doi: 10.1111/isj.12067

Technostress creators and job outcomes: theorising the moderating influence of personality traits

Shirish C. Srivastava,* Shalini Chandra† & Anuragini Shirish‡

*HEC Paris, 1 Rue de la Libération, 78351 Jouy en Josas Cedex, France, e-mail: srivastava@hec.fr, †S P Jain School of Global Management, 10, Hyderabad Road, 119579, Singapore, and e-mail: shalini.chandra@spjain.org ‡Télécom Ecole de Management (Institut Mines-Telecom), 9 Rue Charles Fourier, 91011 Évry Cedex, France e-mail: anuragini.shirish@telecom-em.eu

Abstract. *Although prior research has examined the influence of technostress creators on job outcomes, insights into the influence of personality traits on the perceptions of technostress creators and their consequent impacts on job outcomes are rather limited. Such insights would enable a deeper understanding about the effects of individual differences on salient job-related outcomes. In this research, by leveraging the distinctions in personality traits offered by the big five personality traits in the five-factor model and grounding the research in the transactional model of stress and coping, we theorise the moderating influence of personality traits on the relationships between technostress creators and job outcomes, namely job burnout and job engagement. Specifically, the study theorises the mechanisms through which each of the specific personality traits openness-to-experience, neuroticism, agreeableness, conscientiousness and extraversion interacts with technostress creators to differently influence job burnout and job engagement. We test the proposed model in a field study based on a survey of senior organisational managers who regularly use information and communication technologies for executing professional tasks. Although technostress creators are generally associated with negative job outcomes, our results also show that for individuals with certain personality traits, technostress creators may result in positive job outcomes. The study thus contributes to the technostress literature, specifically by incorporating the salient role of individual differences. The study also provides insights for managers who should pay special attention to allocating specific job roles to employees with particular personality traits in order to optimise job-related outcomes.*

Keywords: technostress creators, personality, transactional model of stress and coping, eustress, job burnout, job engagement

INTRODUCTION

Pervasive information and communications technologies (ICTs) have made it possible to connect anytime, anywhere, to deliver data and information in real time to support businesses, organisations and personal decisions. Although the ubiquity of ICTs is beneficial for the efficiency of organisations, it also promotes employee technostress because of the increased work overload, excessive technology dependence, demands for enhanced productivity and a constant need to adapt to emerging ICT applications, functionalities and workflows (e.g. Wang *et al.,* 2008; Bulgurcu *et al.,* 2010; Tarafdar & Tu, 2010; Tarafdar *et al.,* 2011; Turel *et al.,* 2011; Turel *&* Serenko*,* 2012; D'Arcy *et al.,* 2014). Recent information systems (IS) studies have examined the antecedents and consequences of technostress, which has been shown to influence job parameters such as perceived work overload and information fatigue, resulting in demoralised, demotivated and frustrated employees resulting in negative performance (e.g. Tarafdar *et al.,* 2007; Ragu-Nathan *et al.,* 2008; Tarafdar *et al.,* 2010; Ayyagari *et al.,* 2011; Tarafdar *et al.,* 2011; Tarafdar *et al.,* 2014).

Prior organisational stress literature has shown the salient role of individual personality traits in influencing the experienced stress and its effect on related job outcomes (see Code & Langan-Fox, 2001; Penley & Tomaka, 2002; Grant & Langan-Fox, 2006; Carver & Connor-Smith, 2010). Individuals with different personality traits have been found to experience organisational stress differently and consequently adopt different coping mechanisms (Cohen & Edwards, 1989; Parkes, 1994; Wiebe & Smith, 1997). Personality differences in reactivity to stressful experiences due to differential choice of coping efforts play an important explanatory role in different psychological outcomes for individuals (Bolger, 1990; Bolger & Zuckerman, 1995). From a management perspective, this knowledge is important, especially for understanding the person–job fit and allocating the right resources to the right job. In the context of present-day organisations, technostress has become ubiquitous, and it is clear that to design effective organisational interventions, deeper theoretical insight about how individual differences influence the impact of technostress creators on job outcomes is warranted (see Tarafdar *et al.,* 2014). Although IS research in general and technostress literature in particular acknowledge the importance of examining the role of individual differences such as gender, education and age (e.g. Zmud, 1979; Robey, 1983; Ragu-Nathan *et al.,* 2008), there is a perceptible gap in the theoretical understanding of the impact of technostress creators on job outcomes, especially from the perspective of differences in individual personality traits. Moreover, as new and complex technologies continue to overwhelm and frustrate organisational employees, understanding how different personality types experience and cope with technostress creators presents an area of theoretical interest. On the practical front, such a study can help organisations develop effective preventive stress management strategies that focus on both the organisation and the individual (e.g. Tarafdar *et al.,* 2014). Our main thesis is that the impact of technostress creators is influenced by the individual's personality traits, which can be described as the individual's relatively stable dispositions (McCrae & Costa, 1987; Ajzen, 1988; Junglas *et al.,* 2008). Deeper insights into the integrated role of technostress creators and personality traits in influencing job outcomes will certainly be of interest for both theory and practice.

The two job outcomes that we examine in this study are job burnout and job engagement, which are considered pertinent in the context of occupational stress management studies

(Maslach & Leiter, 1997). Job burnout is a negative job outcome that comes in response to prolonged chronic stressors on the job (Maslach *et al.,* 2001). Job engagement, on the other hand, is a positive job outcome, defined as an affirmative, fulfilling work-related state of mind (Schaufeli *et al.,* 2002; Schaufeli *et al.,* 2006). Grounding our theory development in Lazarus and Folkman's transactional model of stress and coping (TMSC; 1984) and *big five personality traits* comprising the five-factor model (FFM) (e.g. Barrick *et al.,* 2001; Judge *et al.,* 2002; Bono & Judge, 2004; McElroy *et al.,* 2007; Devaraj *et al.,* 2008; Junglas *et al.,* 2008), we posit that technostress creators in organisations can be multifaceted and may be perceived as either threats (negative) or opportunities (positive), depending on the dominant personality traits of individuals. The primary research question addressed in this study is as follows:

RQ: Do personality traits play a significant role in influencing the effects of technostress creators on the job outcomes of job burnout and job engagement?

The present study makes three key contributions. Firstly, prior IS research in general and technostress research in particular has contributed to the literature by examining various aspects of user, task, environment and IT characteristics and their impacts on cognitive and performance outcomes (e.g. Gupta *et al.,* 2006; Gupta & Sharda, 2008; Li *et al.,* 2011; Gupta *et al.,* 2012; Tarafdar *et al.,* 2014), yet despite its theoretical and practical importance, the role of personality traits in influencing negative outcomes related to technostress creators has not been examined in detail. The present research is one of the first studies to do this. Secondly, technostress creators are likely to influence job outcomes through negative or positive evaluations, depending on whether the ICT user evaluates the technostress creators as a threat or as an opportunity. Leveraging TMSC, we assess the appraisal behaviours related to different personality traits and theorise for the integrated role of personality traits with technostressors in influencing job outcomes. Thirdly, this study can be used by IS managers and practitioners as the initial step towards leveraging and managing personality differences amongst employees for better person–job fits, with a view to fostering positive job outcomes.

The rest of the paper is organised as follows. Firstly, we present a literature review on technostress creators and personality traits. Then, we discuss TMSC and describe how it helps explain our predictions concerning the evaluation of technostress creators and their influence on job outcomes. Next, we present our research model and hypotheses, in which we theorise the moderating influence of personality traits on the relationship between technostress creators and job outcomes. We then describe our research method, followed by the results and discussion section. Finally, we discuss the limitations and directions for future research before deliberating on the theoretical and practical implications emerging from this study.

BACKGROUND LITERATURE AND THEORY

Technostress and technostress creators

User dependence on technologies and organisational quests to incorporate such technologies within their business processes has increased dramatically in recent years. This surge in

technology use for organisational processes forces employees to constantly adapt to new applications, functionalities and workflows (Ragu-Nathan *et al.,* 2008). As the organisational use of ICTs becomes smarter and more synchronous, ubiquitous and complex, employees find it difficult to cope with the associated challenges, which leaves them increasingly frustrated and overwhelmed (Tarafdar *et al.,* 2011). Recent literature describes such cognitive responses to the use of ICTs in the workplace as technostress (Clark & Kalin, 1996; Weil & Rosen, 1997; Brillhart, 2004; Ragu-Nathan *et al.,* 2008). Although the term 'technostress' was coined in 1984 by clinical psychologist Craig Brod (1984), who described it as a modern disease caused by an inability to cope or deal with ICT in a healthy manner, Tarafdar *et al.* (2007) extended and developed the concept, thereby initiating active IS research in this field. Technostress is the phenomenon of 'stress caused by an inability to cope with the demands of organisational computer usage' (Tarafdar & Tu, 2010, p. 304). It comprises the stress experienced by users as a result of emerging applications, multitasking, constant connectivity, information overload, frequent system upgrades, constant uncertainty, continual relearning and job-related insecurities as well as technical problems associated with the organisational use of ICT (Tarafdar & Tu, 2010; Ayyagari *et al.,* 2011; Tarafdar *et al.,* 2011).

Stressors or stress creators are the factors that cause stress, which in the organisational context can be related to an individual's job role (see McGrath, 1976; Kahn *et al.,* 1981). In addition to stress creators based on job roles (such as job demand and job control), stressors can also be associated with the technology being used; such stress creators are termed 'technostress creators'. In their comprehensive study of technostress, Tarafdar *et al.* (2007) identified five technostress creators: *techno-overload, techno-invasion, techno-complexity, techno-insecurity* and *techno-uncertainty* (see Appendix 1). Because of the ubiquity and practical relevance of technostress, academic interest in the subject has recently grown, examining both the antecedents and the consequences of technostress. For example, Ayyagari *et al.* (2011) have identified characteristics of technology that might cause stress to users, whilst Shu *et al.* (2011) have examined the role of cognitive factors such as self-efficacy and technology dependence in the creation of technostress. In a similar vein, researchers have examined the relationship of technostress creators to employee performance (Tarafdar *et al.,* 2007; Tarafdar *et al.,* 2014) and end-user satisfaction (Tarafdar & Tu, 2010). Appendix 2 provides brief descriptions of key IS studies that have examined the concept of technostress and technostress creators. From this appendix, we observe that despite the emphasis placed on understanding the role of personality characteristics in IS contexts (e.g. Devaraj *et al.,* 2008; Junglas *et al.,* 2008), to the best of our knowledge, none of the technostress-related studies have examined the integrated influence of personality and technostress creators on job outcomes such as job burnout and job engagement, which have been identified as crucial outcome variables in the occupational stress literature (e.g. Maslach & Leiter, 1997; Maslach *et al.,* 2001).

Personality characteristics and stress

Personality characteristics are the relatively stable individual dispositions, which can be described along several dimensions. However, the FFM describing the 'big five' personality traits (Goldberg, 1981; Digman, 1990; McCrae & Costa, 2003) has been widely adopted as a

consensus framework for theoretically understanding personality characteristics. The five dimensions of the big five personality traits are the following: openness to experience, neuroticism, agreeableness, conscientiousness and extraversion. These broad dimensions are the key determinants of behaviour and give a quick snapshot of a person's relatively stable dispositions. Although an individual will possess the five personality traits in varying degrees, in this study, we follow a 'nomothetic approach' and focus on *generalised personality traits*, rather than follow an 'idiographic approach' and focus on *specific individuals* with a mix of different traits in varying degrees (see Grant & Langan-Fox, 2006). Because we shall be leveraging the big five personality traits for our theory development, we briefly describe each of these dimensions. The first of the five factors, *openness to experience*, involves curiosity, flexibility, imaginativeness and willingness to immerse oneself in atypical experiences (Costa & McCrae, 1985; Carver & Connor-Smith, 2010). The second factor, *neuroticism*, reflects the ease and frequency with which a person becomes upset and distressed. Moodiness, anxiety and depression describe a higher degree of neuroticism (Carver & Connor-Smith, 2010). The third factor, *agreeableness*, includes the qualities of being friendly, helpful, empathetic and able to inhibit one's negative feelings (John & Srivastava, 1999; Graziano *et al.,* 2007). Agreeable people are generally individuals for whom maintaining relationships is critical (Jensen-Campbell & Graziano, 2001). The fourth factor, *conscientiousness*, reflects the qualities of planning, persistence, responsibility, impulse control and reliability (Carver & Connor-Smith, 2010). The fifth factor, *extraversion*, generally implies sociability (Ashton *et al.,* 2002); yet different measures of extraversion emphasise different individual attributes, such as assertiveness, spontaneity, energy, a tendency towards happiness and confidence (Depue & Collins, 1999; Depue & Morrone-Strupinksy, 2005). Appendix 3 provides a quick summary of the definitions for the big five personality traits.

The role of personality traits in work stress processes has been widely examined by psychology researchers (Bolger, 1990; Parkes, 1994; Bolger & Zuckerman, 1995). For example, Bolger & Zuckerman (1995) specified that personality traits affect both exposure and reactivity to stressful events, causing health and psychological outcomes. They showed that personality differences in reactivity are due to different choices of coping efforts. Bolger (1990) showed that coping is actually personality in action under stress. Previous psychology research has also examined the moderating role of personality traits in work stress processes (Kobasa, 1979; Kobasa, 1981; Kobasa & Puccetti, 1983; Parkes, 1994), and recent psychology research has investigated the mediating effects of coping on the relationship between personality and perceived stress (Polman *et al.,* 2010). Thus, the pivotal role of personality traits in coping with work-related stress has been extensively studied in the field of psychology. However, the influence of personality traits on technology-related stress has yet to be examined, and this constitutes a significant research gap.

Similarly, IS research has examined the role of personality traits in influencing positive outcomes, such as their impact on technology adoption and use (see Jahng *et al.,* 2002; Devaraj *et al.,* 2008; Junglas *et al.,* 2008). Yet the role of personality traits in influencing negative outcomes, such as their role in the context of technostress creators, has not been examined extensively, which again indicates a relevant research gap that we try to address through this study (see Appendix 4, which provides a brief description of the key IS studies examining the role of personality variables in IS contexts). Prior research has incorporated the role of personality with

respect to positive evaluations leading to technology acceptance, technology use, job satisfaction, career satisfaction and team performance (White, 1984; Lounsbury *et al.,* 2007; Devaraj *et al.,* 2008). But very few papers have focussed on the negative cognitions of technology (such as work stress and concerns for privacy) by individuals with different personality traits (Rasch & Harrell, 1989; Junglas *et al.,* 2008). Moreover, to the best of our knowledge, none of the past studies have linked technostress creators and personality to examine their joint influence on job outcomes nor has prior research examined the nuanced role of personality traits in evaluating technostress creators differently, as either positive or negative, resulting in positive or negative job outcomes. By addressing the aforementioned gaps through this study, we intend to contribute to both IS research and practice.

Technostress creators and personality

Although ICTs create a situation of stress creators for employees, it is important to note that the use of ICT in the workplace can have both positive and negative effects on employees' work experiences (O'Driscoll *et al.,* 2010). For example, despite the induced stress, ICTs can enhance employees' ability to solve problems by increasing their information access, and this may improve employees' performance efficiency by enhancing their ability to communicate with other organisational members (Dewett & Jones, 2001). However, as already discussed, ICTs increase the demands placed on employees by increasing employee accessibility to the workplace and increasing expectations for productivity, which can have negative effects on employees' work experiences and create further problems for employees (O'Driscoll *et al.,* 2010). Both the occupational stress literature and practical management practices highlight the need to also study positive aspects of stress (Le Fevre *et al.,* 2003).

The original concept of 'stress' was used to describe a set of physiological and psychological responses to adverse external conditions or influences (Selye, 1956, 1964; Maslach, 1998; Mayer, 2000; Quick *et al.,* 2001). Later, researchers studied the behavioural responses to such external influences as stress, which was conceptualised as a natural consequence of living (Vasse *et al.,* 1998; Richmond & Kehoe, 1999). Selye (1964, 1987) further teased out the distinction between distress (bad stress) and eustress (good stress). Distress occurs when demands placed on the individual exceed the individual's capacity and capability to maintain homeostasis so that the demands may be perceived as pleasant or unpleasant. But the interpretation of the demand stimulus as distressful or eustressful depends on the characteristics of the individual experiencing it (Harris, 1970; Selye, 1987; Edwards & Cooper, 1988; Code & Langan-Fox, 2001; Le Fevre *et al.,* 2003). Hence, incorporating personality traits into our theorization, we posit that different individuals with different personality characteristics may perceive the technostress creators in their workplace differently and thus cope with technostress creators differently, as either bad stressors (distressors) or good stressors (eustressors), resulting in either distress or eustress.

In this paper, leveraging TMSC as the grounding theory, we examine the positive or negative cognitions associated with different personality characteristics, cognitions of either opportunities or threats, which result in positive or negative job outcomes. It must be noted that unlike many prior behavioural studies, in this study, we examine the combined influence of personality

and technostress creators on job outcomes rather than the direct impact of personality traits on stress creators. We believe our study with job related outcomes will have significant practical implications for organisations. Hence, for this research we hypothesise the moderating role of personality traits on the relationship between technostress creators and job outcomes. In the following sections, we theorise the moderating role of an individual's personality traits and explain the mechanisms through which these traits moderate the influence of technostress creators on job outcomes. But prior to that, in the next section, we explain TMSC.

