MASTER'S THESIS

The effects of personality on the appraisal of technology related stressors as techno-distress and techno-eustress

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Technostress

EN: The effects of personality on the appraisal of technology related stressors as techno-distress and techno-eustress

NL: De effecten van persoonlijkheid op de beoordeling van technologie gebaseerde stressors als techno-distress en techno-eustress

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Abstract

In this age of increasing digitalization and rapid changes in technology, ICT professionals who find it difficult to cope with these changes experience the effects as technostress. A common assumption of technostress studies is that technostress has predominantly negative effects on the individuals experiencing it. However, in psychological stress literature it is argued that individuals can cognitively appraise stressful situations in a positively and negatively way. This study draws on this dualistic view of stress and aims to identify which individual level characteristics impact an individual's appraisal of technology related stressors as either eustress or distress. The results of this study indicate that individual level characteristics by themselves do not impact an individual's appraisal of technology related stressors and calls for deeper examining the role of other contextual external factors that impact an individual's appraisal of technology related stressors as either eustress or distress.

Keywords: Technostress, Technology, Personality, Stressor, Appraisal, Eustress, Distress

Introduction

Information and Communication Technologies (ICTs) are everywhere and have been associated with many negative consequences (Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2007). Though the latest technological revolution has contributed towards improving efficiency, the rate of these changes occurs at such a fast pace that they also contribute towards increasing stress. In this age of increasing digitalization and rapid changes in technology, ICT professionals who find it difficult to cope with these changes experience these effects as technostress (Christiana & Rajan, 2018).

Technostress is a relatively young field of research. A common assumption of technostress studies is that technostress has predominantly negative effects on the individuals experiencing it (Brooks & Califf, 2017). However, in psychological stress literature it is argued that individuals can cognitively appraise stressful situations in a positively and negatively way. Also, the same literature argues that these appraisals have a strong impact on how individuals respond to these stressful situations (Le Fevre, Matheny, & Kolt, 2003).

Stress is the result of a process wherein an individual interacts with their environment, making judgements, and dealing with issues that arise (Cooper et al., 2001; Galluch, Grover, & Thatcher, 2015). Within stress research, the Person-Environment (P-E) fit model is often used and based on the premise that an individual experiences stress when he or she is no longer in sync with the environment. This experienced stress will lead to strain (Ayyagari, Grover, & Purvis, 2011). We also speak of technostress when ICTs are the cause of the misfit between the individual and the environment (Tarafdar et al., 2007).

Two types of stress perceptions have been identified in literature. Literature identified eustress which embodies the positive perception of a stressful situation. Literature also identified distress which embodies the negative perception of a stressful situation (Le Fevre et al., 2003; Little, Simmons, & Nelson, 2007; Selye, 1983). Analog to this, literature introduced stressful situations induced by technology as techno-eustress and techno-distress (Califf, Sarker, Sarker, & Fitzgerald, 2015).

Individuals who experience techno-eustress perceive the stressors caused by ICTs as challenges (challenge stressors) or opportunities for change, to learn, and to achieve. In contrast, individuals who experience techno-distress perceive the stressors caused by ICTs as threats (threat stressors) (Tarafdar, Cooper, & Stich, 2019). Researchers in several disciplines acknowledge the importance of understanding both eustress and distress (Califf et al., 2015). However, even though prior research acknowledges the need to understand both techno-distress and techno-eustress, there is a dearth of studies investigating what triggers these differential responses (Tarafdar et al., 2019).

Using the dualistic view of technostress, this study aims to identify which individual level characteristics impact an individual's appraisal of technology related stressors as either eustress or distress. To do so, this study reviews the relevant literature on stress, technostress and individual differences and proposes a research model grounded in these literatures. The following research questions will be answered:

- Which individual level characteristics impact an individual's appraisal of technology related stressors as either eustress or distress?
- How do these individual level characteristics strengthen the relationship between ICTs characteristics and eustress or distress?

This paper contributes to the literature on techno-eustress and techno-distress by investigating what individual factors lead to the primary appraisal of technostress as challenge or threat stressors. In the next chapter, the theoretical foundation and research model for this paper is given. Followed by the research method wherein the approach for data collection and analysis is described. After this chapter, the results and the conclusion are presented. This paper ends with the discussion, limitations, implications, and suggestions for further research.

