

Extending research on Technostress: Exploring the Moderating Effects of Techno-savvy and the
Proactive Personality on the relationship between technostress and job satisfaction and stress

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Abstract

Technostress experienced by individuals at workplaces has increased in last ten years. Exploring technostress in depth is crucial. The present study extended technostress research by focusing on the moderating roles of techno-savvy and the proactive personality. Techno-savvy and the proactive personality were proposed to moderate the relationships between the five techno-dimensions (techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty) and job satisfaction. They were also proposed to moderate the relationships between the five techno-dimensions and job stress. An online survey was adopted to recruit participants. There were 140 participants agreed to participate the survey. However, there were 112 participants completed the online survey without missing any questions. The multiple moderation regression analysis was conducted. The result suggested that for individuals who were more techno-savvy, their job satisfaction was shown to be less affected by techno-overload and techno-insecurity than those who were less techno-savvy. The result also suggested that for those who were more techno-savvy, their job stress was shown to be more affected by techno-invasion than those who were less techno-savvy. The proposed moderating role of the proactive personality was not found in the study. The present study can be extended by exploring other techno-dimensions, such as techno-change, techno-addiction and techno-reliability.

Keywords: Technostress, Techno-overload, Techno-insecurity, Techno-invasion, Techno-complexity, Techno-uncertainty, Techno-savvy, Proactive personality trait, job satisfaction, and job stress

Overview

In the early 1980s, when personal computers become commercialised, the development of the information and communication technologies started to blossom and accelerated (Wright & Brown, 2004). Individuals benefit from the use of the information and communication technologies (Turney, 2008; Wright & Brown, 2004). Facilitated by the modern technologies, individuals' work and their life have become more convenient, efficient and flexible (Turney, 2008; Wright & Brown, 2004). However, the information and communication technologies may produce negative impacts on individuals (Tarafdar et al., 2007, 2008). The organisational behaviour research found that the information and communication technologies were related to job strain (Mawhinney, 2014), low job satisfaction, burnout, the decreased job performance and the increased job stress (Atanasoff & Venable, 2017; Tarafdar et al., 2007, 2008, 2011). Because the information and communication technologies can be detrimental to individuals' physical and psychological health (Mawhinney, 2014; Tarafdar et al., 2007, 2008, 2011; Weil & Rosen, 1997), research has emphasised the importance of the in-depth understanding of them (Ayyagari et al., 2011).

The information and communication technologies at workplaces may induce stress (Ayyagari et al., 2011; Tarafdar et al., 2007, 2008, 2011; Weil & Rosen, 1997). Stress research referred the information and communication technologies-induced stress as technostress. The concept of technostress was first identified by Craig Brod in 1984. Recently, stress research identified an increasing trend of technostress that individuals experienced at workplaces (Pusey, 2013; Ayyagari et al., 2011; Tarafdar et al., 2007). The overall level of technostress increased by 50% in 2009 and by 88-96% in 2013 (Pusey, 2013; Ayyagari et al., 2011; Tarafdar et al., 2007).

However, the level of technostress that an individual may experience varies (Ayyagari et al., 2011). Individuals are different in many ways. At workplaces, the individual differences in education (Agarwal & Prasad, 1999; Tarafdar et al., 2008), work experience, technological skills might affect the level of technostress one would experience. Personality is another factor that might relate to the different levels of technostress because various personalities imply different reactions and the coping strategies individuals might apply under the stressful condition (Bateman & Crant, 1993, 2000; Costa & Mcctae, 1992). The present study extended the research in individual differences by specifically detecting the moderating effects of Techno-savvy and the proactive personality on the relationship between technostress and job satisfaction, stress.

Literature Review

Technology

The word 'technology' is broadly recognised and commonly used by individuals (Turney, 2008; Wright & Brown, 2004). It may lead individuals to different thoughts and ideas (Turney, 2008; Wright & Brown, 2004). However, when used poorly, it may cause problems or even harms to individuals (Turney, 2008; Wright & Brown, 2004). Technology-induced stress is an example in that respect (Brod, 1984; Tarafdar et al., 2007, 2008; Weil & Rosen, 1997).

Technology can be described as the collection of techniques, skills, methods and process used in the production of goods or services or the accomplishment of objectives (Franklin, 1999; Mawhinney, 2014; Rip & Kemp, 1997). It is also described as the application of the scientific knowledge to serve individual needs and solve problems (Franklin, 1999; Mawhinney, 2014; Rip & Kemp, 1997). The term of information and communication technology is defined as an extension of information technology and the integration of telecommunications including telephone lines and wireless signals, computers and all necessary software, storage and audio-visual systems (Wright & Brown, 2004). The rapid growth and the use of information and communication technologies have become phenomenal. While enjoying all the benefits provided by the information and communication technologies, individuals face the challenges that posed by them as well (Turney, 2008; Wright & Brown, 2004). For instance, the amount of available information provided by the information and communication technologies is beyond the amount of information an individual can process (Gillings et al., 2016; Weil & Rosen, 1997). At workplaces, the lack of standardisation of information may pose the difficulty in extracting the needed information efficiently and accurately from the oceans of information (Weil & Rosen,

1997). The change and development of the information and communication technologies would continue and accelerate meaning that the related challenges and difficulties would continue (Kurzweil, 2001; Mawhinney, 2014; Moor, 1965). To better handle the challenges and difficulties, it is essential to understand the relevant theories and mechanisms derived from the information and communication technology research.

The definitions of technostress

Craig Brod (1984) defined technostress as “a disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner” (Brod, 1984, p.16). Brod’s definition viewed technostress as a response rather than a transactional process (Edwards et al., 1996). It indicated that any failure to adapt to the demands of the stressor would be followed by the detrimental effects (Atanasoff & Venable, 2017). Brod’s definition was criticised for not including individuals’ perceptions (Edwards et al., 1996). However, the criticism did not change the fact that Brod’s definition is the most used definition of technostress in technostress research (Ayyagari et al., 2011; Mawhinney, 2014; Tarafdar et al., 2007, 2008).

Weil and Rosen (1997) defined technostress as any negative impact on attitudes, thoughts, behaviours or psychology caused directly or indirectly by technologies. Their version was considered to be a better fit for the stress and strain study (Mawhinney, 2014). It covered a broader range of concepts to suit various research purposes (Mawhinney, 2014).

The latest definition described technostress as a collection of interrelated psychosocial constructs that negatively impact employees (Atanasoff & Venable, 2017; Ayyagari et al., 2011; Mawhinney, 2014). It also describes technostress as “any physical, behavioural, and

psychological strain in response to the information and communication technology-dependence, the increasing technological complexity and changes” (Atanasoff & Venable, 2017, p.327).

Technostress and job satisfaction

Previous Research identified the negative relationships between technostress and several job outcomes. Research revealed that individuals’ work performance, work commitment and job satisfaction might decline when they experience technostress at work (Ayyagari et al., 2011; Fuglseth & Sorebo, 2014; Khan et al., 2016; Ragu-Nathan et al., 2008, Tu et al., 2008). The present study focused on job satisfaction as one of the measured outcome variables. Locke and Dunnette (1976, p.1300) defined job satisfaction as “a pleasurable or positive emotional state resulting from the appraisal of one’s job or job experiences”. Employees with low job satisfaction can be costly to organisations (Locke & Dunnette, 1976). Therefore, the measure of this construct was often used in the organisational behaviour research. After all, job satisfaction is one of the desired outcomes that benefit organisations and individuals.

Techno-dimensions

In 2002, Ragu-Nathan, Ragu-Nathan and Tu designed a large-scale survey to examine technostress. They identified the five techno-dimensions which are techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty (Ragu-Nathan et al., 2002).

