include a broader set of predictors and mediators. For instance, only two techno-stressors were relevant in our context, but in other contexts a broader set of techno-stressors may be relevant and should be examined. Second, self-reported measures were used. While these often capture stress aspects correctly, they can be corroborated with bio-physiological measures of stress (Tams, Hill, de Guinea, Thatcher, & Grover, 2014) and qualitative data (i.e. observational and auto-observational data). Lastly, our study implies the existence of a process, though this cannot be fully supported with a cross-sectional design. Future research can employ longitudinal designs in order to better establish causality.

6. Conclusion

The main finding of this study is that the stress dynamic and coping model applies to the techno-stress context. Hence, the effects of techno-stressors on adverse job outcomes are mediated through strain facets and coping strategies. The findings imply that it is important to take into consideration the interplay of stressors, strain, and coping strategies among employees. Organizations and employees can intervene upon these factors. We call for future research to focus on the stress dynamics process and examine interventions that can reduce stressors in the work environment as well as buffer their effects on negative job outcomes.

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Appendix A

Scale items

Techno-invasion:

- I spend less time with my family due to this technology.
- I have to be in touch with my work even during my vacation due to this technology.
- I have to sacrifice my vacation and weekend time to keep current on new technologies.
- I feel my personal life is being invaded by this technology.

Techno-overload:

- I am forced by this technology to work much faster.
- I am forced by this technology to do more work than I can handle.
- I am forced by this technology to work with very tight time schedules.
- I am forced to change my work habits to adapt to new technologies.
- I have a higher workload because of increased technology complexity.

Work-family conflict:

- The demands of my work interfere with my home and family life.
- The amount of time my job takes up makes it difficult to fulfill family responsibilities.
- Things I want to do at home do not get done because of the demands my job puts on me.
- My job produces strain that makes it difficult to fulfill family duties.
- Due to work-related duties, I have to make changes to my plans for family activities.

Distress on job:

- How often have you felt that you were unable to control the important things in your job role?
- How often have you felt UNconfident about your ability to handle your job demands?
- How often have you felt that things were not going your way at work?
- How often have you felt job related difficulties were piling up so high that you could not overcome them?

Work exhaustion:

- I feel emotionally drained from my work.
- I feel used up at the end of the work day.
- I feel fatigued when I get up in the morning and have to face another day on the job.

- I feel burned out from my work.
- Working all day is really a strain for me.

Adaptive coping strategies:

(1) Active coping

- I have been concentrating my efforts on doing something about the stressful technologies.
- I have been taking action to try to make the stressful technologies situation better.

(2) Use of instrumental support

- I have been getting help and instrumental support from other people regarding dealing with stressful technologies.
- I have been trying to get instrumental support or help from other people about what to do regarding stressful technologies.

(3) Planning

- I have been trying to come up with a strategy about what to do regarding stressful technologies.
- I have been thinking hard about what steps to take regarding stressful technologies.

Maladaptive coping strategies:

(1) Denial

- I have been refusing to believe that this technology mess has happened.

(2) Behavioral disengagement

- I have been giving up trying to deal with technology-related stress.
- I have been giving up the attempt to cope with technology-related stress.