Literature review and theory development

The literature review of this study is intended to understand stress from the transactional perspective of the Person-Environment fit (PE-fit) model. This model suggests that individual level factors play an important role in both the perception of and the coping with stress. Meanwhile technostress is a form of stress specifically related to the rapid development and change of modern Information and Communication Technologies (ICTs). Technostress is a phenomenon largely associated with negative consequences (Tarafdar et al., 2007). However, based on the inherent assumption of the PE-fit model that different individual's experience stress in different ways, there is a possibility that certain individuals experience technostress as stimulating or challenging rather than threatening.

First, the search strategy is presented. Then, the theoretical background of the main concepts will be presented. Starting with stress appraisal, followed by technostress, and ending with ICTs and personality characteristics. Finally, a research model will be presented. The proposed research model is developed based on the literature review mentioned above and aimed to answer the two research questions of this paper.

Search strategy

For the initial search a building block strategy was used. The information need was broken up into blocks which were connected through AND/OR operators. In the first screening, the articles were scanned to determine their relevance for the research. In the second screening, the introduction, scientific models and conclusions of the articles that passed the first screening were read to determine further relevance. The articles that passed the second screening were then read in full. From this point on, any relevant quote or citation from third literature underwent the same screenings as the articles from the initial search. This action has been repeated until no further relevant articles were found.

Databases & search engines

The following databases and search engines have been used while searching for peer-reviewed scientific literature.

- **Google Scholar:**
  Used for looking for referenced articles after the second screening and citation export.
- **EBSCOhost through the Maastricht University library:**
  Used for the primary searches. EBSCOhost consists of multiple databases. Not every database proved to be relevant for this study. The following databases did prove to be useful and have been used extensively:
  - ***Academic Search Elite:***
    Academic Search Elite contains full text copies for more than 2,100 journals, nearly 150 journals have PDF images dating back to 1985.
  - ***Business Source Premier:***
    Business Source Premier provides full text for more than 2,300 journals, including full text for more than 1,100 peer-reviewed titles.
  - ***PsycINFO:***
    The PsycINFO® database is the largest resource devoted to peer-reviewed literature in behavioral science and mental health.

Initial search queries

The following search queries have been used within EBSCOhost while searching for peer-reviewed and relevant scientific literature.

Table 1 search query, filters and hits

Search Query	Additional filters	Number of database hits
"technostress" AND "characteristics" AND "information" AND ("technology" OR "systems")	*Limit To: Scholarly (Peer Reviewed) Journals* *Source Types: Academic Journals*	• *(7) Academic Search Elite* • *(6) Business Source Premier* • *(7) PsycINFO*
"technostress" AND "positive" AND "negative"	*Limit To: Scholarly (Peer Reviewed) Journals* *Source Types: Academic Journals*	• *(3) Academic Search Elite* • *(9) Business Source Premier* • *(6) PsycINFO*
"technostress" AND "personality"	*Limit To: Scholarly (Peer Reviewed) Journals* *Source Types: Academic Journals*	• *(6) Academic Search Elite* • *(3) Business Source Premier* • *(8) PsycINFO*
"technostress" AND "effects" ("positive" OR "negative")	*Limit To: Scholarly (Peer Reviewed) Journals* *Source Types: Academic Journals*	• *(6) Academic Search Elite* • *(4) Business Source Premier* • *(9) PsycINFO*
"technology" AND "eustress" AND "distress"	*Limit To: Scholarly (Peer Reviewed) Journals* *Source Types: Academic Journals*	• *(3) Academic Search Elite* • *(5) Business Source Premier* • *(3) PsycINFO*

Using the search strategy described above the theoretical background of the main concepts could be formed. The presentation of the theoretical background starts in the next paragraph "stress appraisal".

Stress appraisal

Stress is a transactional process in which an individual is interacting with the environment, making judgments, and reacting to environmental stimuli. There are different elements to be considered in terms of this transactional perspective, among the availability of stress reducers, such as social support (Galluch et al., 2015).