Transactional model of stress and coping

In this research, we utilise Lazarus and Folkman's TMSC (1984) as the theoretical framework for explaining the mechanisms through which personality traits moderate the influence of technostress creators on job outcomes. We choose this theory because recent research suggests that the popular models of occupational stress, namely person–environment fit theory (Edwards *et al.,* 1998), cybernetic theory (Cummings & Cooper, 1998) and control theory (Spector, 1998), do not sufficiently explain the possibility of positive responses to stress, i.e. eustress caused by individual differences (see Le Fevre *et al.,* 2003). Stressful experiences, in general, are construed as person–environment transactions. These transactions depend on the impact of external stress creators, which are demands made by the internal or external environment that upset balance and thereby affect the individual's physical and psychological well being, requiring action by the individual to restore the balance (Lazarus & Cohen, 1977). External demands are the demands from the contextual environment that need to be met by individuals situated therein (see Beaudry & Pinsonneault, 2005). These demands may be related to the roles played by individuals in the organisation, the tasks assigned to them and/or the technologies they use. Internal demands, on the other hand, are the individual's personal desires and requirements that the environment must meet. An example of an internal demand would be an individual's desire to find his or her job challenging enough, in contrast to the challenges that a specific job offers (French *et al.,* 1974). Stress results from an imbalance between demands and resources. Individuals become stressed when demands or pressures exceed their resources or their ability to cope and mediate the stress. Stress creators are the conditions or factors that create stress, which, in the case of ICT usage in organisations, are termed 'technostress creators' (Tarafdar & Tu, 2010).

The relationship between stress creators and the generated stress is mediated by (1) the individual's appraisal of the stress creators, and (2) the action taken by the individual in view of the available resources at the individual's disposal (Antonovsky & Kats, 1967; Lazarus & Cohen, 1977; Cohen, 1984). Thus, when faced with stress creators, individuals cope with the disruptions using two key processes that continuously influence each other (Lazarus & Folkman, 1984; Beaudry & Pinsonneault, 2005). Firstly, individuals evaluate the potential consequences of the event by making an *appraisal*. The primary appraisal is a person's judgement about the significance of the event as stressful, positive, controllable, challenging or irrelevant. Faced with the stress creator, the second appraisal follows, which is an assessment of the individual's coping resources and options (Cohen, 1984). Secondary appraisals address what the individual can do about the situation. Individuals perform different actions to deal with the situation at hand,

which are their coping efforts (Lazarus & Folkman, 1984). Thus, coping is the act of adaptation that individuals perform in response to disruptive events that occur in their environment.

The introduction and use of a new and complex ICT in an organisation is a disruptive event that generates several expected and unexpected consequences in the user's environment, and these are interpreted and understood in different ways by different individuals with different dominant personality traits, triggering varied and complex user responses (Pinsonneault & Rivard, 1998; Griffith, 1999). Thus, individuals with different personality traits will evaluate and appraise disruptive events caused by ICTs differently, because of their varying internal and external demands. In management literature, disruptive events are appraised as one of two main types: either as opportunities to improve job performance (events perceived as having positive consequences) or as threats to the job (events perceived as having negative consequences; see Beaudry & Pinsonneault, 2005; Carpenter, 1992; McCrae, 1989). Lazarus & Folkman (1984) specified disruptions as multifaceted and capable of being perceived as comprising both opportunities and threats. The positive or negative evaluation of ICTs and technostress creators by different individuals will be influenced by external demands (situational variables and available coping options) as well as the internal demands (personality traits) of the individuals (Lazarus & Folkman, 1984).

Prior studies have largely focussed on situational variables such as technology characteristics (Ayyagari *et al.,* 2011), involvement facilitation and innovation support (Tarafdar & Tu, 2010). However, the role of internal demands imposed by personality traits in perceiving disruptions due to ICTs as opportunities or threats, thus resulting in positive or negative job outcomes for individuals, remains unexamined. Moreover, technostress creators have generally been studied as negative phenomena causing reduced satisfaction and performance (Tarafdar & Tu, 2010; Tarafdar *et al.,* 2014). In the present research, we theorise and test the effect of technostress creators on individuals with different personality traits with respect to the negative outcome of job burnout and the positive outcome of job engagement, which we believe constitutes a significant contribution to the occupational stress literature in general and the technostress literature in particular.

THEORY AND HYPOTHESES

Hypothesis development and research model

In this section, taking different personality traits into account and grounding our discussion in TMSC, we theorise the moderating influence of personality traits in the relationships between technostress creators and job burnout and job engagement.

Openness to experience

The openness-to-experience trait includes flexibility of thought and tolerance for new ideas. Individuals described as having a high level of openness to experience are curious and willing to try out new and different things. Past research has found these individuals to be imaginative, aesthetically responsive, empathic, explorative and unconventional (McCrae & Costa, 1991), with high levels of scientific and artistic creativity and divergent thinking (Judge *et al.,* 2002).

In addition, a high level of openness to experience is consistently associated with training proficiency and predisposes individuals to enjoy learning experiences (Barrick *et al.,* 2001). Because of their propensity to try novel approaches to their work, individuals high in the openness-to-experience trait are more likely to have positive attitudes and cognitions towards job-related technologies and the associated stresses (see Devaraj *et al.,* 2008). From a TMSC perspective, such individuals will view ICT-related disruptions on the job as opportunities for learning new things and for performing better. Thus, individuals high on the openness-to-experience dimension will have positive cognitions towards the experienced technostress creators and will leverage technostress creators as opportunities for performing better. Moreover, by influencing the perception of technostress creators as positive, openness to experience will lower experienced emotional exhaustion and job burnout. The openness-to-experience trait will also help increase job engagement in exploring the emergent opportunities arising from technostress creators. Hence, we hypothesise the following:

H1a: Openness to experience negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the openness-to-experience trait is higher.

H1b: Openness to experience positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the openness-to-experience trait is higher.

Neuroticism

The neuroticism trait includes insecurity, anxiousness and hostility. Individuals high in neuroticism are anxious, embarrassed and depressed and tend to have negative emotions when they face changes. Prior research has identified neuroticism as one of the personality variables affecting beliefs about behaviour, and empirical research has found it to be negatively associated with several constructive ingredients for work behaviour such as enhanced job performance and job satisfaction (Smith *et al.,* 1983; Barrick & Mount, 2000; Devaraj *et al.,* 2008). From a TMSC perspective, individuals high in the neuroticism trait are likely to view ICT-related job disruptions as more threatening and to form further negative beliefs about the technology use. Such individuals will thus view technostress creators as threats (Goldberg, 1990) and develop negative attitudes and cognitions towards job-related technologies. This negative appraisal of technostress creators by individuals high in neuroticism will lead to greater anxiousness, thereby enhancing their emotional exhaustion and the associated job burnout. Further, because a higher level of the neuroticism trait implies insecurity and hostility, technostress creators will influence job engagement more strongly at higher levels of neuroticism trait. Moreover, at lower levels of neuroticism, technostress creators will have a stronger relationship with job engagement than at higher levels of neuroticism. Hence, we hypothesise the following:

H2a: Neuroticism positively moderates the relationship between technostress creators and

job burnout such that technostress creators influence job burnout more strongly when the neuroticism trait is higher.

H2b: Neuroticism negatively moderates the relationship between technostress creators and job engagement such that the technostress creators influence job engagement less strongly when the neuroticism trait is higher.

Agreeableness

The agreeableness trait characterises an individual's propensity to strive for harmony and low levels of conflict in interpersonal relationships (McCrae & Costa, 1991). Individuals described as high in the agreeableness personality trait are kind, considerate, likable, helpful and cooperative (Graziano & Eisenberg, 1997). Such individuals are more likely to be accommodating and cooperative when asked to use organisational ICTs (Devaraj *et al.,* 2008). Because they have a communal orientation (Zellars & Perrewé, 2001), these individuals will agree to use new organisational ICTs in their job even without having the required capability or will, which might impact their perceptions of stress creators (Michel *et al.,* 2011). Hence, individuals high in agreeableness will most likely develop negative perceptions towards technostress creators; as internally, they will feel threatened in performing tasks that are beyond their capacity. Thus, because of their propensity to stretch beyond their capacity to help others and maintain harmony, these individuals may perceive technostress creators as threatening, which can increase their stress levels and result in increased emotional exhaustion and the associated job burnout. Further, because of this potential confusion and conflict about technostress creators, their engagement with the job might go down. Hence, we hypothesise the following:

H3a: Agreeableness positively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout more strongly when the agreeableness trait is higher.

H3b: Agreeableness negatively moderates the relationship between technostress creators and job engagement such that the technostress creators influence job engagement less strongly when the agreeableness trait is higher.

Conscientiousness

Individuals high in the personality trait of conscientiousness strive for dependability, attention to detail and exact effort (Barrick *et al.,* 2001). They are characterised by self-control reflected in a need for achievement, order and persistence (Costa *et al.,* 1991). Because conscientious individuals are intrinsically motivated to improve their job performance and are ready to accept technologies that provide them with such a challenge, these individuals would perceive technostress creators as an opportunity to improve their job performance. This, in turn, will increase their positive stress levels (eustress) and attenuate job burnout. In addition, such individuals are intrinsically motivated to pay close attention to new situations and strive for excellence,

efficiency, accuracy and detail (Costa *et al.,* 1991). Hence, it is quite likely that such individuals will experience higher job engagement because of technostress creators. In summary, individuals high in conscientiousness will most likely develop positive perceptions towards technostress creators; as internally, they will feel challenged to excel and perform with efficiency and accuracy. Thus, because of their eustress, these individuals may perceive technostress creators as an opportunity to achieve and perform better, which attenuates their job burnout. Further, in their quest for excellence, their engagement with the job will amplify. Hence, we hypothesise the following:

H4a: Conscientiousness negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the conscientiousness trait in individuals is higher.

H4b: Conscientiousness positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the conscientiousness trait in individuals is higher.

Extraversion

Individuals high in the extraversion trait are social, active and outgoing and place a high value on close and warm interpersonal relationships (Watson & Clark, 1997). Devaraj *et al.* (2008) suggested that individuals high in the extraversion personality trait are naturally inclined to use the technologies introduced in their organisations, as they are extrinsically motivated to maintain a favourable social image within the organisation. Consequently, taking a TMSC perspective, such individuals are more likely to perceive technostress creators as an opportunity to enhance their power and influence within the organisation, thereby improving their job performance because of the image enhancement. Because individuals high in this personality trait view organisational ICT as an opportunity, higher levels of the extraversion trait will tend to lower experienced emotional exhaustion and job burnout as compared with individuals with lower levels of extraversion trait. Thus, at lower levels of extraversion, the relationship between technostress creators and job burnout will be stronger. In a similar vein, individuals with a higher extraversion trait will associate technostress creators with opportunity, thereby increasing their job engagement because of the technostress creators. Hence, we hypothesise the following:

H5a: Extraversion negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the extraversion trait in individuals is higher.

H5b: Extraversion positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the extraversion trait in individuals is higher.

A summary of the theoretical logic from the TMSC perspective for the role of personality traits in moderating the influence of technostress creators on job burnout and job engagement is given in Appendix 5. Figure 1 presents the research model for this study (along with the control variables), based on the hypotheses that have been developed.

METHOD

Data collection

We used a survey method for collecting data and testing the proposed hypotheses. Validated scales from existing literature were adapted to the research context to formulate the questionnaire (Appendix 6). To measure the items, we used a 7-point Likert scale. Data were collected through questionnaires distributed to senior-level organisational managers who regularly use ICTs to accomplish their professional tasks. We sent online invitations to participate in the study survey to nearly 700 senior managers. The mailing list was prepared using alumni lists from two leading business schools, one in Europe and the other in Asia. Further, invitations were also sent to senior executives from several large corporations who agreed to participate in the study. An online link to the survey was attached to the email invitation, along with a letter which informed the participants of the voluntary nature of survey participation and assured them of confidentiality. A follow-up reminder was sent a week later; after which, we finally received 152 usable responses.

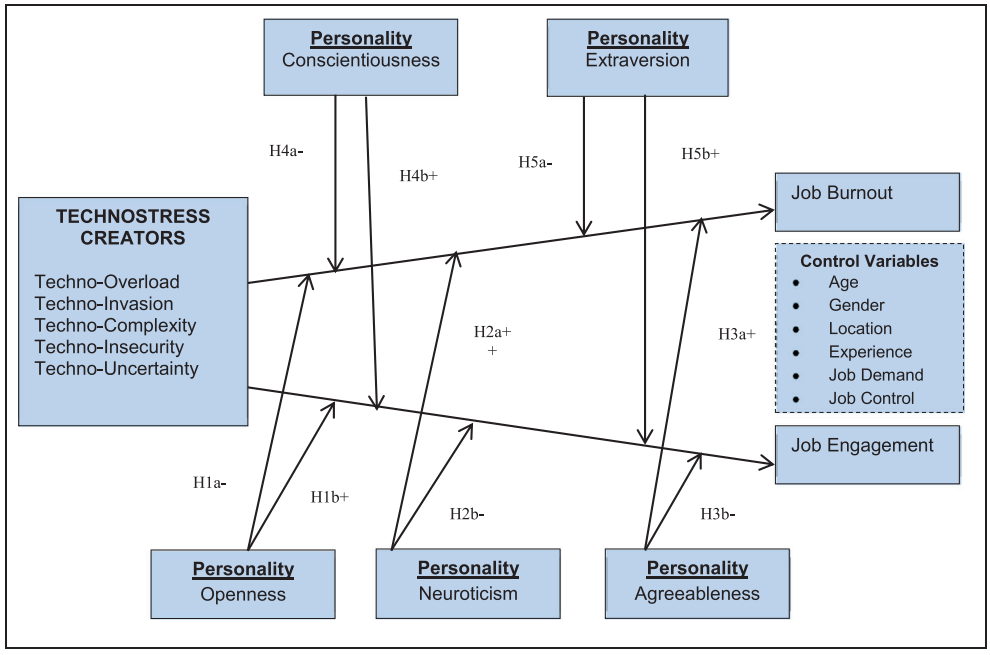


Figure 1. Research model and proposed hypotheses.

To negate the possible influence of confounds due to outliers, we performed an outlier analysis using Cook's distance measures (Belsley *et al.,* 1980). No significant outliers were identified in our sample; hence, we conducted further analysis using all the usable responses. Because the research involved self-reported responses by the survey respondents, it was important to test for the possibility of response bias. Response bias influences the responses of survey participants away from accurate responses, resulting in a large impact on the validity and reliability of the survey to which the respondent is responding (Nederhof, 1985; Furnham, 1986). It is therefore important to be aware of the possibility of any response bias and to attempt to prevent it from negatively impacting the findings. Four main types of response bias were checked and controlled for in the study, as described in Appendix 7. Furthermore, all the validity and reliability criteria were met. The details can be found in Appendix 8. In addition, because all data were self-reported and collected through the same questionnaire during the same period of time with a cross-sectional research design, common method variance, i.e. variance that is attributed to the measurement method rather than the constructs of interest, may cause systematic measurement error and further bias the estimates of the true relationships amongst theoretical constructs. To alleviate such concerns, we adopted a number of procedural remedies and statistical controls, which are described in Appendix 9. Our tests showed that the results of this study do not suffer any confounds because of common method bias.

Control variables

Because the quality of dependent variables may be influenced by factors other than those in the hypothesised model, we incorporated suitable controls in the research model for the two job-related variables to better understand the variance explained by the research variables. Control variables of five different types were included in the research model to account for alternative explanations, namely: (1) respondent demographics: age and gender. Where for age, we used the number of years as reported by the respondent, and for gender, we used a dummy variable indicating male or female; (2) respondent experience: total work experience and work experience with the current employer as the number of completed years; (3) extent of ICT use measured as the number of average hours of ICT use per week; (4) location of employment, because we had respondents from both European and non-European countries and we wanted to eliminate any influence of location and culture on our results, for which we used a dummy variable indicating Europe or non-Europe; and (5) job characteristics indicated by the extent of job demand and job control. The variables for job characteristics were measured using single-item questions for job demand ('My job places conflicting demands on me'; Bala & Venkatesh, 2013; Karasek, 1979; van Jaarsveld *et al.,* 2010) and job control ('I have a say over what happens at work'; Bala & Venkatesh, 2013; Ilies *et al.,* 2010). Because these control variables have been indicated using single items, there are no measurement issues. Nonetheless, to evaluate all the variables together, we did a correlation analysis with all the other constructs and control variables and found that the correlations are satisfactory as shown in Appendix 8. The analysis shows that all the control

variables including job demand and job control are distinct from other constructs including job burnout and job engagement.

RESULTS AND DISCUSSION

The demographics of the survey respondents are presented in Table 1.