Techno-overload

Techno-overload is described as situations where individuals are expected to work more and faster, or even multitask to match the working demands when using technology at

workplaces (Tarafdar et al., 2011; Weil & Rosen, 1997). In a modernised working environment, work overload and information overload could be the contributors of techno-overload (Ayyagari et al., 2011). Work overload which was induced by using the information and communication technologies may become a source of techno-overload. For instance, the generic technology applications (e.g. Word, Excel spreadsheet, power-point) (Moor & Benbasat, 1991) may lead to the perceived expectation of working more or faster (Ayyagari et al., 2011; Kakabadse et al., 2000; Sami & Pangannaiah, 2006; Weil & Rosen, 1997). The gap between the perceived expectation of the working demands and the perceived ability of individuals would become a stressor (Ayyagari et al., 2011). The complexity and the rapid changes of the information and communication technologies require the increasing and continuous effort to deal with the knowledge barriers (Ayyagari et al., 2011; Moore & Benbasat, 1991). To deal with the knowledge barriers, individuals would perceive the pressure from the increased learning, training and practising demands on top of the usual workload (Ayyagari et al., 2011). Therefore, the additional workload might become a stressor to individuals (Ayyagari et al., 2011). The information and communication technologies (e.g., E-mails, instant text messages, voice messages, WeChat and Facebook) possess the features of availability and responsiveness (Ayyagari et al., 2011). When individuals find themselves become increasingly unable to disengage from the work demands due to the use of these technologies, they may be prone to the experience of technostress (Ayyagari et al., 2011; Kakabadse et al., 2000; Tu et al., 2005).

Information-overload could be another source contributing to techno-overload (Weil & Rosen, 1997). Nowadays, when using technologies, people are exposed in overloaded information that their brain cannot process efficiently and effectively, this may well result in information fatigue which is one symptom of technostress (Tarafdar et al., 2011).

Through techno-overload, individuals are prone to the increased work-related errors and the poor decision making (Weil & Rosen, 1997). Thus, they might present a poor job performance, in turn, receive the negative feedback from their superior (Weil & Rosen, 1997). As a result, individuals' job satisfaction would be affected (Weil & Rosen, 1997). Research findings supported the negative correlation between techno-overload and job satisfaction (Tarafdar et al., 2007, 2008; Weil & Rosen, 1997).

Techno-invasion

Techno-invasion describes the situations where technology creates the possibility of reaching individuals anywhere and anytime (Tarafdar et al., 2011; Weil & Rosen, 1997). Individuals perceive the pressure of remaining the constant connections (Tarafdar et al., 2011; Weil & Rosen, 1997). They may also perceive the invasion of their private life and the violation of their privacy (Tarafdar et al., 2011; Weil & Rosen, 1997). Over the time, when the work and life conflict become deepened, individuals internal suffering would be increased and accumulated (Ayyagari et al., 2011; Kakabadse et al., 2000; Tu et al., 2005; Weil & Rosen, 1997). The consequence of the long-term internal suffering would be detrimental to one's physical and psychological health (Mawhinney, 2014). Meanwhile, the stress individuals experienced over the period made them feel less control over the situations and less autonomy at workplaces (Tarafdar et al., 2011; Weil & Rosen, 1997). Thus, individuals become increasingly dissatisfied with their working conditions (Weil & Rosen, 1997). The negative correlation between techno-invasion and job satisfaction was also supported by the research findings (Tarafdar et al., 2007, 2008; Weil & Rosen, 1997).

Additionally, there are organisations adopted the monitoring system for the product quality control and the supervision purpose. However, it could be perceived as the violation of

ones' privacy (Ayyagari et al., 2011). Individuals could be stressed due to the perception of being monitored during work time (Ayyagari et al., 2011; Weil & Rosen, 1997).

Techno-complexity

Techno-complexity describes situations where the professionals have to spend more time and energy in learning and mastering the required knowledge and skills to deal with the technical issues (Tarafdar et al., 2011; Weil & Rosen, 2008). Individuals might be overwhelmed and stressed due to the gap between their perceived abilities and the perceived working demands (Ayyagari et al., 2011). Due to the rapid change and development, the complexity of the information and communication technologies would be continuously increased over the time (Ayyagari et al., 2011; Mawhinney, 2014). Individuals would experience exhaustion or burnout (Ayyagari et al., 2011) which might potentially damage their overall job performance and job satisfaction. However, the research findings did not consistently support the negative correlation between techno-complexity and job satisfaction (Tarafdar et al., 2007, 2008, 2011). Ayyagari et al. (2011) suggested that individuals who voluntarily confronted the technical problems may not negatively view the technology-related complexity. If individuals hold a positive attitude of the technological changes and challenges (Bateman & Crant, 1993, 2000), techno-complexity may not pose a threat to job satisfaction.

Techno-insecurity

Techno-insecurity describes situations, where the information and communication technologies become more advanced; individuals begin to believe that they do not have the adequate skills, knowledge or abilities to use them effectively (Ragu-Nathan et al., 2002). Research indicated that the rapid pace of change could be responsible for techno-insecurity (Ayyagari et al., 2011; Weiss & Heide, 1993; Mawhinney, 2014). The perception of the

inadequate knowledge and skills may develop a feeling of uneasiness (Ayyagari et al., 2011; Weil & Rosen, 1997). The uneasiness may lead to the perception of job insecurity (Ayyagari et al., 2011; Weil & Rosen, 1997). When individuals feel threatened by their colleagues who are believed to be more knowledgeable, skilful or experienced, they might experience the uneasiness and job insecurity (Weil & Rosen, 1997). Through techno-insecurity, individuals might feel their jobs are threatened due to the lack of control of what work-related technology imposes in their working environment (Chilton et al., 2005; Tarafdar et al., 2007). It can diminish the level of their job satisfaction (Chandra et al., 2015). The negative correlation between techno-insecurity and job satisfaction was supported by the research findings (Chandra et al., 2015; Tarafdar et al., 2007, 2008; Weil & Rosen, 1997).

Techno-uncertainty

Techno-uncertainty describes the situations where the constant changes and the rapid updates for devices are causing stress as individuals feel overwhelmed by the increased pace of change (Tarafdar et al., 2007, 2008). Indeed, research showed that the change of technology in work environment might lead to uncertainty in the management of work and the learning demands (Ayyagari et al., 2011). Individuals may also perceive the reduced ability to keep up or take control of the uncertain situation (Ayyagari et al., 2011). The gap between the perception of reduced ability and the perceived uncertainty in the working demands may lead to job uncertainty which could explain techno-uncertainty (Ayyagari et al., 2011). Another dimension may help understand the construct is the uncertainty that was induced by the unreliability feature of technology. Unreliability refers to the degree to which the features and capabilities of technologies become unpredictable and unreliable (e.g., computer system failure, computer programme/system broke-down, the bugs and errors in technological applications) (Ayyagari et

al., 2011). Uncertainty due to the technological unreliability may lead to frustration, panicking and irritation (Weil & Rosen, 1997). The third contributor of techno-uncertainty could be the interruptions which were enabled by the information and communication technology (Ayyagari et al., 2011).

The theoretical foundation

Stress can be viewed as a response, a stimulus or a transaction, depending on the purposes of stress study and which approach or model is adopted when studying the subject. As the negative psychological response to the use of the information and communication technology (Ayyagari et al., 2011; Weil & Rosen, 1997), technostress is unique but still falls within the scope of the overall stress (Mawhinney, 2014). It was suggested that the concept of technostress should be approached within the context and the environment (Cox and Griffiths, 1995). Since each stress model may serve different needs of stress study, an appropriate stress model should be adopted depending on the distinctive research purposes.