One of the most prominent models related to the transactional perspective of stress, the Person-Environment fit (PE-fit) model, posits that stress is the result of unsatisfied personal demands or needs (Ayyagari, 2007; Ayyagari et al., 2011; Cooper et al., 2001; Edwards, 1996). The PE-fit model acknowledges that individual differences can lead to unique perceptions concerning the same stimuli or stressor. Second, the PE-fit model declares stress as a mismatch between individual's demands or needs and the situation provided (Ayyagari, 2007; Cooper, 1998; Edwards, 1996; French, Caplan, & Van Harrison, 1982).

When considering whether an individual perceives an event as stressful, we need to consider two processes (Antonovsky & Kats, 1967; Cohen et al., 1984; R. Lazarus & Cohen, 1977). When encountering a potential stressful event, or stress creator, individuals first consider the potential consequences of this stress creator in terms of its severity (Cohen et al., 1984). If they believe them to be potential harmful, they consider to what degree they have the resources to mitigate the harmful effects. As such individual differences can impact an individuals' stress perception at two points during the transactional process (Beaudry & Pinsonneault, 2005; R. S. Lazarus & Folkman, 1984). First, during the primary appraisal two individuals might perceive the same stressor to be of differing severities. Second, during the secondary appraisal two individuals might have different knowledge or access to support mechanisms mitigating the severity of the stressor differently (Cohen et al., 1984). This study focusses on the primary appraisal.

Technostress

Similar to stress in general, technostress is generally considered as negative. However, not all effects of stressors are negative. Stressors are also believed to be able to encourage individuals and inspire them to be creative (Selye, 1974). As such, stress is a double-edged sword, some may consider it as hindering while others take it as a challenge (R. S. Lazarus, 1966; Tarafdar et al., 2019).

Within organizations, employees will interpret the potentially stressful situations triggered by the use of ICTs differently. One of the factors that triggers the difference in interpretation is different personality characteristics (Griffith, 1999; Pinsonneault & Rivard, 1998). Based on differences in personality, stressful events can be appraised as opportunities or threats (Beaudry & Pinsonneault, 2005; Carpenter, 1992; R. S. Lazarus & Folkman, 1984; McCrae, 1989). The terms eustress and distress reflect these two different interpretations of technostress. Eustress means that stress creates an opportunity to encourage personal growth, while distress means that stress leads to a threat associated with negative impact (Selye, 1974; Tarafdar et al., 2019).

ICTs characteristics

Technostress is stress caused by Information and Communication Technology (ICT). ICTs can be described using six characteristics: usability, complexity, reliability, pace of change, presenteeism and anonymity (Ayyagari et al., 2011). These six features can be divided into three features: usability, dynamic and intrusive features. Usability features are related to the adoption and use of technologies and consist of the three characteristics: usability, complexity and reliability. Dynamic features are related to the dynamic nature of ICTs and consist of the single characteristic: pace of change. Intrusive features are related to the invasiveness of ICTs and consist of the two characteristics: presenteeism and anonymity (Ayyagari et al., 2011).

Usability feature characteristics

Whenever individuals find ICTs **useful**, their abilities to do things faster or in a more productive manner are enhanced. Because of this enhancement their perception of work overload is reduced. In a similar manner, whenever individuals don't think of ICTs as useful their perception of the ICTs abilities are lowered (Straub & Karahanna, 1998). Once this situation occurs they believe that their work demands could be addressed in a better way (Weil & Rosen, 1997).

Whenever individuals find ICTs **complex**, they may become frustrated with the number of features as well as how to use these. For example, a previous study showed that some users are dissatisfied with the growing complexity of mobile devices (Ayyagari et al., 2011). The perception of high complexity represents a knowledge barrier and require individuals to expend more effort. Whenever individuals perceive the use of technology to be difficult, any tasks requiring them to work with said technology is automatically perceived as threatening (Ayyagari et al., 2011).

Whenever individuals perceive ICTs as **unreliable** their perception of workload is increased as precautions must be taken against the threat of a potential breakdown (Ayyagari et al., 2011). Previous study reported users interacting with unreliable ICTs as frustrated and strained (Åborg & Billing, 2003; Ayyagari et al., 2011). It is therefore that reliability, or the dependability and consistency of ICTs, is recognized as an important factor in ICT success models (DeLone & McLean, 1992; Jiang, Klein, & Carr, 2002).