Analysis of respondent demographics shows that nearly 77% of the respondents in our sample were male. The average respondent age was 37.96 years (*S.D.* = 6.73), and the respondents averaged 14.80 years (*S.D.* = 6.80) of total work experience and 7.33 years (*S.D.* = 5.71) of experience with the current employer. Nearly 77% of the respondents reported themselves as working in managerial positions. Moreover, the high level of work experience indicates that most respondents were working at senior managerial levels in organisations. The average ICT use for professional work was 28.12 h per week (*S.D.* = 18.53). The respondents from Europe constituted 35.5% of the sample, whilst 64.5% of the respondents were from non-European countries. Appendices 6 and 9 provide the means, standard deviations and correlations for the research variables in the study. The research model examines the impact of technostress creators together with the big five personality variables on the two job outcome measures related to employee well-being, namely job burnout and job engagement. As both the dependent variables in this research measure job outcomes related to employee well-being, there is a possibility of unobserved relationships between them, implying that the error terms for the two dependent variables might be correlated with each other because of omitted factors that influence perceptions of job burnout and job engagement. To allay the possibility of biassed estimates using ordinary least squares, our model is estimated using seemingly unrelated regression (SUR; see Maruping *et al.,* 2009; Srivastava & Teo, 2012) using STATA (version 12.1; StataCorp LP, College Station, TX, USA) software. Specifically, a three-step hierarchical SUR model was used for testing the hypotheses. In the first step, we introduced all control variables, followed by aggregated

Table 1. Demographics of survey respondents

Measures	Items	Frequency	Percentage
Age	21 to 30 years	25	16.4
	31 to 40 years	73	48.02
	41 to 50 years	49	32.24
	Above 50 years	5	3.29
Gender	Male	116	76.3
	Female	36	23.7
Work experience	$<$10 years	41	27.0
	11 to 15 years	45	29.6
	Above 15 years	66	43.4
Nature of work	Managerial	116	76.3
	Technical	19	12.5
	Other	17	11.2
Workplace location	Europe	54	35.5
	Non-Europe	98	64.5

technostress creators along with the five personality variables in the second step. Finally, in the third step, we added the interaction terms formed by multiplying the technostress creators and the five personality trait variables. Following the guidelines outlined by Aiken & West (1991), we mean-centred all values prior to creating the interaction terms to reduce collinearity. We also checked for multicollinearity of our predictors; we calculated the variance inflation factor and found no significant multicollinearity problems (Hair *et al.,* 2006; Neter *et al.*, 1996). The stepwise regression results for hypothesis testing are presented in Table 2.

Control variables together explain 13.9% of the variance in job burnout and 17.6% of the variance in job engagement. Moreover, amongst the control variables, total work experience ($u = -0.126$, $p < 0.01$) and job demand ($\beta = 0.185$, $p < 0.01$) have significant relationships with job burnout, and job control ($\beta = 0.218$, $p < 0.01$) has a significant relationship with job engagement. The high explained variance by the control variables indicates a reasonable choice of controls in the research model. Upon incorporating the main effects of technostress creators and personality variables into the regression equation (step 2, main effects model), we observe a significant change in variance (ΔR^2), i.e. 21% (job burnout) and 7.6% (job engagement), compared with the control variable models. We also observe that technostress creators significantly influence both job burnout ($\beta = 0.324$, $p < 0.01$) and job engagement ($\beta = 0.186$, $p < 0.05$). Turning to the personality variables, neuroticism ($\beta = 0.378$, $p < 0.01$) is significantly related to job burnout, whereas neuroticism ($\beta = -0.145$, $p < 0.05$) and agreeableness ($\beta = 0.217$, $p < 0.05$) are significantly related to job engagement, albeit in opposite directions.

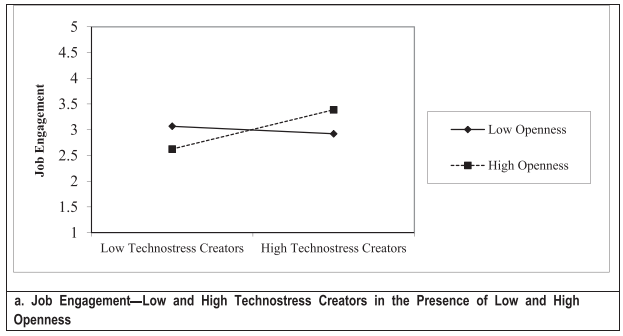
In the third step, we test for the hypothesised moderating influence of the personality variables (openness, neuroticism, agreeableness, conscientiousness and extraversion) on the relationship between technostress creators and the two job-outcome variables, job burnout and job engagement. From the results, we observe that openness does not significantly moderate the relationship between technostress creators and job burnout ($\beta = 0.082$, ns), but it does positively moderate the relationship between technostress creators and job engagement ($\beta = 0.227$, $p < 0.05$). To better understand the pattern of significant interactions between technostress creators and personality variables, we plotted the significant interactions following the guidelines of Aiken and West (1991). The slopes of the lines were plotted one standard deviation of negative affect above and below the mean. Additional insights can be gleaned from the interaction plots compared with the results table alone. Figure 2a shows the significant impact of the interaction between 'technostress creators' and the personality variable 'openness' on job engagement.

From Figure 2a, we observe that openness to experience positively moderates the relationship between technostress creators and job engagement. Further, we observe that at low levels of openness to experience, job engagement does not change much with the level of technostress creators. We also performed slope test and found that the slope for high openness to experience is significantly different from zero whereas the slope for low openness to experience is not significantly different from zero; further, the two slopes are significantly different from each other. Thus, technostress creators influence job engagement more strongly when the openness-to-experience trait is higher. From the combined results in Table 2 and Figure 2a, we conclude that H1a is not supported but H1b is supported.

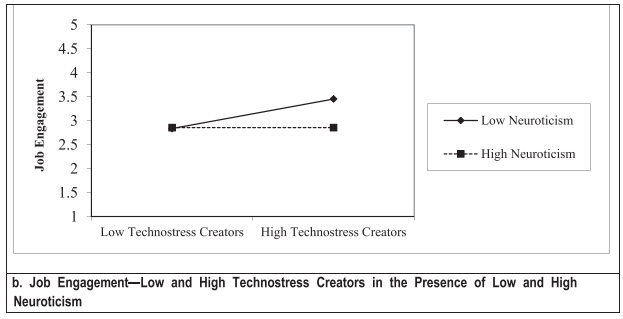
Table 2. Results of seemingly unrelated regressions

	Job burnout			Job engagement		
	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
	Control variables β	Main effects β	Interaction effects β	Control variables β	Main effects β	Interaction effects β
Constant	−0.001 (0.099)	−0.001 (0.087)	−0.028 (0.086)	−0.001 (0.073)	0.001 (0.070)	0.054 (0.070)
Age	0.105 (0.043)	0.113 (0.039)	0.114 (0.038)	−0.015 (0.032)	−0.017 (0.031)	−0.034 (0.031)
Gender	0.042 (0.243)	0.012 (0.220)	−0.029 (0.218)	−0.031 (0.179)	−0.058 (0.177)	−0.084 (0.177)
Location	0.156 (0.213)	0.189 (0.189)	0.140 (0.186)	−0.253 (0.157)	−0.241 (0.153)	−0.270 (0.152)
Total work experience	**−0.126** (0.044)**	**−0.116** (0.038)**	**−0.115** (0.038)**	0.012 (0.033)	0.001 (0.031)	0.020 (0.031)
Experience with current employer	−0.011 (0.025)	−0.017 (0.023)	−0.019 (0.022)	0.027 (0.019)	0.036 (0.018)	0.037 (0.018)
Hours of ICT use per week	−0.005 (0.006)	−0.006 (0.005)	−0.004 (0.004)	0.007 (0.004)	0.005 (0.004)	0.003 (0.004)
Job demand	**0.185** (0.065)**	**0.117* (0.061)**	**0.116* (0.059)**	0.030 (0.048)	0.006 (0.049)	0.005 (0.048)
Job control	0.060 (0.084)	−0.004 (0.078)	−0.036 (0.076)	**0.218** (0.062)**	**0.243** (0.063)**	**0.269** (0.062)**
Technostress creators		**0.324** (0.113)**	**0.301** (0.114)**		**0.186* (0.091)**	0.154 (0.093)
Personality – openness		0.095 (0.094)	0.126 (0.092)		0.012 (0.076)	0.006 (0.075)
Personality – neuroticism		**0.378** (0.073)**	**0.390** (0.070)**		**−0.145* (0.058)**	**−0.144* (0.057)**
Personality – agreeableness		−0.120 (0.112)	−0.099 (0.112)		**0.217* (0.090)**	**0.251* (0.091)**
Personality – conscientiousness		−0.032 (0.088)	0.012 (0.089)		0.071 (0.071)	0.066 (0.072)
Personality – extraversion		0.092 (0.104)	0.063 (0.102)		−0.132 (0.084)	−0.154 (0.082)
Technostress creators × openness			0.082 (0.130)			**0.227* (0.105)**
Technostress creators × neuroticism			0.080 (0.090)			**−0.154* (0.072)**
Technostress creators × agreeableness			**0.344* (0.151)**			0.020 (0.123)
Technostress creators × conscientiousness			−0.011 (0.127)			−0.014 (0.103)
Technostress creators × extraversion			**−0.291* (0.133)**			0.041 (0.108)
R^2	**0.139****	**0.349****	**0.398****	**0.176****	**0.252****	**0.301****
ΔR^2		**0.210****	**0.049****		**0.076****	**0.049****
X-square	**24.470**	**81.300**	**100.610**	**32.560**	**51.230**	**65.300**
P Value	**0.002**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**

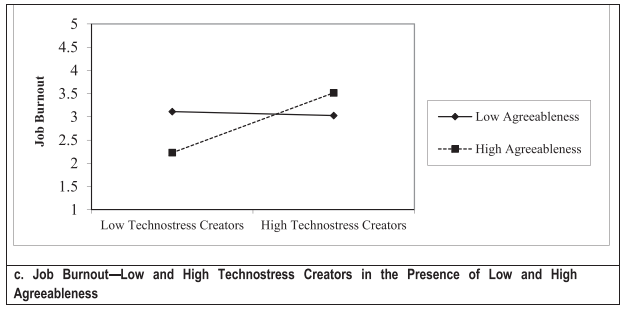
Notes: Significant figures are shown in boldface. $n = 152$. Figures in parentheses are standard errors.
**$p <$ = 0.01 level;
*$p <$ =0.05 level.



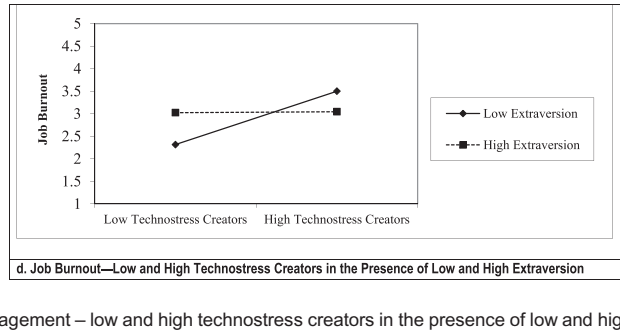
a. Job Engagement—Low and High Technostress Creators in the Presence of Low and High Openness



b. Job Engagement—Low and High Technostress Creators in the Presence of Low and High Neuroticism



c. Job Burnout—Low and High Technostress Creators in the Presence of Low and High Agreeableness



d. Job Burnout—Low and High Technostress Creators in the Presence of Low and High Extraversion

Figure 2. a) Job engagement – low and high technostress creators in the presence of low and high openness. b) Job engagement – low and high technostress creators in the presence of low and high Neuroticism. c) Job burnout – low and high technostress creators in the presence of low and high agreeableness. d) Job burnout – low and high technostress creators in the presence of low and high extraversion.

A plausible reason for the non-support of H1a could be the fact that despite the enthusiasm, the openness-to-experience trait may tend to overload an employee with more than the desirable amount of work. This overload may contribute to some degree of emotional exhaustion and burnout. Yet, as explained in the argument for H1a, individuals with the openness-to-experience personality trait will not feel threatened by new experiences and technologies. Thus, individuals with this trait experience a mix of both positive and negative influences of technostress creators, leading to a non-significant result for H1a.

Next, we observe that neuroticism does not significantly moderate the relationship between technostress creators and job burnout ($\beta = 0.080$, ns), but it does negatively moderate the relationship between technostress creators and job engagement ($\beta = -0.154$, $p < 0.05$). Figure 2b shows the significant impact of the interaction between 'technostress creators' and the personality variable 'neuroticism' on job engagement.

From Figure 2b, we observe that neuroticism negatively moderates the relationship between technostress creators and job engagement, and technostress creators influence job engagement less strongly when the neuroticism trait is higher. At low levels of neuroticism, job engagement is significantly higher than for high levels of the neuroticism trait. We also observe that at low levels of technostress creators, the level of neuroticism does not make a difference to the experienced job engagement. We also performed slope test and found that the slope for high neuroticism is not significantly different from zero whereas the slope for low neuroticism is significantly different from zero; furthermore, the two slopes are significantly different from each other. From the combined results in Table 2 and Figure 2b, we conclude that whilst H2a is not supported, H2b is supported. To explain the non-support of H2a, we looked again at the results presented in Table 2, where we observe that neuroticism has a strong direct significant relationship with job burnout. This implies that the personality trait of neuroticism induces a significant amount of emotional exhaustion. Because of the strong direct effect of neuroticism on job burnout, it is plausible that the relative influence of technostress creators in combination with neuroticism may not significantly enhance the experienced emotional exhaustion and job burnout. This could be a plausible reason for the non-significant result for H2a.

Next, from Table 2, we observe that as hypothesised, the agreeableness trait positively moderates the relationship between technostress creators and job burnout ($\beta = 0.344$, $p < 0.05$), but it does not significantly moderate the relationship between technostress creators and job engagement ($\beta = -0.020$, ns). Figure 2c shows the influence of the interaction between 'technostress creators' and the personality variable 'agreeableness' on job burnout.

From Figure 2c, we observe that technostress creators influence job burnout more strongly when the agreeableness trait is higher. But we also notice that in a scenario of low technostress creators and low agreeableness, job burnout is higher than in a scenario of high agreeableness and low technostress creators. However, as the technostress creators increase, the job burnout decreases for low agreeableness but rises for high agreeableness. In addition to the hypothesised positive moderation, the result is interesting because the slopes of the lines indicate a positive relationship between technostress creators and job burnout for high agreeableness. We also performed slope test and found that the slope for high agreeableness is significantly different from zero whereas the slope for low

agreeableness is not significantly different from zero; furthermore, the two slopes are significantly different from each other.

From the combined results in Table 2 and Figure 2c, we conclude that H3a is supported, but H3b is not supported. The non-significant H3b result can be explained by the fact that agreeableness is an extrinsically driven trait. Individuals with a high agreeableness trait will tend to take on more work and do new things, so externally, they will be doing more work, but internally, because of the work overload, their job engagement may suffer. In a scenario of high-technostress creators, the agreeableness trait encourages individuals to take on more work (which is positive) but also to suffer because of overwork (which is negative). It is plausible that because of the mixed influence of positive and negative influences of the agreeableness trait on the relationship between technostress creators and job engagement, the moderation effect is not significant.

Turning to the personality trait of conscientiousness, we observe that conscientiousness does not significantly moderate either the relationship between technostress creators and job burnout ($\beta = 0.004$, ns) or the relationship between technostress creators and job engagement ($\beta = -0.024$, ns). Thus, both H4a and H4b are not supported. The non-significant H4a and H4b result can be explained by the fact that the personality trait of conscientiousness may be instrumental in appraising organisational technologies neither as an opportunity nor as a threat. Individuals high in the personality trait of conscientiousness are intrinsically motivated to achieve, perform at a high level and take actions to improve their job performance (Devaraj *et al.,* 2008). They are characterised by self-control reflected in a need for achievement, order and persistence (Costa *et al.,* 1991). Because conscientious individuals are intrinsically motivated to improve their job performance wherever possible and are ready to accept organisational technologies that help them in their job, technostress creators are unlikely to cause job burnout for these individuals. In addition, because they tend to pay attention to details and adhere to rules, these individuals are intrinsically motivated to pay close attention to new situations. Hence, it is quite unlikely that such individuals will experience any change in job engagement because of technostress creators. The same may be true for individuals low on conscientiousness trait characterised by laid-back individuals with minimal intrinsic motivation to achieve and perform (see Devaraj *et al.,* 2008). It is plausible that because an individual's level of conscientiousness indicates an intrinsic fundamental desire to either achieve or be indifferent to achievement, we did not find the level of conscientiousness to influence the relationship between extrinsic technostress creators and job burnout. For the same reason, we did not find the level of conscientiousness to interact with external technostress creators in influencing the extent of involvement and engagement with the job.

Finally, we observe that as hypothesised, extraversion negatively moderates the relationship between technostress creators and job burnout ($\beta = -0.291$, $p < 0.05$), but it does not significantly moderate the relationship between technostress creators and job engagement ($\beta = 0.041$, ns). Figure 2d shows the significant influence of the interaction between 'technostress creators' and the personality trait 'extraversion' on job burnout.