The person-environment fit model

The person-environment fit model holds a central position in stress research (Edwards et al., 2000). It is a preferred choice of studying organisational behaviours and wellbeing (Edwards, 1996). The core value of this approach emphasises that the individual-level outcomes such as attitudes, behaviours and emotions do not result from individuals or environments separately. They would result from the interactions between individuals and environments (Ayyagari et al., 2011; Cooper et al., 2001; Edwards, 1996; Edwards et al., 2000). There are two distinct versions of fit underlie this model (Ayyagari et al., 2011; Edwards et al., 2000). One version is known as the demand-ability fit which is referred as “the fit between the demands of the environment and

the abilities of the person” (Edwards et al., 2000, p.5). The concept of demand is understood as the demand of the quantitative and the qualitative job requirements, role expectations, and group and organisational norms (Edwards et al., 2000). Abilities are viewed as aptitudes, skill-training, time and energy an individual is required to meet the demands (Edwards et al., 2000). Edwards (1996) specified that an individual’s skill and knowledge might be enhanced or strengthened with use, but their mental and physical energy may decrease with use. Any lack of fit or gap (misfit) between the demands and the abilities will lead to dissatisfaction and result in a strain (Ayyagari et al., 2011; Cooper et al., 2001; Edwards, 1996). It is essential to understand the core mechanism of the demand-ability fit model. The demand-ability model is to measure the cognitive differences between the perceived environmental demands and the perceived individual ability to meet those demands (Edwards, 1996). The fundamental idea behind the core mechanism is that only demands that one perceives can induce stress (Edwards, 1996; French et al., 1982).

The other version of the person-environment fit model is the supplies-values fit model which is referred as the match between an individual’s values and the environmental supplies to fulfil those values (Edwards, 1996; Edwards et al., 2000). In this version, “values represent the conscious desires held by an individual” (Edwards, 1996, p.294). Supplies represent “the amount, frequency, and quality of environmental attributes that satisfy individual’s values” (Edwards, 1996, p.294). Any imbalance or misfit between the perceived level of supplies and individuals’ subjective fulfilment of their values may induce stress and result in a strain (Ayyagari et al., 2011; Cooper et al., 2001; Edwards, 1996).

The information and communication technologies in working environment can be viewed as tools or resources (Ayyagari et al., 2011; Edwards et al., 2000). Therefore, the person-

environment model with both versions is appropriate to explain the concept of technostress in various work environments (Ayyagari et al., 2011).

Technological features, individual differences and stressors

Ayyagari et al. (2011) identified the associations between the specific technology features and technostress. Their study answered the question which was neglected from previous technostress study (Ayyagari et al., 2011). Their investigation revealed that a particular set of technological features could induce technostress by producing several stressors in a working environment (Ayyagari et al., 2011). These features are usability, dynamic and intrusive features (Ayyagari et al., 2011). The stressors that were related to those features are work overload, information overload, work and life conflict, job insecurity, job uncertainty and task complexity (Ayyagari et al., 2011). The stressors just mentioned provided the stressful sources to the five techno-dimensions (Ayyagari et al., 2011). Through each of the five techno-dimensions, individuals would experience different levels of technostress (Ayyagari et al., 2011).

The technological features were not the only factors that can be manipulative to the experienced technostress. Ayyagari et al. (2011)'s study also indicated that the variation between individuals might affect stressors. Therefore, the variation among individuals could result in different levels of the perceived values of job outcomes (employees' job satisfaction and their overall job stress) (Ayyagari et al., 2011). For example, individuals who are different in skills and the knowledge sets would respond differently to a stressor and develop different coping strategies. Different personalities may also result in different reactions when facing stressful situations (Bateman & Crant, 2000). Therefore, everyone perceives and evaluates stressors differently. These differences may be reflected in the variation of their job outcomes and stress

levels. In respect of individual differences, Ayyagari et al. (2011)'s study made some relevant comments. However, it was not their intention and focus at the time.

The proposed moderators of techno-savvy and the proactive personality

Links between stress and individuals' physical and psychological health are well established over years' research (Cooper, 1998; Stansfeld et al., 1999; Semmer, 2003). However, researchers pointed out that, although stress is indeed one of the factors to people's physical and psychological problems, the correlations found in previous research were not particularly strong (the correlations were typically between 0.20 and 0.30) (Semmer et al., 1996). One of the explanations researchers had drawn from their extended study was that individuals' differences play an important explanatory role (Srivastava et al., 2015) regarding the relationship between stress and its outcome variables (Semmer, 2003). Thus, they should be taken into account when analysing the pathways between the main variables (Semmer, 2003; Spector, 2002). In stress research, associations between stress and the outcome variables do not hold for everyone in the same way (Semmer, 2003; Spector, 2002).

Techno-savvy

Techno-savvy could be defined as someone who is well informed or knowledgeable about modern technologies and technological matters, and also is proficient in the use of modern technologies (online Oxford Dictionary). The concept also implies that being a techno-savvy one should be able to adopt the new generation of technology sufficiently. The technological knowledge and information can be obtained through education (including training at work) and the relevant experience of using the modern technologies. Previous literature found education positively related to perceived ease of using the information and communication technologies

(Agarwal & Prasad, 1999). It is expected that being more educated, one should be less stressful and learn faster when learning or using the new information and communication technology in the working environment. More educated individuals were found to be less affected by technostress (Tarafdar et al., 2008). The current study proposed that individuals who are with high levels of techno-savviness, their perceived job satisfaction and job stress would be less affected by technostress, whereas, those who are less techno-savvy, technostress they experienced should have more influence over their perceived job satisfaction and job stress. Thus, techno-savvy was proposed as a moderator, and its interaction with each techno-dimension was further explored in this study.

Hypothesis 1:

Techno-savvy moderates the relationships between the five dimensions and job satisfaction.

Hypothesis 2:

Techno-savvy moderates the relationships between the five dimensions and job stress.

The proactive personality

The other studied individual difference was the proactive personality. It is referred to “individuals’ disposition towards engaging in active role orientations, such as initiating change and influencing their environment” (Hung et al., 2015, p.146). Individual’s behaviour can reflect their unique personality characteristics (Costa & McCrae, 1992). If the reflected characteristics are persistent in situations, they are viewed as personality traits (Hung et al., 2015). Thus, the proactive personality could also be referred as the trait that may positively impact on one’s work performance (Fugate et al., 2004; Hung et al., 2015). The study revealed that proactive people

tend to select, create and influence their environment, and make positive changes to their environment (Bateman & Crant, 1993, 2000). They confront situations, especially stressful situations, and challenge with positive attitudes (Bateman & Crant, 1993, 2000). A follow-up study indicated proactive people have strong determinations to produce and provide influence rather than being influenced (Onyemah, 2008). Based on the characteristics presented, proactive individuals were found positively correlated with career success, creativity, responsible attitudes, work performance, self-efficacy, and flexible role orientation (Fuller & Marler, 2009). Hung et al. (2015)'s study suggested that proactive traits play an influential role in stressful situations because the proactive individuals can adapt efficiently. Therefore, it is proposed that the proactive personality can be effective on the relationship between the experienced technostress at workplaces and individuals' job outcomes. For those who have the proactive personality, their job satisfaction and job stress might be less affected by technostress in the working environment. For those who are less proactive, their job satisfaction and job stress would be more affected by technostress they experience in the working environment.

Hypothesis 3:

Proactive personality moderates the relationships between the five dimensions and job satisfaction.

Hypothesis 4:

Proactive personality moderates the relationships between the five dimensions and job stress.

Methodology

Procedures

Before the recruitment process started, an estimated number of participants was calculated by using G-Power programme. Given the proposed effect size of .06 which was ranked between the medium and the small effect sizes, G-Power programme produced the result of the minimum of 125 participants were needed to meet the expected effect size of .06 for the study.

Participants were recruited using several convenient sampling methods. Firstly, the survey link and the QR-code were advertised over the Facebook, LinkedIn, and Reddit. Secondly, recruitment emails were sent through the Principal Association Network and the Human Resource Association (See Appendix 1 for recruitment email). Thirdly, the survey link was put on the Canterbury university staff and student blog website. Lastly, friends and family members were approached individually and suggested to pass the survey link to their friends or family members.