Intrusive feature characteristics

Presenteeism is defined as the degree to which ICTs enables users to be reachable. Evidence from previous studies suggests that enabling individuals to be accessible to the office at all times contributes to burnout (McGee, 1996). Also, previous studies identified ICTs as a source of interruption which leads to reduced efficiency and increased psychological strain (McFarlane & Latorella, 2002). Finally, enabling increased communication flows among individuals leads to a fragmentation of work tasks which is perceived by individuals as a source of frustration (Straub & Karahanna, 1998).

Anonymity is defined as the degree to which individuals perceives that their use ICTs cannot be monitored, identified or tracked. Previous studies reported ICTs with a low perception of anonymity as stressful to employees (DeTienne, 1993; Frey, 1993; Jenero & Mapesriordan, 1992; Parenti, 2001; Smith, Carayon, Sanders, Lim, & LeGrande, 1992). Furthermore, it's reported that individuals are wary about the possibility of organizational invasive monitoring (Best, Krueger, & Ladewig, 2006; Boyd, 1997; George, 1996).

Dynamic feature characteristic

Pace of change is defined as the degree to which the frequency of changes within an ICT environment are perceived. These changes could be either altering features within existing ICT environments, or introducing brand-new ICT environments. Constantly changing the functionalities of ICTs burdens individuals with adaptation demands such as learning demands (Korunka & Vitouch, 1999).

Personality characteristics

In this study it is proposed that individuals with different personality characteristics are likely to perceive the same stimuli triggered technology related stressors in different ways. Particular personality characteristics increase the likelihood that technology related stressors are perceived as techno-distress or techno-eustress (Tarafdar et al., 2019).

Personality characteristics can be described in several ways. However, the 'big five' personality traits (Digman, 1990; Goldberg, 1981; McCrae & Costa, 2003) are widely adopted as a consensus framework for theoretically examining and understanding personality characteristics (Srivastava, Chandra, & Shirish, 2015). The 'big five' consists of the following personality traits: agreeableness, conscientiousness, extraversion, neuroticism and openness to experience. These personality traits will be further discussed below.

Agreeable individuals score high on characteristics such as likeability, friendly compliance and social adaptability (Krishnan, 2017). These individuals will be more accommodating when asked to use ICTs within an organizational context (Devaraj, Easley, & Crant, 2008). Previous studies indicate that agreeable individuals tend to use new ICTs even without having the required capability (Srivastava et al., 2015). Therefore, the following hypotheses are proposed.

- H1a: Agreeableness negatively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to lower techno-distress when agreeableness is higher.
- H1b: Agreeableness positively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to higher techno-eustress when agreeableness is higher.

Conscientious individuals have the tendency to be goal-oriented with a strong sense of purpose (Venkatesh, Sykes, & Venkatraman, 2014). These individuals are characterized by will to achieve, conformity and prudence (Witt, 2002). Although conscientiousness can shield individuals from experiencing stress (Zellars, Perrewé, Hochwarter, & Anderson, 2006), it is likely that conscientious individuals perceive technostress creators negatively as they might perceive these creators are more likely to negative impact their qualities of planning and persistence (Carver & Connor-Smith, 2010). These individuals will comprehend technostress creators negatively (Krishnan, 2017). Therefore, the following hypotheses are proposed.

- H2a: Conscientiousness positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to higher techno-distress when conscientiousness is higher.
- H2b: Conscientiousness negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to lower techno-eustress when conscientiousness is higher.

Extraverted individuals are referred to as confident, self-expressing, sociable and surgent (Witt, 2002). Individuals scoring high on extraversion are more likely to perceive technostress creators as negative stimuli impacting their emotions (Krishnan, 2017). Work-related ICTs and its frequent changes are more likely to make extraverted individuals feel the need to update their skills constantly to avoid being replaced (Krishnan, 2017). Furthermore, extraverted individuals prefer to have face-to-face interaction instead of using ICTs (Hamburger & Ben-Artzi, 2000; Landers & Lounsbury, 2006). Therefore, the following hypotheses are proposed.