From Figure 2d, we observe that technostress creators influence job burnout less strongly when the extraversion trait in individuals is higher. We also observe that in a scenario of low technostress creators and low extraversion, job burnout is lower than in a scenario of high

extraversion and low technostress creators. High extraversion helps mitigate the effect of high-technostress creators on job burnout. We also performed slope test and found it to be consistent with the result, and the slopes for high and low extraversion are significantly different from each other, and that technostress creators influence job burnout significantly less strongly when the extraversion trait in individuals is higher. From the combined results in Table 2 and Figure 2d, we conclude that H5a is supported, but H5b is not supported. The non-support of H5b can be explained by the fact that, in addition to the positive influence of extraversion on the relationship between technostress creators and job engagement, as explained in the hypothesised argument for H5b, individuals high in extraversion will devote a significant amount of time interacting and socialising with other persons in the organisation. Although this process will tend to reduce their emotional exhaustion and job burnout, as they will enjoy the work more, it will also serve to disrupt their smooth working, which adversely affects their job engagement. Hence, it is plausible that individuals high in the extraversion trait will experience a mix of both positive and negative influences of technostress creators on job engagement, leading to a non-significant result for H5b.

Appendix 10 lists out a summary of the results and supported hypotheses. The positive effects of technostress creators were interesting, and the non-significant moderation effects were intriguing. Although we have explained our observations, which were different from our hypothesised relationships, it is important to conduct a power analysis so as to assess if the model is strong enough to detect significant effects and confidently reject the ones that do not exist. This is especially important because the sample size for our study is relatively small. Thus, to be confident about the results, we conducted power analysis and found that the observed statistical power for both the dependant variables – job burnout (1.0) and job engagement (0.99) to be above the acceptable level of 0.80 (Cohen, 1988). Hence, we conclude that we have appreciable statistical power to detect significant effects and more importantly reject the non-significant ones.[1]

LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Although this study makes significant contributions, there are a few limitations. Firstly, the data were self-reported and thus may be subject to respondents' personal memory and biases whilst answering the questions. Moreover, the study was cross sectional, and the respondents' perceptions and intentions were measured at a single point in time. In addition, only less than one-third of the invited respondents actually filled in the survey. These limitations can lead to problems of bias – specifically response bias and common method bias. To mitigate these biases, we checked and controlled for response bias (Appendix 7). We also adopted a number of procedural remedies to alleviate common method bias and conducted statistical tests to conclude that common method bias did not confound the results (Appendix 9). In future, a longitudinal study with similar objectives can be used to complement the findings from this research. Secondly, we assumed linear relationships between technostress creators and job

[1]The authors would like to thank the SEs for making this important suggestion.

outcomes, although there is possibility of inverted-U-shaped relationships. Based on our theorization in this study, we restricted the scope to examining the linear moderating influence of personality traits. Nonetheless, we believe that it will be interesting for future research to theorise and test for nonlinear relationships. Thirdly, in order to understand the influence of personality factors on the impacts of technostress creators, the big five personality traits describing the personality profiles across the five dimensions were applied individually – following the nomothetic approach. In actual practice, it is possible that an individual may demonstrate several dominant personality traits that may have a combined or interactive effect on the perception of technostress creators and thus have varied influences on job outcomes. In this paper, we have limited ourselves to using a nomothetic approach, which is also the dominant approach in occupational stress literature and is widely accepted for examining the moderating influence of personality traits on the relationship of technostress creators with job outcomes (see Grant & Langan-Fox, 2006). This approach helps in obtaining an overall insight into individuals' personality dimensions against general population norms. However, it would be interesting to adopt an idiographic approach to provide a more nuanced understanding of how differences in the combinations of personality traits within the same individual may interact and influence job outcomes. This is certainly an important avenue for future technostress-related research. Fourthly, this study has a limited focus on two conveniently chosen job-related outcomes (job burnout and job engagement) because individuals with varying personality traits may perceive disruptions because of ICTs as opportunities or threats, thus resulting in positive or negative job outcomes for individuals. Future studies can examine the change when more/different outcomes are included. Fifthly, our responses might be affected by culture as the data in this study was collected from different continents/regions (Tu *et al.,* 2005). Because we had respondents from both European and non-European countries and we wanted to eliminate any impact of location and culture on our results, we controlled for location whilst testing the influence of personality variables on the impacts of technostress creators. Future studies can theorise the cultural dimension more explicitly in the context of technostress. Sixthly, as the respondents were from both European and non-European countries rather than from one location, generalizability of results can be an issue. Nonetheless, from the results, we see that there is no significant difference between the responses from European versus non-European managers. It is plausible that at senior management levels, location may not be a significant factor in determining the job outcomes. The study thus provides some insights into how the research findings and conclusions from this study can be applied to a larger population.

IMPLICATIONS

The study makes several contributions that have implications for both research and practice.

Implications for research

Firstly, prior organisational stress, literature has established the significant relationship of job stressors with negative job outcomes. In a similar vein, literature on technostress has

examined the salient role of technostress creators in contributing to undesirable outcomes such as reduced job satisfaction, reduced organisational productivity and increased job strain (see Ragu-Nathan *et al.,* 2008; Tarafdar & Tu, 2010; Ayyagari *et al.,* 2011). Notwithstanding these findings, a salient discourse on occupational stress conceptualises stress as the natural behavioural response to external influences and views stress as a natural consequence of living (Vasse *et al.,* 1998; Richmond & Kehoe, 1999). In addition, researchers such as Selye (1964, 1987) have distinguished between distress (bad stress) and eustress (good stress). This branch of stress research has shown that distress causes negative job outcomes such as increased strain, whilst eustress results in positive job outcomes such as increased performance, in models of occupational stress (Harris, 1970; Selye, 1987; Edwards & Cooper, 1988; Code & Langan-Fox, 2001; Le Fevre *et al.,* 2003). Despite the salience of the distress/eustress concept in the organisational literature, it has not yet been leveraged in the technostress literature. The present study is one of the first to theorise and empirically establish that technostress creators in certain situations may produce positive job outcomes such as increased job engagement, in addition to having the usual negative outcomes such as job burnout. The results from this study thus also establish the need to distinguish between stress creators creating distress (negative stress) and those creating eustress (positive stress) in the context of technology-induced stress (see Mark *et al.,* 2003). Further research in this direction is certainly needed to examine the contexts in which technostress creators can be leveraged for positive outcomes. In addition, the levels of technostress creators may also determine their influence on job outcomes. It is possible that lower levels of stress might be viewed as eustress whilst higher levels of stress become distress.

Secondly, this research incorporates the significant role of personality traits into the technostress creators–job outcomes model. Grounding the research in the TMSC, the study theorises and empirically tests the moderating influence of personality traits on the relationship between technostress creators and job outcomes, specifically job burnout and job engagement. This is especially interesting because the coping mechanisms for individuals with different personality traits are quite different, leading to differences in how they perceive technostress creators, i.e. as opportunities or as threats. In turn, the latter leads to differences in the resulting job outcomes of either burnout or engagement. This research also offers a nuanced understanding of how the different personality traits of *openness to experience, neuroticism, agreeableness, conscientiousness* and *extraversion* combine with technostress creators to create a positive or a negative influence on job outcomes. Hence, one of the key contributions of this study is establishing the salience of personality traits for determining the impact of technostress creators on job outcomes. The research also calls for deeply examining the role of personality variables in IS research, because incorporating personality traits into well-established IS research models has been shown to significantly enhance their predictive power (see Devaraj *et al.,* 2008; Junglas *et al.,* 2008). In the present research, incorporating individual-level personality traits along with technostress creators significantly enhanced the predictive power of the research model.

Thirdly, the finding that the same technostress creators can be perceived either as a threat or as an opportunity by individuals with different dominant personality traits calls for additional research. It will be interesting to know whether there are other contextual conditions under

which the same may be possible. For example, other situational factors such as technology characteristics and social support from the organisation may also influence the perception of technostress creators by individuals with different personality characteristics. Also, it extends the stream of recent research that examines the role of organisational interventions and mechanisms that can mitigate the negative effect of technostress on performance (Tarafdar *et al.,* 2014). In addition, prior technostress research has related strain to productivity, organisational commitment and job satisfaction (Tarafdar *et al.,* 2007; Ragu-Nathan *et al.,* 2008; Tarafdar & Tu, 2010; Ayyagari *et al.,* 2011). Given the significance of human capital, future research can study the effect of personality on the relationship between technostress and the stated outcomes.

Implications for practice

Firstly, in the domain of managerial practice, this study can be used as the initial step towards understanding how the personality characteristics of employees using ICT in their organisations influence their job outcomes. Even though personality traits cannot change but are innate predispositions that stabilise with time (McCrae *et al.,* 2004), personality resources are considered to be one of the antecedents to occupational stress and have been shown to affect the coping mechanisms of the individual and the organisation (Lazarus, 1995). Therefore, knowing the role that personality traits play in influencing job outcomes as positive or negative can be leveraged in multiple ways by IS managers and also designers.

Secondly, the results from this study prove that it is unlikely that 'one size will fit all' in terms of ICT usage and ICT-induced stress for organisational employees. Organisational management can carefully plan and implement ICT usage norms to manage ICT-induced stress for individuals with different dominant personality traits. Keeping individual differences in mind whilst describing job expectations might alleviate negative job outcomes and increase positive job outcomes for employees. For example, individuals who are high in openness to experience may be given more complex ICT jobs, as they will perceive them positively and work on them to improve their job performance. Similarly, complex jobs can also be given to individuals low on neuroticism trait because their job engagement increases with increased exposure to technostress creators. From the results, we can also conclude that management can plan after-work duties for extraverted individuals who generally do not perceive these negatively. Thus, this study's findings about relationships between the variables related to personality differences and technostress creators have implications for managing the effects of personality differences on technostress.

Thirdly, our findings suggest that personality differences influence the degree and nature of stress experienced and how an individual responds to it. Our study reinforces the role of personality within the organisational behaviour stress literature, suggesting that different personality traits perceive and react to work stress creators differently because of different levels of emotional stability and coping abilities. The advantage of understanding and recognising individuals' stress-related personalities is that it can aid the development of better organisational stress management strategies. For example, organisations can help their employees develop better coping skills such as adopting a 'control strategy' or a take-charge

attitude about a problem, or using 'social support' to better deal with stressful events (Carver *et al.,* 1989). These strategies can be worked out by the management based on innate differences in the dominant traits of particular employees. Within the organisation, strategies for the identification, management and prevention of technostress can be orchestrated at different levels. For example, organisation-focused strategies might include modifying the physical demands of the job or the interpersonal demands at work, and individual-focused strategies might include either managing ways of coping with technostress creators (primary prevention) or modifying responses to inevitable technology-related demands (secondary prevention). Certain therapeutic treatment strategies can also be prescribed for affected individuals who may be easily identified or monitored in large organisations because of the presence of certain dominant personality traits (tertiary prevention) in such employees. Overall, the organisation can take into account several stress management and intervention research studies to identify the effects of personality traits on technostress in order to equip the organisation within its specific work context.

CONCLUSIONS

Recent technostress literature has made significant advances in understanding the antecedents and consequences of technostress creators from multiple perspectives (e.g. Tarafdar *et al.,* 2007; Ragu-Nathan *et al.,* 2008; Tarafdar & Tu, 2010; Ayyagari *et al.,* 2011). Moreover, the influence of technostress creators on different outcomes has also been examined (e.g. Tarafdar *et al.,* 2007; Tarafdar & Tu, 2010). Yet the role of individual differences in influencing the perception of technostress creators needs deeper examination (Ragu-Nathan *et al.,* 2008). In the present research, by leveraging the FFM defining the big five personality traits and grounding the study in the TMSC, we theorise and empirically examine the moderating influence of personality traits on the relationships between technostress creators and job outcomes related to employee well-being, namely job burnout and job engagement. We also describe the mechanisms through which different personality traits colour the perceptions of technostress creators and thereby influence different job outcomes, either positively or negatively. By incorporating the significant role of personality traits into the perception of technostress creators and related job outcomes, we offer a nuanced understanding of ICT-induced stress amongst organisational employees. This study will be helpful in informing other aspects of the 'dark side of Information Technology (IT)' in future research. For example, personality traits can be instrumental to other dark-side processes, beyond technostress such as technoaddiction, cyberloafing and cyberbullying. We believe that the relationships established in this paper can be used to further advance research in this important area.

ACKNOWLEDGEMENTS

The authors would like to thank the special issue senior editors, the associate editor, and the anonymous reviewers for their insightful and constructive suggestions, which contributed to

the significant improvement of the quality of this manuscript. The authors would also like to gratefully acknowledge financial support from 'HEC Paris Foundation', which partially funded this project.

REFERENCES

Aharony, N. (2009) Web 2.0 use by librarians. *Library & Information Science Research*, **31**, 29-37.

Ahuja, M.K., Chudoba, K.M., Kacmar, C.J., McKnight, D.H. & George, J.F. (2007) IT road warriors: balancing work–family conflict, job autonomy, and work overload to mitigate turnover intentions. *MIS Quarterly*, **31**, 1–17.

Aiken, L.S. & West, S.G. (1991) Multiple Regression: Testing and Interpreting Interactions. Sage, Newbury Park, CA.

Ajzen, I. (1988) Attitudes, Personality, and Behavior. 1st edn. Open University Press, Stony Startford, UK.

Antonovsky, A. & Kats, R. (1967) The life crisis history as a tool in epidemiologic research. *Journal of Health and Social Behavior*, **8**, 15–20.

Ashton, M.C., Lee, K. & Paunonen, S.V. (2002) What is the central feature of extraversion? Social attention versus reward sensitivity. *Journal of Personality and Social Psychology*, **83**, 245–252.

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

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

Barrick, M.R. & Mount, M.K. (2000) Select on conscientiousness and emotional stability. In: Handbook of Principles of Organizational Behavior, Locke, E.A. (ed.), pp. 15–28. Blackwell, Malden, MA.

Barrick, M.R., Arrick, M.R., Mount, M.K. & Judge, T.A. (2001) Personality and performance at the beginning of the new millennium: what do we know and where do we go next?. *International Journal of Selection and Assessment,* **9**, 9–30.

Beaudry, A. & Pinsonneault, A. (2005) Understanding user responses to information technology: a coping model of user adaptation. *MIS Quarterly*, **23**, 493–524.

Belsley, D.A., Kuh, E. & Welsch, R.E. (1980) Regression Diagnostics. Wiley, New York, NY.

Bolger, N. (1990) Coping as a personality process: a prospective study. *Journal of Personality & Social Psychology*, **59,** 525–537.

Bolger, N. & Zuckerman, A. (1995) A framework for studying personality in the stress process. *Journal of Personality & Social Psychology*, **69**, 890–902.

Bono, J.E. & Judge, T.A. (2004) Personality and transformational and transactional leadership: a meta-analysis. *Journal of Applied Psychology*, **89**, 901–910.

Brillhart, P.E. (2004) Technostress in the workplace: managing stress in the electronic workplace. *Journal of American Academy of Business*, **5**, 302–307.

Brod, C. (1984) Technostress: The Human Cost of the Computer Revolution. Addison Wesley, Reading, MA.

Bulgurcu B., Cavusoglu, H. & Benbasat, I. (2010) Information security policy compliance: an empirical study of rationality-based beliefs and information security awareness. *MIS Quarterly*, **34**, 523–548.

Carmines, E.G. & Zeller, R.A. (1979) Reliability and Validity. Sage, Beverly Hills, CA.

Carpenter, B. (1992) Issues and advances in coping research. In: Personal Coping: Theory, Research and Application, Carpenter, B. (ed.), pp. 1–14. Praeger, Westport, CT.

Carver, C.S. & Connor-Smith, J. (2010) Personality and coping. *Annual Review of Psychology*, **61**, 679–704.

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

Chin, W.W. (1998) The partial least squares approach for structural equation modelling. Modern methods for business research. Marcoulides, G.A. (ed.), Lawrence Erlbaum Associates, Hillsdale, NJ.

Clark, K. & Kalin, S. (1996) Technostressed out? How to cope in the digital age. *Library Journal*, **21**, 30–32.

Code, S. & Langan-Fox, J. (2001) Motivation, cognitions and traits as predictors of occupational health, well being and performance. *Stress and Health*, **17**, 159–174.

Cohen, F. (1984) Coping. In: Behavioral Health: A Handbook of Health Enhancement and Disease Prevention, Matarazzo, J.D., Weiss, S.M., Herd, J.A., Miller, N.E. & Weiss, S.M. (eds.), pp. 261–274. Wiley, New York, NY.

Cohen, J. (1988) Statistical Power Analysis for the Behavioral Sciences (2nd ed.), Lawrence Erlbaum Associates, Hillsdale, NJ.

Cohen, S. & Edwards, J.R. (1989) Personality characteristics as moderators of the relationship between stress and disorder. In: Advances in the Investigation of Psychological Stress, Neufeld, R.W.J. (ed.), pp. 235–283. Wiley, New York, NY.