The survey was administrated on Qualtrics Survey Software. It consists four main sections: information sheet providing a brief introduction of the study and other necessary information before any participation; consent form for participants to confirm their agreement to their involvement; eight demographic questions about participants; and the actual questionnaires. The questionnaires were to assess participants' perceived technostress across five technostress dimensions, their perceived job satisfaction and job stress, their techno-savviness, and their proactive behaviours.

Sample

There were 140 participants consented to participate the online survey and 139 of them completed the first part of the survey questions which included six demographical questions. The sample set included 45 males and 94 females. For participants' age, the age of 18 was the youngest, and the age of 66 was the oldest ($Mean = 34.52, SD = 14.90$). The sample was composed of 99 New Zealand Europeans, 2 Maoris, 1 Pacific Islanders, 13 Asians, 14 Europeans, 5 Australians, and five reported as 'others'. The descriptive statistics also reported that, 69.8% of the participants were working full-time, 19.4% of them were working part-time, and 10.8% of them were working casually. The occupations participants reported crossed over 36 different job titles. All the reported technologies participants use or have to deal with at work fall in the range of ICTs with no exception. Regarding participants' computer literacy level, 2.2% of them self-evaluated with low computer literacy level, 20.9% of them reported with a medium level, 46.8% reported with high level, 29.5% reported with very high level, and the rest were not sure about their computer literacy level. For education level, there was 1 participant had no qualification or certificate. There were 36 of them had high school certificate, 7 participants had trading diploma or certificates, 41 participants had bachelor's degrees, 46 participants had postgraduate, or master's or equivalent qualifications, and 8 participants had Doctor of Philosophy (PhD) or equivalent qualifications.

Measures

Technostress

A 24-item scale designed by Ragu-Nathan et al. (2002) was used to assess participants' technostress aiming to identify the five dimensions of techno-invasion, techno-overload, techno-

insecurity, techno-complexity and techno-uncertainty with the Cronbach's Alpha of .89. A seven-point Likert scale was used where 1 = strongly disagree, and 7 = strongly agree. Various numbers of items were distributed to each technostress dimension. In total, there were 118 participants completed technostress scale.

Here are some sample-items for each techno-dimension. For techno-overload, responders would see a short statement such as "I am forced by this technology to work faster". For techno-invasion, responders would read statements such as "I have to be in touch with my work even during my vacation due to the technology". For techno-complexity, responders would see short statements such as "I do not know enough about this technology to handle my job satisfactorily". For techno-insecurity, responders would see statements such as "I feel there is less sharing of knowledge with my co-workers for fearing of being replaced". For techno-uncertainty, a typical statement could be represented as "There are constant changes in computer software in our organisation" (See Appendix 2 for the 24-item technostress survey).

Job satisfaction

A 3-item scale, adopted to assess participants' job satisfaction, was derived from a seven-item overall job satisfaction scale developed by Taylor and Brown in 1974. The adopted 3-item scale was with the Cronbach's Alpha of .85. The three selected items were "How satisfied do you feel with the progress you have made in this organisation up to now", "How satisfied do you feel with your chance for getting ahead in this organisation in the future", and "All in all, how satisfied are you with your job". As mentioned before, responses were obtained on a 7-point Likert-type scale where 1 = completely unsatisfied and 7 = completely satisfied (See Appendix 2 for this 3-item job satisfaction scale). There were 118 participants completed this scale.

Job stress

This construct was assessed by using a 21-item burnout measuring scale developed by Pines and Aronson in 1988 with the Cronbach's Alpha of .77. The 21 items were all short statements including sixteen negative statements, such as "Being tired", "Being emotionally exhausted", and "Feeling run-down", and also including five positive statements, such as "Being happy", "Having a good day", and "Feeling optimistic". The responses to the job stress scale were also obtained on a 7-point Likert-type scale where 1 = never and 7 = always (See Appendix 2 for the 21-item job stress scale). There were 115 participants completed this scale.

Techno-savvy

The measure of this construct comprised two parts. One was a one-item measurement testing the fit of the definition of techno-savviness. This item defined techno-savvy as "someone who is well informed/knowledgeable about modern technology or technical matters, and proficient in the use of modern technology". Compared to other scales, the responses to this scale were obtained on a 6-point Likert-type scale where 1 = Not well at all and 6 = Extremely well.

The other part was a 10-item self-developed techno-savvy scale. It was used to assess participants' techno-savviness. Based on the definition of the construct, the initial set of sample items contained 15 statements regarding techno-savviness through assessment of technological knowledge/expertise, proficiency of using various forms of technological measures and the capability/proficiency of keeping up with technological changes. The initial set of sample items was sent to 9 experts in the field of Industrial/Organizational Psychology, for the item review. Two of them were professors from Psychology Department of Canterbury University, one of them was a post-doctoral guest researcher in Applied Psychology from Canada, and the rest were Master students in Industrial/Organizational Psychology from the University of Canterbury.

Item review was conducted and administrated by using Qualtrics Survey Software. An item review survey was developed to obtain reviewers' responses and feedback regarding how appropriate and relevant each item was to capture techno-savviness. The responses were collected on a 5-point Likert-type scale where 1 = not at all and 5 = very much. There was a column for feedback and suggestion for changing the wording of each item. There were nine reviewers fully completed the item review survey. Initially, a reliability test was run with the initial set of 15 items. The result with Cronbach's Alpha value lower than .6 indicated that one or more items did not suit and should be taken out. Then, based on the response score and feedback of each item, the reliability test was re-run several times by taking one suggested item at a time until ten items remained with the Cronbach's Alpha of .77. Thus, the remained ten items were used to detect and assess participants' responses to the construct of techno-savviness. The responses from the techno-savviness scale were also obtained on a 7-point Likert-type scale where 1 = strongly disagree, and 7 = strongly agree. Three samples of the scale were "I possess a high degree of work-related technological expertise", "I am very knowledgeable about modern technology at work" and "I am very proficient of developing/maintaining communication links by using different technology measures at work" (See Appendix 2 for the self-developed 10-item techno-savvy scale). There were 115 participants completed this scale.

Proactive Personality Trait

It is a 17-item scale developed by Bateman and Crant in 1993, to detect and assess individuals' proactive personality trait or behaviours. This scale was with the Cronbach's Alpha of .88. The responses were obtained on a 7-point Likert-type scale where 1 = Strongly disagree, and 7 = strongly agree. Three typical examples demonstrating proactive behaviours would be "I am always looking for new ways to do things", "If I see something I do not like, I fix it" or

“When I have a problem, I tackle it head-on” (See Appendix 2 for this 17-item proactive behaviour scale). There were 112 participants completed this scale.

Data Analysis

For each psychological construct, factor analyses and reliability test were conducted to confirm and reassure the reliability and validity of each measure. It was a necessary step to diagnose the data set and each measure to get them prepared for further data analysis. Hence, it was a crucial step for identifying the problems from the data set.

After data preparation, the Process programme was adopted to determine the moderation model used for moderation detection. For the current study, Model 1 shown in Figure 1 was selected. Then, the data analysis examined the proposed moderating roles of techno-savvy and the proactive personality trait by running multiple moderation regression analysis through SPSS and Syntax. To further demonstrate the identified moderating effects, the simple slope analysis plotted as two-way-interaction graphs were used to illustrate the observed moderator interacted with techno-dimension on the outcome variables.

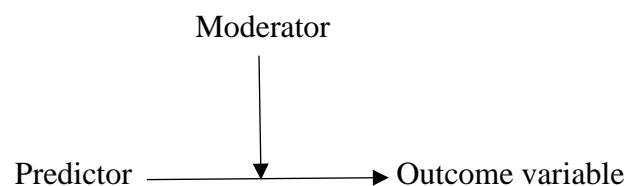


Figure 1.