- H3a: Extraversion positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to higher techno-distress when extraversion is higher.
- H3b: Extraversion negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to higher techno-eustress when extraversion is higher.

Neurotic individuals embody stress, anxiousness and hostility (Landers & Lounsbury, 2006). Individuals scoring high on neuroticism perceive ICTs to which they have not been exposed before more negative (Landers & Lounsbury, 2006). As neurotic individuals possess negative attitudes and cognition towards ICTs (Srivastava et al., 2015), it is more than likely that they will perceive ICT-related job disruptions as threatening (Srivastava et al., 2015; Tarafdar, Pullins, & Ragu-Nathan, 2015). Neurotic individuals have the tendency to be insecure, which will increase the chance for them to perceive newer ICTs as a threat to their job security (Krishnan, 2017). Therefore, the following hypotheses are proposed.

- H4a: Neuroticism positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICT characteristics lead to higher techno-distress when neuroticism is higher.
- H4b: Neuroticism negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to lower techno-eustress when neuroticism is higher.

Individuals who are **open to experience** are creative, flexible, curious and unconventional (Krishnan, 2017). They engage in experiential learning (Barrick, Mount, & Judge, 2001), and are motivated to work towards self-set goals (Judge, Higgins, Thoresen, & Barrick, 1999). Individuals scoring high on openness to experience are more likely to perceive technostress creators negatively as such creators are likely to limit their creativity (Bala & Venkatesh, 2013). Furthermore, ICT-based disruptions have a negative influence on their learning experiences (Galluch et al., 2015). Therefore, the following hypotheses are proposed.

- H5a: Openness to experience positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to higher techno-distress when openness to experience is higher.
- H5b: Openness to experience negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to lower techno-eustress when openness to experience is higher.

Proposed research model

The proposed hypotheses above are represented in Figure 1below.