Cook, T.D., Bean, J.R., Calder, B.J., Frey, R., Krovetz, M.L. & Reisman, S.R. (1970) Demand characteristics and three conceptions of the frequently deceived subject. *Journal of Personality and Social Psychology*, **14**, 185–194.

Costa, P.T. Jr. & McCrae, R.R. (1985) The NEO Personality Inventory Manual. Psychological Assessment Resource, Odessa, FL.

Costa, P.T., McCrae, R.R. & Dye, D.A. (1991) Facet scales for agreeableness and conscientiousness: a revision of the NEO personality inventory. *Personality Individual Differences*, **12**, 887–898.

Cummings, T.G. & Cooper, C.L. (1998) A cybernetic theory of organizational stress. In: Theories of Organizational Stress, Cooper, C.L. (ed.), pp. 101–121. Oxford University Press, New York, NY.

D'Arcy, J., Gupta, A., Tarafdar, M. & Turel, O. (2014) Reflecting on the "Dark Side" of Information Technology use. Communications of the AIS, Forthcoming.

Depue, R.A. & Collins, P.F. (1999) Neurobiology of the structure of personality: dopamine, facilitation of incentive motivation, and extraversion. *Behaviour and Brain Sciences*, **22**, 491–517.

Depue, R.A. & Morrone-Strupinksy, J.V. (2005) A neurobehavioral model of affiliative bonding: implications for conceptualizing a human trait of affiliation. *Behaviour and Brain Sciences*, **28**, 313–395.

Devaraj, S., Easley, R.F. & Crant, J.M. (2008) How does personality matter? Relating the five-factor model to technology acceptance and use. *Information Systems Research*, **19**, 93–105.

Dewett, T. & Jones, G.R. (2001) The role of information technology in the organization: a review, model, and assessment. *Journal of Management*, **27**, 313–346.

Digman, J.M. (1990) Personality structure: emergence of the five-factor model. *Annual Review of Psychology,* **41**, 417–440.

Edwards, J. R., Caplan, R. D. & Harrison, R. V. (1998) Person–environment fit theory: Conceptual foundations, empirical evidence, and directions for future research.In: Theories of Organizational Stress, Cooper, C. L. (ed.), pp. 28–67. Oxford University Press, Oxford England.

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

Fornell, C. & Larcker, D.F. (1981) Structural equation models with unobservable variables and measurement errors. *Journal of Marketing Research*, **18**, 39–50.

French, J.R.P., Rodgers, W. Jr. & Cobb, S. (1974) Adjustment as person–environment fit. In: Coping and Adaptation, Coelho, G.V., Hamburg, D.E. & Adams, J.E. (eds.), pp. 316–333. Basic Books, New York, NY.

Furnham, A. (1986) Response bias, social desirability and dissimulation. *Personality and Individual Differences*, **7**, 385–400.

Garfield, M.J., Taylor, N.J., Dennis, A.R. & Satzinger, J.W. (2001) Research report: modifying paradigms—individual differences, creativity techniques, and exposure to ideas in group idea generation. *Information Systems Research*, **12**, 322–333.

Gefen, D. & Straub, D.W. (2005) A practical guide to factorial validity using PLS-Graph: tutorial and annotated example. *Communications of the AIS*, **16**, 91–109.

Goldberg, L.R. (1981) Language and individual differences: the search for universals in personality lexicons. In: *Review of Personality and Social Psychology*, Wheeler. L (ed.), pp. 141–165. Sage, Beverly Hills, CA.

Goldberg, L.R. (1990) An alternative 'description of personality': the big five factor structure. *Journal of Personality and Social Psychology*, **59**, 1216–1229.

Gosling, S.D., Rentfrow, P.J. & Swann, W.B. Jr. (2003) A very brief measure of the big-five personality domains. *Journal of Research in Personality*, **37**, 504–528.

Grant, S. & Langan-Fox, J. (2006) Occupational stress, coping, and strain: the combined/interactive effect of the Big Five traits. *Personality & Individual Difference*, **41**, 719–732.

Graziano, W.G. & Eisenberg, N.H. (1997) Agreeableness as a dimension of personality. In: Handbook of Personality, Hogan, R., Johnson, J. & Briggs, S. (eds.), pp. 795–825. Academic Press, San Diego, CA.

Graziano, W.G., Habashi, M.M., Sheese, B.E. & Tobin, R. M. (2007) Agreeableness, empathy, and helping: a person X situation perspective. *Journal of Personality and Social Psychology*, **93**, 583–599.

Griffith, T.L. (1999) Technology features as triggers for sensemaking. *Academy of Management Review*, **24**, 472–488.

Gupta, A., & Sharda, R. (2008) SIMONE: simulator for interruptions and message overload in network environments. *International Journal of Simulation and Process Modeling*, **4**, 237–247.

Gupta, A., Sharda, R., Ducheneaut, N., Zhao, L. & Weber, R. (2006) Email management: a techno-managerial research perspective. *Communications of the AIS*, **17**, 941–961.

Gupta, A., Li, H. & Sharda, R. (2012) Should I send this message? Understanding the impact of interruptions, social hierarchy and perceived task complexity on user performance and perceived workload. *Decision Support Systems*, **55**, 135–145.

Hair, J.F.J., Anderson, R.E., Tatham, R.L. & Black, W.C. (1998) Multivariate Data Analysis with Readings. Prentice-Hall, Englewood Cliffs, NJ.

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. & Tatham, R.L. (2006) Multivariate Data Analysis. 6th edn. Pearson Prentice Hall, Upper Saddle River, NJ.

Harris, D.V. (1970) On the brink of catastrophe. *Quest Monograph*, **13**, 33–40.

Haynes, S.N., Richard, D.C.S. & Kubany, E.S. (1995) Content validity in psychological assessment: a functional approach to concepts and methods. *Psychological Assessment*, **7**, 238–247.

Ilies, R., Dimotakis, N. & De Pater, I.E. (2010) Psychological and physiological reactions to high workloads: implications for well-being. *Personnel Psychology*, **63**, 407–436.

Jahng, J.J., Jain, H. & Ramamurthy, K. (2002) Personality traits and effectiveness of presentation of product information in e-business systems. *European Journal of Information Systems*, **11**, 181–195.

Jensen-Campbell, L.A. & Graziano, W.G. (2001) Agreeableness as a moderator of interpersonal conflict. *Journal of Personality*, **69**, 323–362.

John, O.P. & Srivastava, S. (1999) The Big Five trait taxonomy: history, measurement, and theoretical perspectives. In: Handbook of Personality: Theory and Research, Pervin, L.A. & John, O.P. (eds.), pp. 102–138. Guilford, New York, NY.

Judge, T.A., Heller, D. & Mount, M.K. (2002) Five-factor model of personality and job satisfaction: a meta-analysis. *Journal of Applied Psychology,* **87**, 530–541.

Junglas, I.A., Johnson, N.A. & Spitzmuller, C. (2008) Personality traits and concern for privacy: an empirical study in the context of location-based services. *European Journal of Information Systems*, **17**, 387–402.

Kahn, R.L., Wolfe, D.M., Quinn, R.P. & Snoek, J.D. (1981) Organizational Stress: Studies in Role Conflict and Ambiguity. Krieger Publishing, Malabar, FL.

Karasek, R.A. (1979) Job demands, job decision latitude, and mental strain: implications for job redesign. *Administrative Science Quarterly*, **24**, 285–311.

Knowles, E.S. & Nathan, K.T. (1997) Acquiescent responding in self-reports: cognitive style or social concern. *Journal of Research in Personality*, **31**, 293–301.

Kobasa, S.C. (1979) Stressful life events, personality, and health: an inquiry into hardiness. *Journal of Personality and Social Psychology*, **37**, 1–11.

Kobasa, S.C. (1981) The hardy personality: toward a social psychology of stress and health. *Social Psychology of Health and Illness*, **4**, 3–32.

Kobasa, S.C. & Puccetti, M.C. (1983) Personality and social resources in stress resistance. *Journal of Personality and Social Psychology*, **45**, 839–850.

Lang, F.R., John, D., Lüdtke, O., Schupp, J. & Wagner, G.G. (2011) Short assessment of the Big Five: robust across survey methods except telephone interviewing. *Behavior Research Methods*, **43**, 548–567.

Lauriola, M. & Levin, I.P. (2001) Personality traits and risky decision making in a controlled experimental task: an exploratory study. *Personality and Individual Differences,* **31**, 215–226.

Lazarus, R.S. (1995) Psychological stress in the workplace. In: Occupational Stress: A Handbook, Crandall, R. & Perrewé, P.L. (eds.), pp. 3–14. Taylor & Francis, Philadelphia, PA.

Lazarus, R.S. & Cohen, J.B. (1977) Environmental stress. In: Human Behavior and Environment, Altman, I. & Wohlwill, J.F. (eds.), pp. 89–127. Plenum Press, New York.

Lazarus, R.S. & Folkman, S. (1984) Stress, Appraisal, and Coping. Springer, New York, NY.

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

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

Liang, H., Saraf, N., Hu, Q. & Xue, Y. (2007) Assimilation of enterprise systems: the effect of institutional pressures and the mediating role of top management. *MIS Quarterly* **31**, 59–87.

Lounsbury, J.W., Moffitt, L., Gibson, L.W., Drost, A.W. & Stevens, M. (2007) An investigation of personality traits in relation to job and career satisfaction of information technology professionals. *Journal of Information Technology*, **22**, 174–183.

Mark, L.F., Jonathan, M. & Gregory, S.K. (2003) Eustress, distress, and interpretation in occupational stress. *Journal of Managerial Psychology*, **18,** 726–744.

Maruping, L.M., Venkatesh, V. & Agarwal, R. (2009) A control theory perspective on agile methodology use and changing user requirements. *Information Systems Research*, **20**, 377–399.

Maslach, C. (1998) A multidimensional theory of burnout. In: Theories of Organizational Stress, Cooper, C.L. (ed.), pp. 68–85. Oxford University Press, New York, NY.

Maslach C. & Jackson, S.E. (1986) Maslach Burnout Inventory Manual. 2nd edn. Consulting Psychologists Press, Palo Alto, CA.

Maslach, C. & Leiter, M.P. (1997) The Truth about Burnout. Jossey-Bass, New York, NY.

Maslach, C., Schaufeli, W.B. & Leiter, M.P. (2001) Job Burnout. *Annual Review of Psychology*, **52**, 397–422.

Mayer, E.A. (2000) The neurobiology of stress and gastrointestinal disease. *Gut*, **47**, 861–869.

McCrae, R.R. (1989) Age differences and changes in the use of coping mechanisms. *Journal of Gerontology*, **44**, 161–169.

McCrae, R.R. & Costa, P.T. (1987) Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology,* **52**, 81–90.

McCrae, R.R. & Costa, P.T. Jr. (1991) Adding liebe und arbeit: the full five factor model and well-being. *Personality and Social Psychology Bulletin*, **17**, 227–232.

McCrae, R.R. & Costa, P.T. Jr. (2003) Personality in Adulthood: A Five-Factor Theory Perspective. 2nd edn. Guilford, New York, NY.

McCrae, R.R., Costa, P.T., Martin, T.A., Oryol, V.E., Rukavishnikov, A.A., Senin, I.G., & Urbánek, T. (2004) Consensual validation of personality traits across cultures. *Journal of Research in Personality*, **38**, 179–201.

McElroy, J.C., Hendrickson, A.R., Townsend, A.M. & DeMarie, S.M. (2007) Dispositional factors in internet use: personality versus cognitive style. *MIS Quarterly*, **31**, 809–820.

McGrath, J. (1976) Stress and behavior in organizations. In: Handbook of Industrial and Organizational Psychology, Dunnette, M. (ed.), pp. 1351–1395. Rand-McNally, Chicago, IL.

Meisenberg, G. & Williams, A. (2008) Are acquiescent and extreme response styles related to low intelligence and education? *Personality and Individual Differences*, **44**, 1539–1550.

Michel, J.S., Clark, M.A. & Jaramillo, D. (2011) The role of the five factor model of personality in the perceptions of negative and positive forms of work–nonwork spillover: a meta-analytic review. *Journal of Vocational Behavior*, **79**, 191–203.

Nederhof, A. (1985) Methods of coping with social desirability bias: a review. *European Journal of Social Psychology,* **15**, 263–280.

Neter, J., Kutner, M.H., Nachtsheim, C.J. & Wasserman, W. (1996) Applied Linear Statistical Methods. 4th edn. Irwin, Chicago, IL.

Nunnally, J.C. (1978) Psychometric Theory. 2nd edn. McGraw-Hill, New York, NY.

O'Driscoll, M.P., Brough, P., Timms, C. & Sawang, S. (2010) Engagement with information and communication technology and psychological well-being. In: Research in Occupational Stress and Well-being: New Developments in Theoretical and Conceptual Approaches to Stress, Perrewe, P.L. & Ganster, D.C. (eds.), pp. 269–316. Emerald, Bingley, UK.

Orne, M. (1962) On the social psychology of the psychological experiment: with particular reference to demand characteristics and their implications. *American Psychologist*, **17**, 776–783.

Parkes, K.R. (1994) Personality and coping as moderators of work stress processes: models, methods and measures. *Work & Stress: An International Journal of Work, Health & Organisations*, **8,** 110–129.

Penley, J.A. & Tomaka, J. (2002) Associations among the big five, emotional responses, and coping with acute stress. *Personality and Individual Differences*, **32**, 1215–1228.

Petter, S., Straub, D. & Rai, A. (2007) Specifying formative constructs in information systems research. *MIS Quarterly*, **31**, 623–656.

Pinsonneault, A. & Rivard, S. (1998) The impact of information technologies on managerial work: from the productivity paradox to the Icarus paradox. *MIS Quarterly*, **22**, 287–312.

Podsakoff, P.M. & Organ, D.W. (1986) Self-reports in organizational research: problems and prospects. *Journal of Management*, **12**, 531–544.

Podsakoff, P.M., MacKenzie, S.B., Lee, J. & Podsakoff, N.P. (2003) Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, **88**, 879–903.

Polman, R., Borkoles, E. & Nicholls, A.R. (2010) Type D personality, stress, and symptoms of burnout: the influence of avoidance coping and social support. *British Journal of Health Psychology*, **15**, 681–696.

Quick, J.C., Nelson, D.L., Quick, J.D. & Orman, D.K. (2001) An isomorphic theory of stress: the dynamics of person–environment fit. *Stress and Health*, **17**, 147–157.

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

Rasch, R.H. & Harrell, A. (1989) The impact of individual differences on MAS personnel satisfaction and turnover intentions. *Journal of Information Systems*, **4**, 13–22.

Richmond, R.L. & Kehoe, L. (1999) Quantitative and qualitative evaluations of brief interventions to change excessive drinking, smoking, and stress in the police force. *Addiction*, **94**, 1509–1521.

Riedl, R., Kindermann, H., Auinger, A. & Javor, A. (2012) Technostress from a neurobiological perspective. *Business & Information Systems Engineering*, **4**, 61–69.

Robey, D. (1983) Cognitive style and DSS designs: a comment on Huber's paper. *Management Science*, **29**, 580–582.

Saucier, G. (1994) Mini-markers: a brief version of Goldberg's unipolar Big-Five markers. *Journal of Personality Assessment*, **63**, 506–516.

Schaufeli, W.B., Salanova, M., González-Romá, V. & Bakker, A.B. (2002) The measurement of engagement and burnout: a confirmatory factor analytic approach. *Journal of Happiness Studies*, **3**, 71–92.

Schaufeli, W.B., Baker, A.B. & Salanova, M. (2006) The measurement of work engagement with a short questionnaire: a cross-national study. *Educational and Psychological Measurement*, **66**, 701–716.

Schaufeli, W.B., Taris, T.W. & Van Rhenen, W. (2008) Workaholism, burnout and engagement: three of a kind or three different kinds of employee well-being. *Applied Psychology—An International Review*, **57**, 173–203.

Schellhammer, S., Haines, R. & Klein, S. (2012) The struggle for 'appropriateness'—new sources of (techno) stress. In: *Proceedings of JAIS Theory Development Workshop. Sprouts: Working Papers on Information Systems*, http://sprouts.aisnet.org/12-15.

Selye, H. (1956) The Stress of Life. McGraw-Hill, New York, NY.

Selye, H. (1964) From Dream to Discovery. McGraw-Hill, New York, NY.

Selye, H. (1987) Stress without Distress. Transworld, London, UK.

Shu, Q., Tu, Q. & Wang, K. (2011) The impact of computer self-efficacy and technology dependence on computer-related technostress: a social cognitive theory perspective. *International Journal of Human-Computer Interaction*, **27**, 923–939.

Smith, C.A., Organ, D.W. & Near, J.P. (1983) Organizational citizenship behavior: its nature and antecedents. *Journal of Applied Psychology*, **68**, 653–663.

Spector, P.E. (1998) A control theory of the job stress process. In: Theories of Organizational Stress, Cooper, C.L. (ed.), pp. 153–169. Oxford University Press, Oxford, UK.