The illustration of Moderation model 1 from Process Programme

Ethics

The technostress study had followed the guidelines and expectations provided by the New Zealand Human Ethics Committee throughout the whole research process. The study proposal was approved by both Psychology Department of the University of Canterbury and the New Zealand Human Ethics Committee. The detailed guidelines and expectations when using human subjects in research can be found at:

<http://www.canterbury.ac.nz/humanethics>.

Results

Table 1.

Means, standard deviations, and correlations of the studied variables (N = 112)

Variables	M (SD)	1	2	3	4	5	6	7	8	9
1. Techno Overload	4.17 (1.29)		.48**	.43**	.49**	.37**	.05	-.14		.25**
2. Techno Invasion	3.75 (1.41)			.32**	.39**	.10	.05	-.07	-.06	.33**
3. Techno Complexity	3.27 (1.29)				.52**	.20*	-	-	-.06	.31**
4. Techno Insecurity	2.72 (1.22)					.31**	-	-.14	-.09	.37**
5. Techno Uncertainty	4.80 (1.21)						.15	.06	.12	.04
6. Proactive Personality	4.73 (.79)							.31**	.19*	-
7. Techno Savvy	4.86 (1.14)								.24*	-
8. Job Satisfaction	5.13 (1.33)									.38**
9. Job Stress	3.32 (.91)									.52**

Notes: * $p < .05$ and ** $p < .01$

Table 1 presents the means, standard deviations, and the inter-correlations of study's variables.

Table 2.

Moderation Regression with Techno-savvy as the moderator between techno-dimensions and the outcome variables (N = 112)

Variable	Job Satisfaction		Job Stress	
	B	SE	B	SE
INTERCEPT	5.14***	0.13	3.34***	0.08
Techno Overload	0.13	0.13	0.02	0.08
Techno Complexity	0.17	0.15	-0.10	0.09
Techno Invasion	-0.09	0.11	0.15*	0.06
Techno Insecurity	-0.19	0.13	0.21**	0.08
Techno Uncertainty	0.07	0.12	0.00	0.07
Techno Savvy	0.36**	0.14	-0.31*	0.08
Adjusted R ²	0.05		0.25*	
<i>Step 2</i>				
intercept	5.10***	0.14	3.34***	0.09
Techno Overload	0.14	0.13	0.01	0.08
Techno Complexity	0.08	0.15	-0.07	0.09
Techno Invasion	-0.09	0.10	0.14*	0.06
Techno Insecurity	-0.13	0.13	0.20*	0.08
Techno Uncertainty	0.05	0.12	0.02	0.07
Techno Savvy	0.41**	0.14	-0.33***	0.09
TechnoOvl*TechnoSavvy	-0.22*	0.11	0.02	0.07
TechnoCom*TechnoSavvy	-0.05	0.10	0.01	0.06
TechnoInv*TechnoSavvy	-0.05	0.10	0.13*	0.06
TechnoIns*TechnoSavvy	0.23*	0.10	-0.11	0.06
TechnoUnc*TechnoSavvy	-0.01	0.12	0.02	0.07
Adjusted R ²	0.11*		0.28*	
R ² Change	.06*		.03	

Notes: * $p < .05$, ** $p < .01$

Results from the multiple regression compared two models before and after the interaction with techno-savvy were presented in Table 2. For the examination of hypothesis 1, results revealed that only techno-overload and techno-insecurity had significant interactions with techno-savvy ($B = -.22, p < .05$; $B = .23, p < .05$). The interactions of techno-savvy and techno-invasion, techno-complexity and techno-uncertainty were not significant. Therefore, hypothesis 1

was partially supported. The graph using simple slope analysis in Figure 2 illustrated that the relationship between techno-overload and job-satisfaction was weaker and negative under the condition of the higher level of techno-savviness as compared to the lower level of techno-savviness. In other words, techno-savvy moderated the relationship between techno-overload and job satisfaction in that for individuals with high levels of techno-savviness, job satisfaction was higher and less dependent on techno-overload than individuals with low levels of techno-savviness with technology.

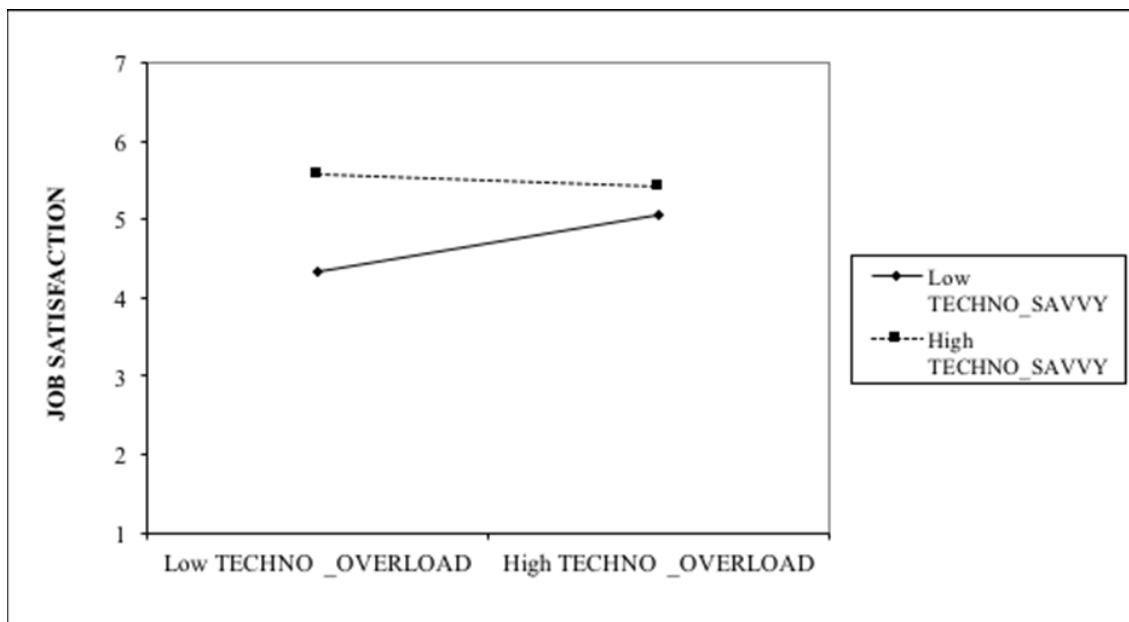


Figure 2.

Simple Slope Analysis: Two-way interactions with techno-savvy between techno-overload and job-satisfaction.

The graph using simple slope analysis in Figure 3 illustrated that the relationship between techno-insecurity and job-satisfaction became less strong and almost flat under the condition of a higher level of techno-savviness as compared to the lower level of techno-savviness, meaning that high levels of techno-savviness made job-satisfaction less dependent on techno-insecurity.

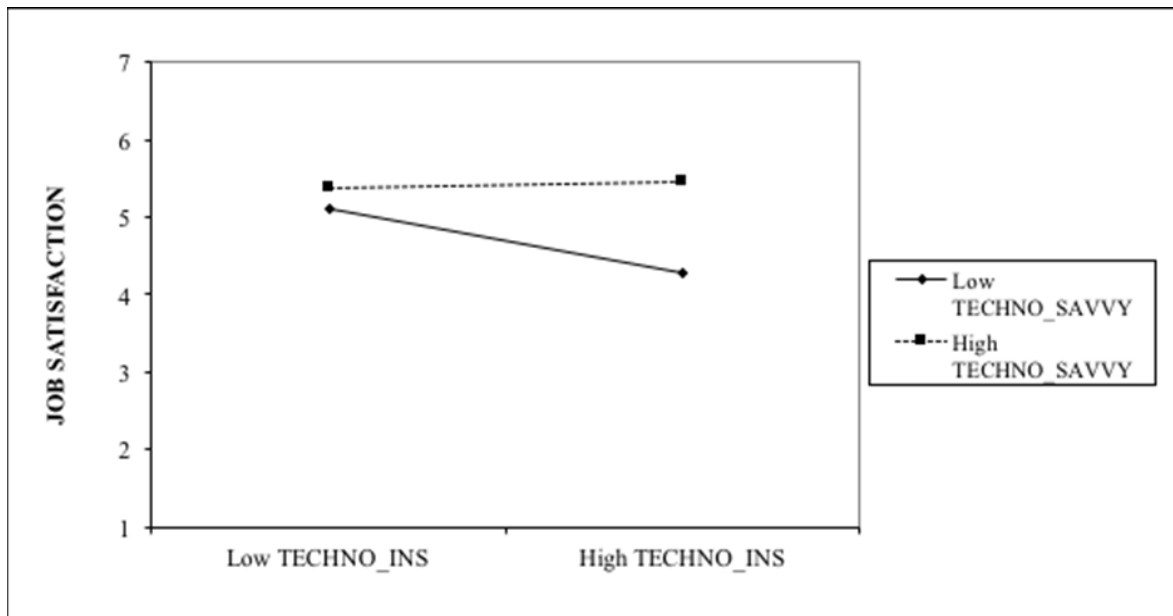


Figure 3.

Simple Slope Analysis: Two-way interactions with techno-savvy between techno-insecurity and job-satisfaction.

For the testing of Hypothesis 2, results in Table 2 revealed that techno-invasion had significant interactions with techno-savvy ($B = .13, p < .05$). The interactions between techno-savvy and the other four techno-dimensions were not statistically significant. Therefore, hypothesis 2 was partially supported as well. The graph using simple slope analysis in Figure 4 illustrated that the relationship between techno-invasion and job-stress became stronger and positive under the condition of a higher level of techno-savvy as compared to the lower level of techno-savvy. In other words, the moderating role of techno-savvy was effective on the relationship between techno-invasion and job stress, in that respect for individuals with more techno-savvy, techno-invasion become a stronger predictor of job stress.

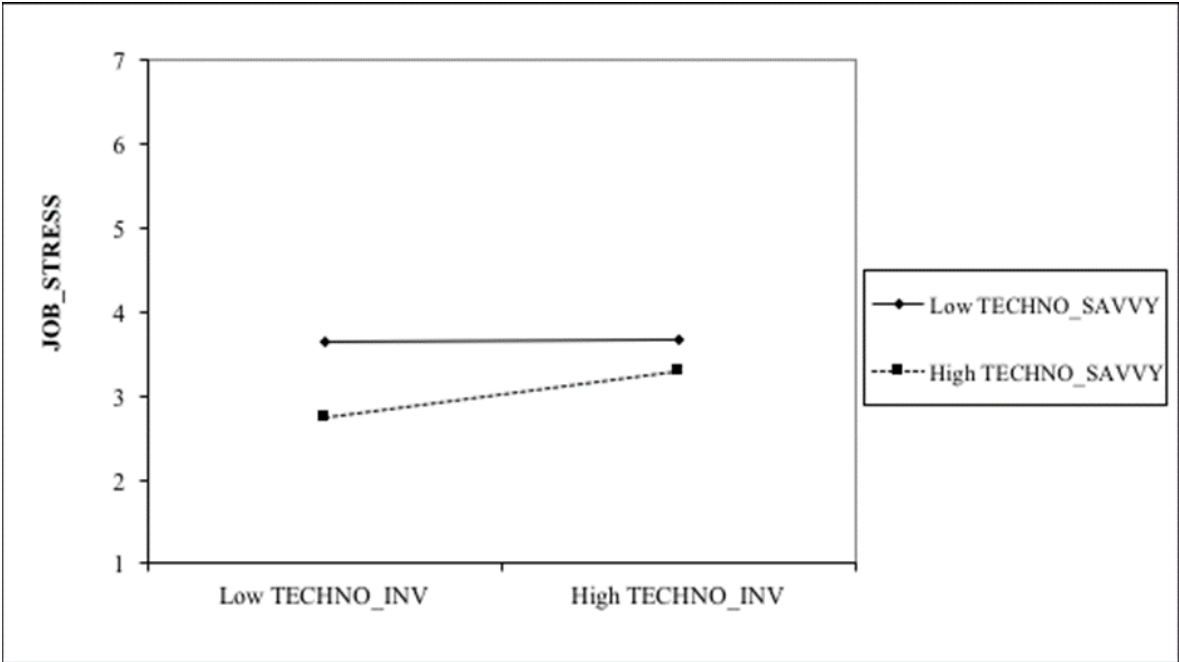


Figure 4.

Simple Slope Analysis: Two-way interactions with techno-savvy between techno-invasion and job-stress.

Table 3.

Moderation regression with Proactive Personality as the moderator between techno-dimensions and the outcome variables (N=112)

Variable	Job Satisfaction		Job Stress	
	B	SE	B	SE
INTERCEPT	5.15***	0.13	3.32***	0.07
Techno Overload	0.13	0.13	0.02	0.08
Techno Complexity	0.00	0.13	0.03	0.07
Techno Invasion	-0.09	0.11	0.16*	0.06
Techno Insecurity	-0.13	0.13	0.15*	0.08
Techno Uncertainty	0.09	0.12	0.00	0.07
ProactivePersonality	0.27	0.16	-0.39***	0.10
Adjusted R ²	0.01		0.27	
Step 2				
intercept	5.12***	0.14	3.33***	0.08
Techno Overload	0.16	0.14	0.04	0.08
Techno Complexity	-0.01	0.14	0.04	0.08
Techno Invasion	-0.13	0.11	0.16*	0.07
Techno Insecurity	-0.12	0.14	0.14	0.08
Techno Uncertainty	0.09	0.12	0.01	0.07
ProactivePersonality	0.24	0.18	-0.43***	0.11
TechnoOvl*ProactivePersonality	-0.11	0.17	0.01	0.10
TechnoCom*ProactivePersonality	-0.07	0.15	0.06	0.09
TechnoInv*ProactivePersonality	0.09	0.13	0.08	0.08
TechnoIns*ProactivePersonality	-0.10	0.16	-0.05	0.09
TechnoUnc*ProactivePersonality	0.03	0.16	-0.07	0.09
Adjusted R ²	-0.02		0.25	
R ² Change	.01		.02	

Notes: * $p < .05$, ** $p < .01$

Results from multilevel regression analysis testing the moderating effect of the proactive personality trait to the relationships between the five predictors and outcome variables of job-satisfaction and job-stress were presented in Table 3. Results revealed that there were no significant interactions with the proactive personality trait detected between the five predictors and the outcome variables of job-satisfaction and job-stress.

Discussion

The present study proposed hypothesis 1 and hypothesis 2 to predict that techno-savvy would moderate the relationships between each techno-dimension and the job outcomes of job satisfaction and job stress. However, for hypothesis 1, the moderating role of techno-savvy was found to be effective on the relationship between techno-overload, techno-insecurity and job satisfaction. Thus, hypothesis 1 was partially supported by the findings. For hypothesis 2, techno-savvy was only found to moderate the relationship between techno-invasion and job stress. Therefore, hypothesis 2 was partially supported as well. No moderating effects were found from the proactive personality. Therefore, hypothesis 3 and hypothesis 4 were not supported by the result.