Spector, P.E., Zapf, D., Chen, P.Y. & Frese, M. (2000) Why negative affectivity should not be controlled in job stress research: don't throw out the baby with the bath water. *Journal of Organizational Behavior*, **21**, 79–95.

Srivastava, S.C. & Teo, T.S.H. (2012) Contract performance in offshore systems development: role of control mechanisms. *Journal of Management Information Systems*, **29**, 115–158.

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

Tarafdar, M., Ragu-Nathan, T.S., Ragu-Nathan, B. & Tu, Q. (2007) The impact of technostress on role stress and productivity. *Journal of Management Information Systems*, **24**, 307–334.

Tarafdar, M., Tu, Q., Ragu-Nathan, T.S. & Ragu-Nathan, B. S. (2011) Crossing to the dark side: examining antecedents and consequences of technostress. *Communications of the ACM*, **54**, 113–120.

Tarafdar, M., Pullins, E.B., & Ragu-Nathan, T.S. (2014) Technostress: negative effect on performance and possible mitigations. *Information Systems Journal, Forthcoming article published online* DOI: 10.1111/isj.12042

Thatcher, J.B. & Perrewe, P.L. (2002) An empirical examination of individual traits as antecedents to computer anxiety and computer self-efficacy. *MIS Quarterly*, **26**, 381–396.

Tu, Q., Wang, K. & Shu, Q. (2005) Computer-related technostress in China. *Communications of the ACM*, **48**, 77–81.

Turel, O. & Serenko, A. (2012) The benefits and dangers of enjoyment with social networking websites. *European Journal of Information Systems*, **21**, 512–528.

Turel, O., Serenko, A. & Giles, P. (2011) Integrating technology addiction and use: an empirical investigation of online auction users. *MIS Quarterly*, **34**, 1043–1061.

Van Jaarsveld, D.D., Walker, D.D. & Skarlicki, D.P. (2010) The role of job demands and emotional exhaustion in the relationship between customer and employee incivility. *Journal of Management*, **36**, 1486–1504.

Vasse, R.M., Nijhuis, F.J. & Kok, G. (1998) Associations between work stress, alcohol consumption and sickness absence. *Addiction*, **93**, 231–244.

Venkatesh, V. & Windeler, J.B. (2012) Hype or help? A longitudinal field study of virtual world use for team collaboration. *Journal of the AIS*, **13**, 735–771.

Wang, K., Shu, Q. & Tu, Q. (2008) Technostress under different organizational environments: an empirical investigation. *Computers in Human Behavior*, **24**, 3002–3013.

Watson, D. & Clark, L.A. (1997) Extraversion and its positive emotional core. In: Handbook of Personality Psychology, Hogan, R., Johnson, J.A. & Briggs, S.R. (eds.), pp. 767–793. Academic Press, San Diego, CA.

Weil, M.M. & Rosen, L.D. (1997) Technostress: Coping with Technology@ Work@ Home@ Play. Wiley, New York, NY.

White, K.B. (1984) MIS project teams: an investigation of cognitive style implications. *MIS Quarterly*, **8**, 95–101.

Wiebe, D.J. & Smith, T.W. (1997) Personality and health: progress and problems in psychosomatics. In: Handbook of

Personality Psychology, Hogan, R., Johnson, J.A. & Briggs, S.R. (eds.), pp. 891–918. Academic Press, San Diego, CA.

Williams, L.J., Edwards, J.R. & Vandenberg, R.J. (2003) Recent advances in causal modeling methods for organizational and management research. *Journal of Management*, **29**, 903–936.

Yan, Z., Guo, X., Lee, M.K. & Vogel, D. (2013) A conceptual model of technology features and technostress in telemedicine communication. *Information Technology & People*, **26**, 283–297.

Zellars, K.L. & Perrewé, P.L. (2001) Affective personality and the content of emotional social support: coping in organizations. *Journal of Applied Psychology*, **86**, 459–467.

Zmud, R.W. (1979) Individual differences and MIS success: a review of the empirical literature. *Management Science*, **25**, 966–979.

Biographies

Shirish C. Srivastava is an associate professor at HEC, Paris. Prior to joining HEC, he has lectured at the School of Business, National University of Singapore. His research has been published in several international refereed journals such as *MIS Quarterly, Journal of Management Information Systems, Journal of the Association for Information Systems, European Journal of Information Systems, Journal of Information Technology, Communications of the Association for Information Systems, MIS Quarterly Executive, Journal of Global Information Management, and Information Resources Management Journal*, among others. Shirish currently works on the editorial board of several journals such as *Journal of the Association for Information Systems, European Journal of Information Systems, IEEE Transactions on Engineering Management, Journal of Electronic Commerce Research*, and *The Journal of Information Technology Case and Application Research*. His research interests include offshore sourcing, e-government, new collaborative technologies, and technology-enabled innovation.

Shalini Chandra is an assistant professor at S P Jain School of Global Management, Singapore. Prior to joining SP Jain, she has worked as a research fellow at Nanyang Technological University Singapore and holds a PhD from the same university. Her research has been published in several international refereed journals such as *Journal of the Association for Information Systems and Communications of the Association for Information Systems*, among others. She has also presented her work at several top-tier conferences in the area of information systems and management such as *Academy of Management (AOM), Pacific Asia Conference on Information systems (PACIS), Americas Conference on Information Systems (AMCIS), and International Conference on Information Systems (ICIS)*, and also at top-tier communication conferences such as *International Communication Association (ICA)*. Her research interests include technostress, virtual worlds, mobile payment, trust, and technology acceptance.

Anuragini Shirish is a doctoral candidate at Telecom School of Management, Paris, France. Her graduate research studies, undertaken at the National University of Singapore, pertained to strategising about e-commerce legal policies for the ASEAN region. She has a rich and practical research experience in the area of corporate and commercial laws including IT and IP laws. Her research has been presented in several notable information systems and management conferences such as *AOM, PACIS, AMCIS, Production and Operations Management (POMS), ACM SIGMIS Computers and People Research Conference*, and *ICIW and IFIP*. Her research interests include new collaborative and pervasive technologies, culture and information systems, global virtual teams, and creative digital entrepreneurship.

APPENDICES

Appendix 1: Definitions of technostress creators (Tarafdar *et al.,* 2007; Ragu-Nathan *et al.,* 2008)

Technostress creators	Definitions
Techno-overload	This describes situations where use of new technologies forces people to work more and faster.
Techno-invasion	This describes being 'always exposed' so that people can potentially be reached anywhere and anytime and feel the need to be constantly connected. The regular workday is extended, office work is done at all sorts of hours, and it is almost impossible to 'cut away'.
Techno-complexity	This describes situations where the complex computer systems used at work force people to spend time and effort learning and understanding how to use new applications and updating their skills. People find the variety of applications, functions and jargon intimidating and consequently feel stressed.
Techno-insecurity	This is associated with situations where people feel threatened about losing their jobs to other people who have a better understanding of new gadgets and computing devices.
Techno-uncertainty	This relates to the short life-cycles of computer systems. Continuous changes and upgrades do not give people the chance to experience a particular system. People find this unsettling because their knowledge becomes rapidly outdated, and they are required to re-learn things very rapidly and often.

Appendix 2: Key Research on Technostress

Name	Methodology and theory	Results
Ayyagari *et al.* (2011)	Field study. Online survey of 661 professionals – ICT users.	This study investigated the role of technological characteristics and their relationships with stress amongst individuals. It was shown that technological characteristics such as usability, intrusiveness and dynamism predicted stress and were related to stressors such as work overload, role ambiguity, invasion of privacy, work-home conflict and job insecurity. These, in turn, were proposed to cause strain. The results showed that workload and role ambiguity were the two most dominant stressors. Intrusive technology characteristics were found to be dominant predictors of stressors and supported the prevalence of technostress.
Riedl *et al.* (2012)	Laboratory experiment.	In this study, it was shown that gender is crucial to the technostress–strain relationship. Using physiological reactions through a skin conductance test, the experiment showed that men demonstrate more achievement stress than women when faced

Continues

Appendix 2. (Continued)

		with malfunctioning technologies in time-pressure situations.
Schellhammer *et al.* (2012)	Conceptual working paper.	This paper proposed that being simultaneously enmeshed in multiple distributed CoPs – defined as configurations of people (i.e., teams) that pursue shared enterprises over time and engage in joint practices – would also potentially inflict stress on the individual, apart from the technological characteristics that are widely studied. The paper uses the concept of 'appropriateness' to capture this phenomenon theoretically. It highlights that social norms that shape the appropriateness of the individual will also influence technostress and hence, must be examined separately.
Shu *et al.* (2011)	Survey of 289 employees who use computer technology in routine work, including IT professionals and general end users in China from a range of sectors.	This study explored the relationship of different cognitive factors to technostress. Computer self-efficacy had a negative impact on technostress, whilst technology dependence had a positive impact. The results also showed that employees with varying levels of cognitive factors will perceive technostress differently. The paper suggests coping strategies for mismatch situations to mitigate technostress.
Tarafdar *et al.* (2007)	Survey of 233 ICT users in multiple organisations.	This paper showed that technostress, which is created due to the stressors techno-overload, techno-invasion, techno-insecurity, techno-invasion, techno-complexity and techno- uncertainty, influences role stress positively and productivity negatively. This is the first paper to define and design scales for measuring technostress creators.
Tarafdar & Tu (2010)	Survey of 233 ICT users from two public sector organisations.	This study found that technostress creators decrease end users' satisfaction along with performance, including productivity and innovation in their tasks. Situational variables such as mechanisms that facilitate user involvement and innovation support were shown to mitigate technostress creators, thereby increasing end user satisfaction and performance. This paper extended the technostress literature to the end user domain.
Tarafdar *et al.* (2014)	Survey of 237 institutional sales professionals.	The study establishes a negative association between technostress creators and performance. Furthermore, the paper finds that, whilst traditional effort-based mechanisms like building technology competence reduce the impact of technostress creators on technology-enabled innovation and performance, more empowering mechanisms like developing technology self-efficacy and literacy enhancement and involvement in IS initiatives are required to counter the decrease in overall performance due to technostress creators.
Tu *et al.* (2005)	Survey of 700 employees from 12 Chinese companies.	This study examined the impact of technostress in the Chinese work context and justified its findings based on cultural differences. It showed that technostress did not affect productivity amongst Chinese workers, whereas the techno-overload factor had a positive effect on productivity.

Continues

Appendix 2. (Continued)

Wang *et al.* (2008)	Survey of 1029 employees in 86 Chinese organisations.	Technostress levels of employees were found to vary significantly for organisations with differently configured organisational environments. Low centralization/ innovation types of environment were found to lead to the lowest levels of technostress. In contrast, high centralization/high innovation types lead to the highest levels of technostress.
Yan *et al.* (2013)	Conceptual paper in the context of telemedicine technology use.	Using the person–fit theory as a basis, this study proposed a model for evaluating stress amongst telemedicine technology users. The model has two dimensions: complementary fit and supplementary fit. It was proposed that communication and information support meet the ability-demand fit, whilst social presence and social support help in individuals' supply and social norm fit. The paper also showed that personal innovativeness with respect to IT has a moderating effect on the relationship between technostress creators and the resulting strain.

Appendix 3: Definitions of 'The Big Five' Personality Traits (Gosling *et al*., 2003; Lang *et al*., 2011; Saucier, 1994)

The Big Five	Definitions
Openness to experience	Openness to experience characterises individuals who are willing to try new and different things. They actively seek out new and varied experiences and value change.
Neuroticism	Neuroticism characterises individuals who are anxious, self-conscious, paranoid and prone to negative emotions and negative reactions to work-related stimuli.
Agreeableness	Agreeableness characterises individuals who are kind, considerate, likable, helpful and cooperative. Agreeable individuals are more likely to be accommodating and cooperative when asked to consider a new technology.
Conscientiousness	Conscientiousness characterises individuals who are intrinsically motivated to achieve, perform at a high level and take actions to improve their job performance.
Extraversion	Extraversion characterises individuals who are social, active and outgoing and place a high value on close and warm interpersonal relationships. The biggest motivation for such individuals to adopt an innovation is possible gain in terms of social image.

Appendix 4: Key Research on Personality in the IS Field

Name	Methodology and theory	Results
Aharony (2009)	Survey of 168 Israeli librarians.	This paper examined influences on the use of Web 2.0 technology by librarians. It showed that certain personality characteristics (resistance to change, cognitive-appraisal-as-threat and introversion) negatively impacted the librarians' use of Web 2.0 technologies, whereas characteristics such as cognitive-appraisal-as-opportunity and extroversion positively impacted the librarians' use of Web 2.0 technologies. The study also showed that computer expertise, motivation, importance and capacity to study and integrate different applications of Web 2.0 in the future also impacted the librarians' use of technology.
Devaraj *et al.* (2008)	Survey of collaborative and groupware technology use by 100+ students.	This paper showed that the 'big five personality traits' in the five-factor model of personality dimensions can be useful predictors of users' attitudes and beliefs about technology acceptance and use. The study used the technology acceptance model (TAM) and theory of reasoned action (TRA) as a basis to examine the influence of the 'big five personality trait' factors. Each of the factors individually affected the TAM constructs differently, as well as the subject norm constructs of TRA. The 'big five personality traits' were generally associated with perceptions about the usefulness of a particular technology and also moderated the relationships between usefulness and intention to use. They also moderated the relationship between subjective norms and intention to use, except for the openness factor.
Garfield *et al.* (2001)	Experimental study of 219 undergraduate students.	This study showed that individual differences, groupware-based creativity techniques and ideas from others influenced the types of ideas that individuals generated. Discounting the influence of individual differences that were inherent, it was shown that the disclosure of paradigm-modifying ideas from others and the use of intuitive groupware-based creativity techniques rather than analytical groupware-based creativity techniques increased the number of paradigm-modifying ideas produced by the individuals.
Jahng *et al.* (2002)	Experiment with sample of 136 students.	This study showed that in the context of e-commerce, the effectiveness of product information presentations vary based on differences in consumers' psychological types. Furthermore, a rich product information presentation was found to significantly influence the online-buying behaviour of intuitive and feeling personality types. However, a similar result was not found for sensing and thinking personality types.
Junglas *et al.* (2008)	Survey of users of location-based services.	This study found that the personality traits agreeable ness, conscientiousness and openness to experience have an influence on concern for privacy (CFP),

Continues

Appendix 4. (Continued)

		whereas the other two traits, extraversion and emotional stability, were not found to influence CFP. These results are said to have implications for the adoption, design and marketing of highly personalised new technologies.
Li *et al.* (2011)	Experiment method.	This study showed the impact of instant messaging on users' perceived task complexity and satisfaction in the context of multitasking work processes, examining the relationships from the perspective of an individual's multitasking preferences. The results revealed that polychronic knowledge workers were more content with the multitasking work process deploying instant messaging technology than were monochronic ones. The increased interruption frequency reduces the process satisfaction of monochronic individuals.
Lounsbury *et al.* (2007)	Study using 1059 IT professionals' data taken from archival sources for a HR company.	This study examined personality traits in relation to job satisfaction (JS) and career satisfaction (CS). Eight traits (assertiveness, emotional resilience, extraversion, openness, teamwork disposition, customer service orientation, optimism and work drive) were significantly related to both JS and CS. It was shown that emotional resilience and optimism accounted for higher significance levels for the outcome variables, whereas conscientiousness and image management were not related to the outcome variables. A visionary style influenced CS at a low but significant level in the study.
McElroy *et al.,* 2007	Survey of 132 students.	This study showed that personality, rather than cognitive style, should be used as an antecedent variable for Internet use. The 'Big Five' personality factors significantly added to the predictive capabilities of the dependent variables after controlling for suitable factors that influence Internet use, whereas cognitive styles did not add to the predictive capabilities of the dependent variables. It was shown that research on personality is more useful than cognitive style for testing IS models.
Rasch & Harrell (1989)	Survey of 30 management advisory service personnel (MAS).	This study posited that less work and greater job satisfaction with lower rates of voluntary turnover can be experienced by MAS personnel who have relatively high achievement needs, Type A personalities and influence orientations.
Thatcher & Perrewe (2002)	Survey of 235 university students.	This study's results suggested that situation-specific traits (personal innovativeness) wield a more persistent influence on IT-situation-specific individual differences (computer self-efficacy and computer anxiety) than broad traits such as anxiety and negative affectivity. The results also showed that computer anxiety mediates the impact of situation-specific traits. These results indicate a nomological network amongst individual differences that affects computer self-efficacy.
Venkatesh & Windeler (2012)	One-year field study comparing two collaborative technology systems, one,	This study explored the value of virtual world use for team collaboration. The results revealed that when individuals interact with time and technology,

Continues

Appendix 4. (Continued)

	based on traditional desktop principles, and the other, based on a virtual world. 91 teams were studied.	the personality traits of agreeableness, conscientiousness, extraversion, openness and computer self-efficacy positively impact team technology use. The use of a virtual world system positively impacted the association between technology use and team cohesion, thereby predicting team performance, compared with the traditional desktop modes of technology.
White (1984)	Interview of MIS personnel and users on the strengths and weaknesses of two teams in MIS projects.	This study showed the influence of individual cognitive style on team performance in MIS projects. The results showed that a lack of certain personality styles (measured via the Myers-Briggs Type indicator) in one project team, one made it weak compared with another project team, which scored well on team effort and had all four personality styles represented. A mix of personalities produces more successful results than the dominance of one type of personality. This paper showed that HR considerations are very important for IT system development.