For hypothesis 1, the relationship between techno-overload and job satisfaction was moderated by techno-savvy. The finding suggested that, under the influence of high levels of techno-savviness, the relationship between techno-overload and job satisfaction was shown to be weaker. Techno-overload was viewed as the situations when individuals perceive the pressure to work more and faster by using technologies to match the work demands at workplaces (Tarafdar et al., 2007, 2008). Individuals with high levels techno-savviness were viewed as those possess the required or adequate knowledge, information and skills. The knowledge, information and skills they possess might allow them to utilise the information and communication technologies more efficiently and effectively. Thus, compared to those with lower levels of techno-savviness, individuals with high levels of techno-savviness may not perceive as many difficulties and frustrations as their counterparts when asked to comply with the working demands. In line with

these expectations, techno-overload was shown to be less influential on the perceived job satisfaction for those with high levels of techno-savviness than their counterparts at workplaces.

As for techno-insecurity, its relationship with job satisfaction was moderated by techno-savvy. Techno-insecurity was shown to be less effective on job satisfaction for those with high levels of techno-savviness. On the contrary, techno-insecurity was shown to be more effective on job satisfaction for those with low levels of techno-savviness. Techno-insecurity describes the perceived job insecurity derived from the perception of the constant and increasing learning demands due to technological changes and complexity (Tarafdar et al., 2011; Weil & Rosen, 2008). Individuals with high levels of techno-savviness were viewed as those with high levels of knowledge, information and skills regarding modern technology. The high levels of technological knowledge, information and skills individuals possess may help them accept and adapt to the information and communication technology changes relatively easier and faster than their counterparts. To those with the right set of technological skills, technology changes and upgradings may not be as disturbing as to those without such skills. Therefore, as shown in the result, techno-insecurity was less effective on job satisfaction for those with high levels of techno-savviness than their counterparts in the same environment.

The level of techno-savviness did not influence the relationship between techno-complexity, techno-invasion, techno-uncertainty and job satisfaction. The possible explanation for techno-complexity was that the rapid technological change and the constant needs of the system upgrading might pose the same challenge to everyone. Individuals without the continuous learning or training, their technology-related knowledge and information would be dated. If they are constantly required to devote more time and energy to meet the learning demands, individuals might experience frustration and exhaustion regardless the level of techno-savviness

they possess. As for techno-invasion, the intrusive features of information and communication technologies imply that regardless the levels of techno-savviness, individuals may not be able to avoid the influence of techno-invasion. Individuals can be approached after work hours for the work-related matters, or they may be interrupted by the incoming e-mails or text messages during work when they attempt to complete their work on time. The unpredictable incoming e-mails, messages and unexpected technology interruptions may also explain why there was no moderation of techno-savvy for techno-uncertainty.

For hypothesis 2, techno-savvy was only found to moderate the relationship between techno-invasion and job stress. The relationship between techno-invasion and job stress was shown to be stronger under the influence of high levels of techno-savviness. The explanation might be that individuals with high levels of techno-savviness may be more likely to be approached for assistance when organisations adopt new technology systems or applications or when their colleagues with low levels of techno-savviness experience technical difficulties and frustrations. Individuals with high levels of techno-savviness are likely to be frequently approached during work or even after work to provide technical assistance or solutions. The frequent interruptions and the unexpected contacts on top of the usual workload may cause stress for those with high levels of techno-savviness.

Both hypothesis 3 and hypothesis 4 were not supported since the moderating role of proactive personality was not found, since the levels and directions of the relationships between the techno-dimensions and job outcomes did not change. The definition refers proactive personality as the combination of proactive tendency (Fugate et al., 2004; Hirschfeld et al., 2011; Hung et al., 2014), proactive actions and the positive attitude towards changes and challenges posed in the environment (Bateman & Crant, 1993, 2000). The content of the proactive

personality was not technology-specific. It is much broader. On the contrary, the five techno-dimensions are all technology-focused. Therefore, there might be a mismatch between the construct of the proactive personality and each techno-dimension. Thus, if taking the content validity into account, it might be a challenge to detect the predicted interaction between the proactive personality and each techno-dimension.

Future research

Previous literature showed that technostress experienced by professionals has increased in the past ten years (Tarafdar et al., 2010, 2011). Apart from the five techno-dimensions explaining technostress, researchers found techno-addiction (Byun et al., 2009), techno-reliability (Ayyagari et al., 2011), and techno-change (Mawhinney, 2014) as the additional dimensions of technostress. Another possible extension for the present study can be the examination of the interactions between the proactive personality dimensions and techno-savvy and the additional techno-dimensions just mentioned. Taking techno-change as an example, Mawhinney's study (2014) indicated that individuals perceived the rapid change of technology and perceived the changing pace is getting faster in recent years. The proactive individuals tend to take actions to keep the changes at their manageable level, especially when they start perceiving the gap between their coping skill of current technological system and the upcoming change in information and communication system. Thus, the moderating effects of the proactive dimension may be identified.

Methodological challenges

Regarding the sample size, there were 140 participants agreed to participate the online survey, however, in the end, there were only 112 participants completed the whole survey without the unfinished questions. For variable measurements, five specific scales were used to obtain responses from participants. Technostress scale was composed of 24 items, and job stress scale contained 21 items. They both were considered as the large scales. Literature regarding sampling suggested that each item should be assigned with minimum 5 participants. Thus, a 24-item scale should at least have a sample of 120 participants. In comparison, the sample of 112 might potentially compromise the power of the moderation investigation. Furthermore, the dataset showed that the responders' rate to each measured variable was different meaning that the levels of incomplete responses might have a negative influence on the representation of the selected sample (Levin, 2006; Pine et al., 1997).

The method of participant recruitment and the sample size had embedded some issues in the study. The study used an online survey to recruit participants, those who already experienced technostress might choose to avoid completing the survey, or left survey unfinished, or attempted to complete the whole survey, but meanwhile became more stressed (Lazer et al., 2006; Mawhinney, 2014). It may also explain why there were different responder rates for the measures of the studied constructs.

The purpose of this present study was to investigate the moderating roles of techno-savvy and the proactive personality. The cross-sectional study design was appropriate to be adopted for the present study (Levin, 2006). Although the cross-sectional study design was known for not being able to establish any causal inference, it does not affect the investigation of moderation effects. Participants were selected through an online survey from a broad population (whoever

had access to the internet during the period). Therefore, the sample was considered to be representative of the population.

Implications

Contributions to technostress and ICTs research

The identification of the five techno-dimensions supported the consistency and validity of Ragu-Nathan et al. (2002)'s technostress scale. The result of this study provided support for the overall phenomenon of technostress, and further emphasised the importance of investigating technostress in depth. Although the findings partially supported the hypotheses, it made a meaningful addition to the existing knowledge base of technostress. The present study placed the focus on the individuals' differences—the human factor. It advocated paying more academic attention to the exploration of individual differences since they help understand how individual differences may change the level of effectiveness that technostress possessed on the outcome variables.

Being a techno-savvy is beneficial

The findings of the present study suggested that, for individuals with high levels of techno-savviness, their job satisfaction was less affected by techno-overload and techno-insecurity. It showed the effectiveness of techno-savvy to some extent. Techno-savvy were described as those who possess the adequate knowledge, information and skills when using modern technologies as well as show proficiency of making an adaption to technology changes. Technostress literature suggested that those who are knowledgeable and skilful of modern technologies are more likely to perceive the easiness of adaption and to develop the better-coping strategies when experience technostress (Ayyagari et al., 2011; Tarafdar et al., 2007, 2008, 2011).

Research emphasised that technological changes and development would continue and increase at an accelerating pace (Kurzweil, 2001; Mawhinney, 2014; Moor, 1965). It further indicated that those perceived that they did not have the knowledge or skills required to cope with the rapid changes tend to be overwhelmed at workplaces (Mawhinney, 2014). Thus, individuals would benefit from being or becoming a techno-savvy. They would gain a sense of being in control in the technological environment. They may also increasingly perceive the easiness when using information and communication technologies and their upgrading (Mawhinney, 2014).