Appendix 5: Role of Personality Traits and the Theoretical Logic for Their Interactions with Technostress Creators in Determining Job Burnout and Job Engagement

	Job burnout	Job engagement
Definition	Job burnout is a prolonged response to stressors on the job; comprises three-dimensions: exhaustion, cynicism and inefficacy (Maslach *et al.,* 2001). Of special relevance in the context of job, stress is the induced emotional exhaustion.	Job engagement is defined as a positive, fulfilling work-related state of mind, which is characterised by vigour, dedication and absorption (Schaufeli *et al.,* 2002).
Are technostress creators related to job outcomes?	Does professional ICT usage contribute to employees' job burnout?	Does professional ICT usage contribute to employees' job engagement?
Role of technostress creators	Technostress creators have been found to have a negative impact on individuals in terms of strain, which in turn contributes to reduced employee productivity and satisfaction (Tarafdar & Tu, 2010). Thus, we expect technostress creators to contribute to job burnout.	Despite their researched negative consequences, technostress creators can also be perceived as providing an opportunity to engage in and learn new things. Thus, by facilitating greater involvement in the job, technostress creators may contribute to job engagement.
Role of personality traits	Individuals with certain personality traits may perceive technostress creators as having negative consequences or as threats, thus contributing to job burnout.	Individuals with certain personality traits may perceive technostress creators as providing opportunities to engage in and learn new things, thus contributing to job engagement.

Continues

Appendix 5. (Continued)

Combined effect of technostress creators and personality traits on job outcomes	According to the TMSC, stressful experiences develop as a result of person–environment interactions. Thus, in addition to the imbalances in the work environment caused by technostress creators, it is important to incorporate the influence of person-related factors in the assessment of technostress creators impacting job outcomes such as job burnout and job engagement. Consequently, grounding our work in TMSC, we expect that in the event of environmental imbalances, individuals with different personality traits appraise disruptive events differently – as stressful, positive, controllable, challenging or irrelevant. Thus, when evaluating the contribution of technostress creators to employees' job burnout and job engagement, it is important to include differences in individuals' personality traits in the appraisal process.	
Interaction of technostress creators with the personality trait openness to experience Technostress creators × Openness	Individuals with high levels of the personality trait openness to experience are curious and explorative and are predisposed to enjoying learning (Barrick *et al.,* 2001). They have broad sense awareness and may perceive technostress creators to be an opportunity for learning new things and improving performance. From a TMSC perspective, such individuals will view ICT-related disruptions as opportunities for performing better. Consequently, openness-to-experience will influence the perception of technostress creators as positive, thereby decreasing their influence on job burnout.	Individuals with high levels of the personality trait openness to experience are curious and unconventional and have a propensity to experience new things (McCrae & Costa, 1991). Individuals high in openness to experience will have better awareness and thus be prone to perceive opportunities due to technostress creators. Consequently, we expect that openness to experience will enhance the perception of technostress creators as opportunities, thereby enhancing involvement and hence strengthening the relationship between technostress creators and job engagement.
	Thus, openness to experience negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the openness-to-experience trait is higher. H1(a)	Thus, openness to experience positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the openness-to-experience trait is higher. H1(b)
Interaction of technostress creators with the personality trait neuroticism	Individuals with high levels of the neuroticism trait are emotionally less stable and anxious and hence have a tendency to perceive situations as threats (Goldberg, 1990). They generally appraise events as less positive and have a lower risk-taking appetite due to their anxious behaviour (Spector *et al.,* 2000; Lauriola & Levin, 2001). From a TMSC perspective, we expect individuals high in neuroticism trait to view ICT-related job disruptions as more threatening and thus develop negative attitudes towards job-related technologies. This will lead to greater anxiousness, enhanced emotional	Individuals high in the neuroticism trait are emotionally less stable, impatient and cynical (Junglas *et al.,* 2008). Because of their nervous temperament and lower risk-taking appetite, they will appraise disruptive events as threatening. Because they are likely to perceive technostress creators as threatening, they will not easily adapt to new ICTs in their organisations, which will contribute to their not achieving a high degree of engagement in their job.

Continues

Appendix 5. (Continued)

Technostress creators × Neuroticism	exhaustion and increased influence on job burnout.	Consequently, neuroticism negatively moderates the relationship between technostress creators and job engagement such that the technostress creators influence job engagement less strongly when the neuroticism trait is higher. H2(b)
	Thus, neuroticism positively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout more strongly when the neuroticism trait is higher. H2(a)	
Interaction of technostress creators with the personality trait agreeableness	The agreeableness trait characterises a tendency to be friendly, sympathetic and good-natured. Individuals with this trait are sensitive and considerate towards the thoughts and opinions of others. They are more likely to be accommodating and cooperative when expected to consider new organisational ICTs, even without having the required capability or will. From a TMSC perspective, individuals high in agreeableness trait feel threatened in performing tasks that are beyond their capacity. Hence, internally, they will experience increased stress, which further contributes to job burnout.	The agreeableness trait characterises a tendency to be friendly, cooperative and helpful (John & Srivastava, 1999) and empathic (Graziano *et al.,* 2007), and individuals with this trait are able to inhibit their negative feelings
Technostress creators × Agreeableness		Consequently, agreeable individuals will accept using new ICTs even though, internally, they may not be comfortable using them. Because of this potential confusion and disagreement about technostress creators, their engagement with the job may be relatively less.
	Hence, agreeableness positively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout more strongly when the agreeableness trait is higher. H3(a)	Hence, agreeableness negatively moderates the relationship between technostress creators and job engagement such that the technostress creators influence job engagement less strongly when the agreeableness trait is higher. H3(b)
Interaction of technostress creators with the personality trait conscientiousness	Individuals high in conscientiousness strive for dependability, attention to detail and exact effort (Barrick *et al.,* 2001). From a TMSC perspective, because conscientious individuals are intrinsically motivated to improve their job performance wherever possible and are ready to accept technologies which provide them an opportunity to further on-the-job achievement, these individuals may perceive technostress creators as an opportunity to improve their job performance, which can increase their positive stress levels (eustress) and thus attenuate job burnout.	Individuals with high levels of conscientiousness will be willing to maintain their emotional stability, modify their tasks and adapt the new organisational ICTs as they strive for excellence, efficiency, accuracy and detail, and do so with high levels of self-discipline and deliberation (Costa *et al.,* 1991). Because of their innate desire to pay attention to details, it is quite likely that such individuals will experience higher in job engagement due to technostress creators.
Technostress creators × Conscientiousness	Hence, conscientiousness negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job	Hence, conscientiousness positively moderates the relationship between technostress creators and job engagement such that technostress

Continues

Appendix 5. (Continued)

	burnout less strongly when the conscientiousness trait in individuals is higher. H4(a)	creators influence job engagement more strongly when the conscientiousness trait in individuals is higher. H4(b)
Interaction of technostress creators with the personality trait extraversion	Individuals high in the extraversion trait are energetic, outgoing and dominant in sociability (Junglas *et al.,* 2008). Devaraj *et al.* (2008) suggested that such individuals are naturally inclined to use technologies introduced in their organisations, as they are motivated to maintain a favourable social image in their organisations. From a TMSC perspective, such individuals are more likely to perceive technostress creators as an opportunity and see them as providing a chance to enhance their power and influence and improve their job performance through such image enhancement. Consequently, individuals high in extraversion will view the stress, because of ICTs, as desirable and will consequently experience lesser job burnout.	Individuals high in the extraversion trait place a high value on close and warm interpersonal relationships (Watson & Clark, 1997). They are concerned about their social image and base their behaviour on the opinions of significant others. Thus, such individuals will view technostress creators as providing an opportunity for maintaining a desirable social image, as the organisation expects them to use the new ICTs. Consequently, with positive evaluations of technostress creators, individuals high in extraversion will have enhanced job engagement.
Technostress creators × Extraversion	Hence, extraversion negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the extraversion trait in individuals is higher. H5(a)	Hence, extraversion positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the extraversion trait in individuals is higher. H5(b)

Appendix 6: Research Constructs and their Scales

Technostress creators—Ragu-Nathan *et al.,* 2008; Tarafdar *et al.,* 2007	Mean	Standard deviation (*SD*)
Techno-overload (reliability: $\alpha = 0.90$)	4.61	1.26
I am forced by ICTs to…		
… work much faster.		
… do more work than I can handle.		
… work with very tight time schedules.		
… change my work habits to adapt to new technologies.		
… handle higher workload because of increased technological complexity.		
Techno-invasion (reliability: $\alpha = 0.88$)	4.25	1.55
Because of ICTs…		
… I spend less time with my family.		
… I have to be in touch with my work even during my vacation.		
… I have to sacrifice my vacation and weekend time to keep current on new ICTs.		

Continues

Appendix 6. (Continued)

… I feel my personal life is being invaded.		
Techno-complexity (reliability: $\alpha = 0.85$)	3.38	1.27
I do not know enough about the new ICTs to handle my job satisfactorily.		
I do not find enough time to study and upgrade my ICT skills.		
I need a long time to understand and use new ICTs.		
I often find it too complex for me to understand and use new ICTs.		
I find new recruits to this organisation know more about ICTs than I do.		
Techno-insecurity (reliability: $\alpha = 0.88$)	2.80	1.38
Because of new ICTs, I feel constant…		
… threat to my job security.		
… need to update my skills to avoid being replaced.		
… threat by coworkers with newer ICT skills.		
For fear of being replaced…		
… I do not share my knowledge with my coworkers.*		
… I feel there is less sharing of knowledge amongst coworkers.*		
Techno-uncertainty (reliability: $\alpha = 0.89$)	4.32	1.35
In our organisation, there are always…		
… new developments in the ICTs we use.		
… constant changes in ICT software.		
… constant changes in ICT hardware.		
… frequent upgrades in ICT networks.		
The Big Five Personality Traits—Gosling *et al.,* 2003; Lang *et al.,* 2011; Saucier, 1994	Mean	*SD*
Openness to experience (reliability: $\alpha = 0.77$)	5.19	1.02
I see myself as…		
… creative.		
… imaginative.		
… unconventional.		
Neuroticism (reliability: $\alpha = 0.80$)	3.73	1.36
I see myself as…		
… moody.		
… easily upset.		
… anxious.		
Agreeableness (reliability: $\alpha = 0.83$)	5.55	0.90
I see myself as…		
… sympathetic.		
… warm.		
… kind.		
Conscientiousness (reliability: $\alpha = 0.83$)	5.52	1.19
I see myself as…		
… dependable.*		
… self-disciplined.		

Continues

Appendix 6. (Continued)

… organised.		
Extraversion (reliability: $\alpha = 0.78$)	5.07	1.06
I see myself as…		
… extraverted.		
… enthusiastic.		
… talkative.		
Job Outcomes	Mean	*SD*
Job Burnout (reliability: $\alpha = 0.92$) (Maslach & Jackson, 1986)	2.99	1.33
I feel emotionally drained by my work.		
Working at my job all day long requires a great deal of effort.		
I feel like my work is breaking me down.		
I feel frustrated with my work.		
I feel I work too hard on my job.		
It stresses me too much to work on my job.		
I feel like I am at the end of my rope.		
I feel burned out from my work.		
I feel used up at the end of the workday.		
	Mean	*SD*
Job Engagement (reliability: $\alpha = 0.94$) (Based on UWES–9 scale; Schaufeli *et al.,* 2008)	5.20	1.01
I get carried away when I am working.*		
In my work, I feel bursting with energy.		
In my job, I feel strong and vigorous.		
I am enthusiastic about my job.		
My job inspires me.		
When I get up in the morning, I feel like going to work.		
I feel happy when I am working intensely.		
I am proud of the work that I do.		
I am immersed in my work		

*These items were deleted from the analysis after performing factor analysis.

Appendix 7: Response Bias Control

Response bias	Description	Controlled in this study
Demand characteristics bias	Arises when respondents figure out the purpose of the study, which can influence the participants and their responses (Orne, 1962).	Designed and administered the survey in a way that prevented the survey respondents from discovering the true hypotheses of the research (Cook *et al.,* 1970).
Acquiescence bias	Arises because respondents have a tendency to agree with all the questions in a measure (Podsakoff *et al.,* 2003).	Assessed respondents' tendency to agree with a large sample of items that were heterogeneous in content (Knowles & Nathan, 1997; Meisenberg & Williams, 2008). For example, in the survey, we included items with measures for both positive and negative job outcomes with minimal correlations.

Continues

Appendix 7. (Continued)

Social desirability bias	Drives an individual to respond in such a manner as to deny undesirable traits and to attribute traits that are socially desirable (Nederhof, 1985). Respondents may have a tendency to over-report desirable behaviour or under-report undesirable behaviour (Nederhof, 1985; Furnham, 1986).	Controlled by two means: *Forced choice*: survey questions were in the form of agree/disagree statements with survey scales, and questions that seemed to be neutral with regard to social desirability (Nederhof, 1985). *The survey*: questionnaires were self-administered. This strategy involved isolating the participants before they began answering the survey or questionnaire and thus removing any social cues the researcher may have presented to the participants. Furthermore, we clearly stated the voluntary nature of the survey, i.e. the participants could leave the survey at any stage, and we also assured confidentiality of responses to the participants.
Extreme responding bias	Drives respondents to select only the most extreme options or answers available (Furnham, 1986).	Restricted by carefully wording the questions in our survey and presenting a 7-point Likert scale to avoid loading one type of response and unduly favouring one response over another.

Appendix 8. Validity and Reliability

We checked for three types of validity: content validity, convergent validity and discriminant validity. Content validity assesses whether the chosen measures appropriately capture the full domain of the construct. In this research, content validity was examined by first checking for consistency between the measurement items and the existing literature and then pre-testing the instrument (Carmines & Zeller, 1979; Haynes *et al.,* 1995). Convergent validity detects whether the measures for a construct are more correlated with one another than with the measures of another construct (Petter *et al.,* 2007). Factor loadings measure the strength of the correlation between each item and the corresponding construct. As can be seen in Table A8a, the factor loading values (shaded) exceed 0.50, an acceptable minimum value (Chin, 1998) showing that there is a strong correlation between each of the indicators and the corresponding constructs. As the loadings within the construct are higher than those across constructs, this demonstrates convergent validity (Fornell & Larcker, 1981). Convergent validity was further tested by examining the composite reliability (CR) and average variance extracted (AVE: the ratio of the construct variance to the total variance amongst indicators) for the measures (Hair *et al.,* 1998). For CR, a score of 0.70 is the recommended threshold, whilst for AVE, 0.50 is the acceptable level (Fornell & Larcker, 1981). As shown in Table A8a, the CR and AVE values are acceptable, demonstrating convergent validity. From Appendix 6, we observe that Cronbach's alpha for all research constructs ranges between 0.94 and 0.77. As the value of Cronbach's alpha for every construct is above 0.70 (Nunnally, 1978), we conclude that the reliabilities for all constructs are also adequate. Discriminant validity, on the other hand, verifies that the items that demonstrate convergent validity are not highly correlated to any other

constructs in the model (Gefen & Straub, 2005). This research verified the discriminant validity of the various constructs by checking the square root of the AVE, as recommended by Fornell & Larcker (1981). The values of the square root of the AVE (reported on the diagonals in Table A8b) are all greater than the inter-construct correlations (the off-diagonal entries in Table A8b), thus exhibiting satisfactory discriminant validity. Further, the cross-loadings on the items of other constructs (Table A8a) are quite low, which again indicates discriminant validity.