Based on the notion above, the present study would suggest that organisations should provide the training programmes (Ayyagari et al., 2011; Tarafdar et al., 2011) which were designed according to the modern technologies used at workplaces (Ayyagari et al., 2011) and individuals' needs. In this way, the selected training programme would be more effective by delivering the required and the needed knowledge and information.

Conclusion

The result of the present study showed that the level of techno-savviness could be influential over the relationships between techno-overload, techno-insecurity and job satisfaction. It might also impact on the relationship between techno-invasion and job stress. However, the result did not identify the moderating role of the proactive personality. Based on the findings, the present study suggested organisations to be mindful of individual differences when adopting the training programmes. It means that organisations should determine the individuals' needs based on their knowledge, ability and skill set. In this way, the training programme would be more effective and the training experience would be enhanced. The next step of the present study should be extending the research by further investigating the additional

techno-dimensions that previous research suggested (Ayyagari et al., 2011; Byun et al., 2009; Mawhinney, 2014).

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Appendix 1

Hello.

My name is Monica Ye. I am a master's student in Industrial/Organizational Psychology at the University of Canterbury. For my dissertation, I am studying technostress. In recent years, technostress has been related to adverse effects on people's work and their life outside of work. The goal of my research is to help reduce stress while still enjoying the benefits of technology at work.

I would like to invite you to participate this survey study. Your participation is entirely voluntary and anonymous, and you have the right to withdraw at any stage without penalty by closing the web browser. If you choose to take part in this study, your involvement will be much appreciated and valued. The questionnaire will take you approximately 10 to 15 minutes. Your responses will be anonymous which means that any published or reported results will not identify the participants or the organisations they work for. After you submit your responses, you will be redirected to leave your email address for either entering in a prize winning-draw (1 out of 3 to win up to \$ 50 Westfield gift voucher) or for receiving the summary of the final research report result. Your responses will be separated from your email address to ensure the anonymity of your data.

Some of the questions in the survey may concern sensitive issues. If you do not feel comfortable responding to these questions, you can leave the questions unanswered. You can also withdraw from the survey at any point, should the questions or the topics raised cause you distress. If this happens, we do suggest that you seek assistance. We have provided a list of potential sources at the bottom of this page.

The project is being carried out by me, Monica Ye. I can be contacted at monica.ye@pg.canterbury.ac.nz. The project is under the supervision of Katharina Naswall, who can be contacted at katharina.naswall@canterbury.ac.nz. We both would be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

[Lifeline New Zealand offers free phone-based counselling and support. Lifeline can be contacted at 0800 543 354 The New Zealand Association of Counsellors provides a counsellor search tool which enables you to find counselling services and is accessible at <http://www.nzac.org.nz>](#)

If you consent to participate in my survey, please click "Agree" on the next page.

Appendix 2

Technostress

The following 24 statements aim to detect and capture any stress you have had experienced or currently experience in relation to technology at work. Please read each statement and indicate the extent to which you agree. You may only pick one response for each statement.

Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
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I am forced by the technology/technologies at the work place to work much faster.

I am forced by the technology/technologies at work 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 recent technologies.

I have a higher workload because of increased technology complexity.

I have to spend a lot of time everyday reading an overwhelming amount of e-mail messages.

I have to work harder because of delays from hardware, software and network problems.

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 the technology I use.

I do not know enough about this technology to handle my job satisfactorily.

I need a long time to understand and use new technologies.

I do not find enough time to study and upgrade my technology skills.

I find new recruits to this organization know more about computer technology than I do.

I often find it too complex for me to understand and use new technologies.

I feel constant threat to my job security due to new technologies

I have to constantly update my skills to avoid being replaced.

I am threatened by co-workers with their skills in newer technology.

I do not share my knowledge with my co-workers for fear of being replaced.

I feel there is less sharing of knowledge among co-workers for fear of being replaced.

There are always new developments in the technologies we use in our organization.

There are constant changes in computer software in our organization.

There are frequent upgrades in computer networks in our organization.

Job satisfaction The following 3 questions aim to how you feel about your current job. Please indicate the extent to which you agree with each statement by clicking the circle below each corresponding scale point. You may only pick one response for each statement.

Completely unsatisfied (1)	Unsatisfied (2)	A little unsatisfied (3)	Neither unsatisfied nor satisfied (4)	A little satisfied (5)	Satisfied (6)	Completely satisfied (7)
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How satisfied do you feel with the progress you have made in this organization up to now?

How satisfied do you feel with your chance for getting ahead in this organization in the future?

All in all, how satisfied are you with your job?

Job stress The following 21 short statements aim to detect and capture the feelings you may experience at work. Please indicate the extent to which you agree with each statement by choosing each corresponding scale point. You may only pick one response for each statement.

	Never (1)	Once in a great while (2)	Rarely (3)	Sometimes (4)	Often (5)	Usually (6)	Always (7)
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- Being tired (1)
- Feeling depressed (2)
- Having a good day (3)
- Being physically exhausted (4)
- Being emotionally exhausted (5)
- Being happy (6)
- Being “wiped out” (7)
- “Can’t take it anymore” (8)
- Being unhappy (9)
- Feeling run-down (10)
- Feeling trapped (11)
- Feeling worthless (12)
- Being weary (13)
- Being troubled (14)
- Feeling resentful (15)
- Being weak and susceptible (16)
- Feeling hopeless (17)
- Feeling rejected (18)
- Feeling optimistic (19)
- Feeling energetic (20)
- Feeling anxious (21)

Proactive personality Please rate each statement according to how well it describes you. Please make sure that you base your ratings on how you really are, not how you would like to be.

Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	Somewhat agree (5)	Agree (6)	Strongly agree (7)
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- I am constantly on the lookout for new ways to improve my life. (1)
- I feel driven to make a difference in my community, and maybe the world. (2)
- I tend to let others take the initiative to start new projects. (3)
- Wherever I have been, I have been a powerful force for constructive change. (4)
- I enjoy facing and overcoming obstacles to my ideas. (5)
- Nothing is more exciting than seeing my idea turn into reality. (6)
- If I see something I don’t like, I fix it. (7)

- No matter what the odds, if I believe in something I will make it happen. (8)
- I love being a champion for my ideas, even against other’s opposition. (9)
- I excel at identifying opportunities. (10)
- I am always looking for better ways to do things. (11)
- If I believe in an idea, no obstacles will prevent me from making it happen. (12)
- I love to challenge the status quo. (13)
- When I have a problem, I tackle it head-on. (14)
- I am great at turning problems into opportunities. (15)
- I can spot a good opportunity long before others can. (16)
- If I see something/someone in trouble, I help out in any way I can. (17)

Techno-savvy Techno-savvy is defined as someone who is well informed/knowledgeable about modern technology or technical matters, and also proficient in the use of modern technology. Please indicate below how this definition fits with your level of techno-savvy.

- Not well at all (1)
- Slightly well (2)
- Moderately well (3)
- well (5)
- Very well (6)
- Extremely well (4)

Techno-savvy Please indicate the extent to which you agree with each statement below by choosing one corresponding scale point.

Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Neither agree nor disagree (4)	somewhat agree (5)	Agree (6)	Strongly agree (7)
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- I possess a high degree of work-related technological expertise. (4)
- I am very knowledgeable about modern technology at work. (5)
- I am very proficient of developing/maintaining communication links by using different technology measures at work. (6)
- I struggle to keep up with the changing technological system/applications at work. (8)
- I can proficiently complete my job using the technology at work without the assistance of others. (9)
- I can get my job done using new technologies for the first time. (10)
- I can complete my job using the technology at work if someone else helps me get started. (12)
- I rely on someone else to help me when I get stuck with the technology issues at work. (13)
- I need someone to show me how to use the modern technology before I can use it at work. (14)
- My colleagues/co-workers turn to me when they need help with their technological problems. (15)