Table A8a: Constructs, Indicators and Cross-Loadings

	BURN	JENG	OPEN	NEUR	AGRE	CONS	EXTR	TOVE	TINV	TCOM	TINS	TUNC
BURN1	0.6	−0.4	0.0	0.1	0.1	−0.1	−0.2	0.1	0.0	0.1	0.0	−0.1
BURN2	0.6	−0.1	−0.1	0.1	0.1	0.0	0.1	0.0	0.2	0.2	−0.1	0.2
BURN3	0.8	−0.2	0.0	0.1	0.0	−0.1	−0.1	0.1	0.1	0.1	0.0	−0.1
BURN4	0.6	−0.4	0.1	0.2	−0.2	−0.1	−0.2	0.2	0.0	0.0	0.0	−0.2
BURN5	0.8	0.0	−0.1	0.0	0.1	0.1	0.1	0.0	0.2	0.0	0.1	0.2
BURN6	0.9	0.0	0.0	0.2	−0.1	0.0	0.0	0.1	0.0	0.1	0.2	−0.1
BURN7	0.8	−0.2	0.2	0.2	−0.1	−0.1	0.0	0.1	0.0	0.0	0.2	−0.1
BURN8	0.8	−0.1	0.1	0.1	0.0	−0.1	0.0	0.0	0.0	0.1	0.2	−0.1
BURN9	0.9	−0.1	0.0	0.0	0.2	−0.1	0.0	0.1	−0.1	0.0	0.1	0.0
JENG1	−0.1	0.8	0.0	0.1	−0.2	0.1	0.1	0.0	0.0	−0.1	0.0	0.0
JENG2	−0.2	0.8	0.1	0.1	−0.2	0.1	0.0	0.1	0.0	0.1	0.0	0.1
JENG3	−0.2	0.9	0.0	−0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.1
JENG4	−0.2	0.9	0.0	−0.1	0.1	0.0	0.1	0.1	−0.1	0.0	0.0	0.0
JENG5	−0.2	0.8	−0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.1	0.1
JENG6	0.0	0.8	0.2	0.0	0.2	0.1	−0.2	0.0	0.0	0.1	−0.1	0.0
JENG7	−0.2	0.8	0.0	−0.1	0.3	−0.1	0.0	0.0	0.0	−0.1	0.1	0.1
JENG8	0.1	0.8	−0.1	0.0	0.1	0.0	−0.1	0.0	0.1	0.2	0.0	0.0
OPEN1	0.1	0.1	0.8	0.0	0.0	0.1	0.3	0.0	−0.1	−0.3	0.1	0.0
OPEN2	0.1	0.1	0.8	0.0	0.2	0.0	0.2	0.1	−0.1	−0.3	0.0	0.0
OPEN3	0.1	−0.2	0.7	−0.1	0.1	0.0	−0.1	0.0	0.1	0.1	−0.1	0.2
NEUR1	0.3	−0.1	0.0	0.6	0.3	−0.1	−0.1	0.1	0.0	0.3	−0.2	0.0
NEUR2	0.3	−0.1	0.0	0.8	0.1	−0.1	−0.1	−0.1	0.1	0.1	0.0	0.1
NEUR3	0.3	0.0	−0.1	0.6	0.3	0.0	0.1	−0.2	0.2	0.0	0.1	0.2
AGRE1	0.0	0.1	0.1	0.2	0.7	0.0	0.0	0.1	0.0	−0.2	0.2	−0.1
AGRE2	0.0	0.1	0.0	0.1	0.8	0.2	0.2	−0.1	−0.1	0.0	0.0	−0.1
AGRE3	0.0	0.0	0.1	0.0	0.8	0.1	0.2	0.1	0.0	0.1	0.0	−0.1
CONS1	−0.1	0.2	0.0	−0.1	0.1	0.8	0.1	0.2	−0.1	−0.1	0.1	−0.1
CONS2	−0.1	0.1	0.0	−0.1	0.1	0.9	0.2	0.0	−0.1	0.0	−0.1	0.0
EXTR1	0.1	0.1	0.0	−0.1	0.2	0.4	0.7	−0.1	−0.1	−0.1	0.0	0.0
EXTR2	0.0	0.1	0.2	−0.1	0.1	0.3	0.8	0.0	−0.1	0.1	−0.2	0.0
EXTR3	−0.1	−0.1	0.1	0.1	0.1	−0.1	0.8	0.1	0.0	−0.1	0.0	0.1
TOVE1	0.1	0.1	−0.1	−0.3	0.1	0.2	0.1	0.7	0.2	0.1	0.0	0.1
TOVE2	0.2	0.0	0.0	0.1	0.1	0.0	0.2	0.8	0.2	0.1	0.1	0.1
TOVE3	0.1	0.0	0.0	−0.1	0.1	0.1	0.0	0.8	0.2	−0.1	0.1	0.1
TOVE4	0.0	0.1	0.1	0.0	−0.1	−0.1	0.0	0.8	0.2	0.1	0.0	0.2
TOVE5	0.2	0.1	0.1	0.1	−0.1	0.1	−0.2	0.8	0.2	0.1	0.2	0.2
TINV1	0.1	0.1	0.1	−0.1	−0.1	−0.1	0.1	0.4	0.7	0.1	0.1	0.0
TINV2	0.0	−0.1	0.0	0.0	−0.1	0.0	−0.1	0.2	0.9	0.1	0.0	−0.1
TINV3	0.0	0.0	−0.1	0.3	0.0	0.0	0.0	0.3	0.7	0.1	0.2	−0.2
TINV4	0.1	0.0	−0.1	0.1	0.0	−0.1	−0.1	0.3	0.8	0.1	0.2	0.0
TCOM1	0.1	0.1	−0.1	0.2	−0.1	−0.3	0.1	0.2	0.0	0.7	0.3	0.0
TCOM2	0.0	0.0	−0.1	0.0	0.1	−0.1	−0.1	0.0	0.1	0.8	0.1	−0.2
TCOM3	0.2	0.2	−0.1	0.3	−0.1	0.1	−0.1	0.1	0.1	0.7	0.4	−0.1
TCOM4	0.2	0.1	0.0	0.3	−0.2	0.1	0.0	0.1	0.0	0.6	0.4	−0.1
TCOM5	0.2	0.2	−0.2	−0.2	0.0	0.0	−0.2	0.1	0.2	0.6	0.1	−0.1
TINS1	0.2	−0.1	−0.1	0.1	0.1	−0.1	0.0	0.0	0.1	0.3	0.8	0.0
TINS2	0.1	0.0	0.0	−0.1	0.0	0.0	−0.1	0.2	0.1	0.1	0.8	0.0
TINS3	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.3	0.8	0.0
TUNC1	−0.1	−0.1	0.2	0.0	0.1	0.0	0.0	0.1	−0.1	−0.1	−0.1	0.8
TUNC2	−0.1	0.1	0.1	0.2	−0.1	−0.1	0.0	0.2	−0.1	−0.2	0.1	0.8
TUNC3	0.0	0.2	−0.1	0.0	−0.1	0.1	0.1	0.2	0.0	0.0	0.1	0.8
TUNC4	0.0	0.2	0.0	0.0	−0.2	−0.1	0.0	0.2	0.0	−0.1	0.0	0.8
CR	0.9	0.9	0.8	0.7	0.8	0.8	0.8	0.9	0.9	0.8	0.9	0.9
AVE	0.6	0.7	0.6	0.5	0.6	0.7	0.6	0.6	0.6	0.5	0.7	0.7

Notes: BURN, Job burnout; JENG, Job engagement; OPEN, Openness; NEU, Neuroticism; AGRE, Agreeableness; CON, Conscientiousness; EXTR, Extraversion; TOVE, Techno-overload; TINV, Techno-invasion; TCOM, Techno-complexity; TINS, Techno-insecurity; TUNC, Techno-uncertainty; CR, Composite reliability; AVE, Average variance extracted.

Table A8b: Correlations for all constructs including control variables

	JBR	JBE	AGE	SEX	LOC	EX1	EX2	HRS	TST	OPE	NEU	AGR	CON	EXT	JDM
JBR	**0.78**														
JBE	−0.33	**0.84**													
AGE	−0.04	0.19	**1.00**												
SEX	−0.07	0.02	0.09	**1.00**											
LOC	0.10	−0.13	0.07	−0.09	**1.00**										
EX1	−0.14	0.21	0.93	0.16	0.01	**1.00**									
EX2	−0.12	0.25	0.66	0.21	−0.00	0.70	**1.00**								
HRS	−0.10	0.19	0.13	−0.01	0.03	0.14	0.10	**1.00**							
TST	0.29	0.16	0.08	0.06	−0.09	0.07	0.06	0.14	**0.78**						
OPE	0.10	−0.01	−0.05	−0.12	0.11	−0.08	−0.21	0.11	−0.09	**0.78**					
NEU	0.43	−0.13	−0.09	0.00	0.01	−0.09	−0.03	−0.07	0.20	−0.02	**0.71**				
AGR	0.03	0.11	0.04	−0.13	0.12	0.05	−0.06	0.05	−0.03	0.16	0.21	**0.78**			
CON	−0.22	0.21	0.02	−0.05	−0.07	0.08	0.12	0.12	−0.10	0.07	−0.25	0.19	**0.84**		
EXT	−0.03	0.06	−0.09	−0.25	0.02	−0.07	0.02	0.13	−0.09	0.24	−0.04	0.32	0.39	**0.78**	
JDM	0.24	0.04	0.19	−0.04	0.06	0.13	0.05	−0.07	0.24	0.10	0.05	0.04	−0.22	−0.18	**1.00**
JCN	0.00	0.35	0.34	−0.05	−0.03	0.34	0.31	0.19	0.06	0.06	0.04	0.03	0.22	0.25	0.03

Notes: JBR, Job burnout; JBE, Job engagement; AGE, Age; SEX, Gender; LOC, Location; EX1, Total work experience; EX2, Experience with current employer; HRS, Hours of ICT usage per week; TST, Technostress creators; OPE, Openness; NEUR, Neuroticism; AGR, Agreeableness; CON, Conscientiousness; EXT, Extraversion; JDM, Job Demand; JCN, Job Control; The figures in bold on the diagonal indicate the square roots of the average variance extracted (AVE).

Appendix 9. Common Method Bias Analysis

Common method variance can either inflate or deflate observed relationships between constructs. In a critical review of common method bias in behavioural research, Podsakoff *et al.* (2003) provide recommendations to alleviate common method bias. They suggest the following:

1 using *procedural remedies* during questionnaire design; and
2 performing *statistical controls*.

We followed Ayyagari *et al.* (2011) and incorporate both the suggestions. For procedural remedies, we psychologically separated the criterion and predictor variable measures. This was achieved by providing a cover story between the criterion and predictor measurement phases, as shown in Table A9a. In addition, we assured anonymity for our respondents and indicated that there is no right or wrong answer. We also carefully designed our questionnaire to avoid the use of ambiguous or unfamiliar terms, vague concepts and 'double-barreled' questions (Ayyagari *et al.,* 2011).

Table A9a. Procedural remedies for method bias

Separation introduced through the following statements	Comments
Did you know that 28% of IT professionals hide their career from friends and family to get out of giving free tech support?	Introduced between criterion and predictor variable measures
Did you know that Bill Gate's house was designed using a Macintosh computer?	
Did you know that the first computer mouse was invented by Doug Engelbart in 1964 and was made of wood?	

Next, for statistical control, we performed statistical analysis to assess the severity of common method bias in the data. First, we performed Harman's one factor test (Podsakoff & Organ, 1986). All the variables in the study were loaded into exploratory factor analysis, and we examined the factor solution to determine the number of factors necessary to account for the variance in the variables (Podsakoff *et al.,* 2003). The test revealed the presence of four distinct factors with eigenvalue greater than 1.0, rather than a single factor. The test also indicated the presence of 13 factors accounting for a total of 78% of the variance, with the first of these factors accounting for merely 11% of the variance. Because a single factor did not emerge and one general factor did not account for most of the variance, we conclude that common method bias is not a significant problem with the data (Podsakoff *et al.,* 2003).

Although these results suggest that method bias might not pose a severe threat, it should be noted that Harman's test is only a diagnostic test and does not actually control for method bias (Ayyagari *et al.,* 2011). Therefore, based on recommendations by Podsakoff *et al.* (2003) and IS articles (Ahuja *et al.,* 2007; Liang *et al.,* 2007), we introduced a common method factor whose indicators included all the principal constructs' indicators. This common method factor linked to all of the single-indicator constructs that were converted from observed indicators. For each single-indicator construct, we examined the coefficients of its two incoming paths from its substantive construct and the method factor. These two path coefficients are equivalent to the observed indicator's loadings on its substantive construct and the method factor and can be used to assess the presence of common method bias. Common method bias can be obtained by testing the statistical significance of factor loadings of the method factor and comparing the variances of the observed indicator explained by its substantive construct and the method factor (Williams *et al.,* 2003). As shown in Table A9b, the squared values of the method factor loadings were interpreted as the percent of indicator variance caused by method, whereas the squared loadings of substantive constructs were interpreted as the percent of indicator variance caused by substantive constructs. If the method factor loadings are insignificant and the indicators' substantive variances are substantially greater than their method variances, we can preclude the possibility of common method bias.

As shown in Table A9b, the average substantively explained variance of the indicators is 0.55, whereas the average method-based variance is only 0.02. The ratio of substantive construct variance to common method variance is about 28:1. Further, most method factor loadings are not significant, indicating that common method is not a serious concern for this research (Liang *et al.,* 2007). These tests helped us rule out the possibility of common method bias contaminating the results from this research.

Table A9b: Common Method Bias Analysis

Construct	Indicator	Substantive factor loading ($R1$)	$R1^2$	Method factor loading ($R2$)	$R2^2$
Technostress creators	TSOV1	0.78***	0.61	−0.36*	0.13
	TSOV2	0.71***	0.50	−0.03	0.00
	TSOV3	0.71***	0.50	−0.17	0.03
	TSOV4	0.77***	0.59	−0.26*	0.07
	TSOV5	0.76***	0.58	−0.05	0.00
	TSIV1	0.73***	0.53	−0.09	0.01
	TSIV2	0.50***	0.25	0.03	0.00
	TSIV3	0.68***	0.46	0.02	0.00
	TSIV4	0.69***	0.48	0.06	0.00
	TSCO1	0.49***	0.24	0.11	0.01
	TSCO2	0.36**	0.13	0.12	0.01
	TSCO3	0.50***	0.25	0.17	0.03
	TSCO4	0.51***	0.26	0.15	0.02
	TSCO5	0.48***	0.23	0.02	0.00
	TSIS1	0.38**	0.14	0.30	0.09
	TSIS2	0.62***	0.38	−0.01	0.00
	TSIS3	0.55***	0.30	0.15	0.02
	TSUC1	0.03	0.00	−0.22	0.05
	TSUC2	0.16	0.03	−0.18	0.03
	TSUC3	0.35	0.12	−0.33	0.11
	TSUC4	0.29	0.08	−0.25	0.06
Openness	POPE1	0.88***	0.77	−0.06	0.00
	POPE2	0.90***	0.81	−0.06	0.00
	POPE3	0.70***	0.49	0.16	0.03
Neuroticism	PNEU1	0.83***	0.69	0.01	0.00
	PNEU2	0.86***	0.74	0.06	0.00
	PNEU3	0.85***	0.72	−0.07	0.00
Agreeableness	PAGR1	0.78***	0.61	0.08	0.01
	PAGR2	0.92***	0.85	−0.06	0.00
	PAGR3	0.89***	0.79	0.00	0.00
Conscientiousness	PCON1	0.92***	0.85	−0.02	0.00
	PCON2	0.93***	0.86	−0.02	0.00
Extraversion	PEXT1	0.84***	0.71	−0.02	0.00
	PEXT2	0.87***	0.76	−0.03	0.00
	PEXT3	0.82***	0.67	0.06	0.00
Job burnout	BURN1	0.49***	0.24	0.23	0.05
	BURN2	0.62***	0.38	0.02	0.00
	BURN3	0.75***	0.56	0.16	0.03
	BURN4	0.50***	0.25	0.26	0.07
	BURN5	0.92***	0.85	−0.22	0.05
	BURN6	0.91***	0.83	−0.04	0.00
	BURN7	0.87***	0.76	−0.01	0.00
	BURN8	0.94***	0.88	−0.09	0.01
	BURN9	1.06***	1.12	−0.26**	0.07
Job engagement	JENG1	0.77***	0.59	0.04	0.00

Continues

Appendix 9b. (Continued)

	JENG2	0.91***	0.83	0.26	0.07
	JENG3	0.93***	0.86	−0.01	0.00
	JENG4	0.88	0.77	−0.05	0.00
	JENG5	0.81	0.66	−0.07	0.00
	JENG6	0.75	0.56	−0.02	0.00
	JENG7	0.82	0.67	−0.03	0.00
	JENG8	0.78	0.61	−0.10	0.01
Average		0.71	0.55	−0.01	0.02

Note: $^{*}p < 1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Appendix 10: Summary of Results

Hypotheses	Statement	Support
H1a	Openness to experience negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the openness-to-experience trait is higher.	Not supported
H1b	Openness to experience positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the openness-to-experience trait is higher.	Supported
H2a	Neuroticism positively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout more strongly when the neuroticism trait is higher.	Not supported
H2b	Neuroticism negatively moderates the relationship between technostress creators and job engagement such that the technostress creators influence job engagement less strongly when the neuroticism trait is higher.	Supported
H3a	Agreeableness positively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout more strongly when the agreeableness trait is higher.	Supported
H3b	Agreeableness negatively moderates the relationship between technostress creators and job engagement such that the technostress creators influence job engagement less strongly when the agreeableness trait is higher.	Not supported
H4a	Conscientiousness negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the conscientiousness trait in individuals is higher.	Not Supported
H4b	Conscientiousness positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the conscientiousness trait in individuals is higher.	Not Supported
H5a	Extraversion negatively moderates the relationship between technostress creators and job burnout such that technostress creators influence job burnout less strongly when the extraversion trait in individuals is higher.	Supported
H5b	Extraversion positively moderates the relationship between technostress creators and job engagement such that technostress creators influence job engagement more strongly when the extraversion trait in individuals is higher.	Not supported