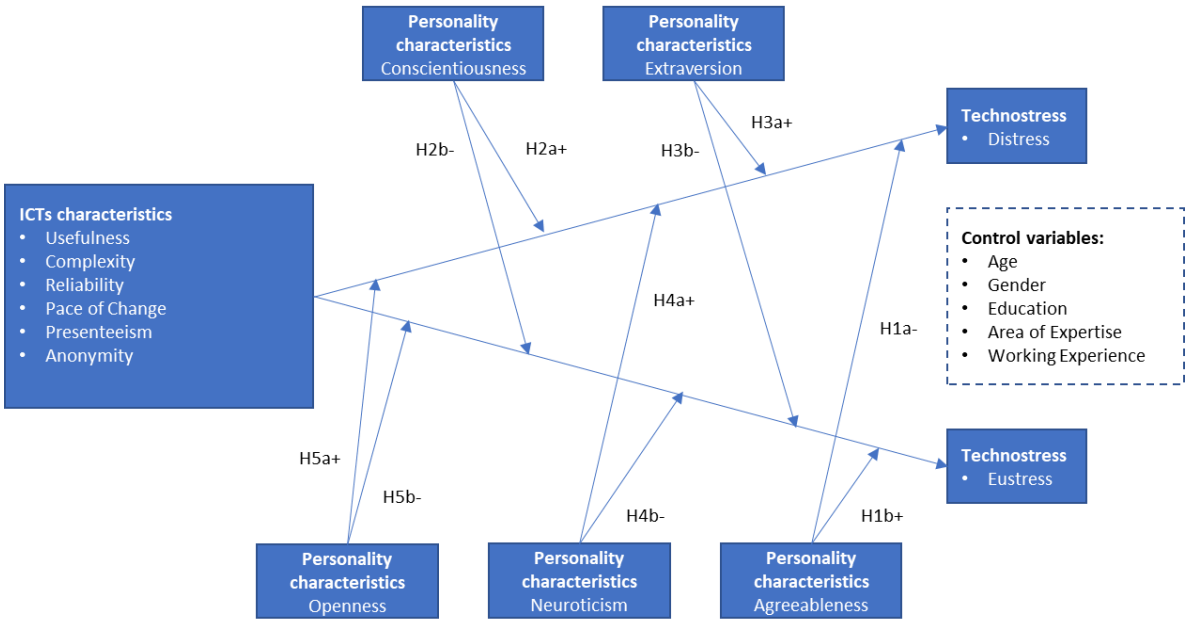

Figure 1 Proposed Research Model

Research Method

This study uses a deductive approach where the focus lies on using data to test a theory. Since there is no theory development, quantitative research is conducted. In this study, data is collected to numerically examine the relationships between variables in the research model, and analyze these using a range of statistical and graphical techniques. For data collection a combination of unstructured interviews with an online questionnaire is used. Previous research already designed, standardized and tested questions regarding the constructs of the research model in such a way that all respondents interpret them the same, therefore these questions form the body of the questionnaire. The unstructured interviews are used to gain insights about which ICTs are used by the sample population. These insights are used to form ICT categories which are used to split the respondents over these categories in order to increase the variation of the response data.

The next paragraph will outline the target and sample population. Afterwards, the method of data collection through unstructured interviews and online questionnaires is discussed while also considering maintaining validity and reliability. Then, using the results of previous research, the control variables and the operationalization of the constructs are discussed. Finally, creating the ICT categories and dividing the respondents over these categories are discussed.

Population

In this study ICT professionals are targeted. This group is targeted because previous research has observed that computer and technology related applications are the major source of stress in the electronic workplace for ICT professionals (Chang, Hung, & Hung, 2014).

In the first quarter of 2019 there were 262.000 ICT specialists working full-time in the Netherlands. Their jobs include software- and application developers, and database and network specialists. Out of these ICT specialists, 235.000 are male and 27.000 are female. The majority of these ICT specialists (177.000) are between 25 to 45 years. Also, the majority of these ICT specialists (222.000) have completed a higher education (CBS Statline, 2019).

The sample population consists of 850 employees working in a large ICT consultancy firm in the Netherlands. These ICT professionals can be divided into seven areas of expertise (sub-domains): Business Analytics, Cloud, Digital Collaboration, Digital Experience, Management Consultancy, Security and Software Development. Most of the ICT professionals work in projects outside of the office at the client's location. Beside ICT professionals there are also management and staff functions. For example, Finance and Control, Fleet Management, Business Unit Management, Sales Management and Human Resources. This last group will be grouped into an eighth area of expertise: Management & Staff.

The quantity and quality of the response should be high enough for the results to be generalizable. Therefore, since participation is completely on a voluntarily bases, the entire organization is sampled and it's avoided to only recruiting members of a certain subset of the population. Surveys usually have a response rate of about 10% to 20%. In order to achieve statistically reliable results a response of 80 to 100 is needed. By applying this logic to the sample population, a response between 90 and 180 can be expected.

Survey

The hypotheses in this study are primarily examined using online surveys. Given the explanatory and analytical nature of the research, a survey is used to collect data in a standardized and systematic manner, to examine and explain the relationships between the constructs. It is inadvisable to use questionnaires in exploratory or other research that requires large numbers of open-ended questions (Saunders, Lewis, & Thornhill, 2012). Questionnaires work best in a scenario where questions that are intended to be interpreted the same by all respondents can be standardized, which is the case in this study.

As the survey questions cover sensitive topics like the psychological effects such as eustress and distress, social desirability bias is expected. To decrease social desirability bias, no personal information is collected. Also, before the start of the survey, a disclaimer will be given stating the purpose of the study and that no personal information will be collected or generated that might lead to the identification of an individual.

Because the sample population is employed within a Dutch speaking company it can be assumed that not everyone is fluent in the English language. Having an English only survey is a reliability risk and could also lead to a lower response rate. Therefore, the survey will support both the English and the Dutch language. This means that all English questions have to be translated into Dutch. This is a reliability risk because the translated questions, when incorrectly translated, might measure something different than the original questions. To prevent this the questions will first undergo their translation from English into Dutch. Then, an independent person is asked to translate the Dutch questions back into English. The Dutch translation is deemed reliable when the last translation is the same as the original English questions.

Operationalization of constructs

Four constructs are included for research and model development: ICTs characteristics, personality characteristics, distress and eustress. To operationalize the constructs, existing scales are adapted from prior research that suit the context of this study. As the measures have been tested many times before, this will increase content validity.

Personality Characteristics

Personality characteristics are derived from (Srivastava et al., 2015). The research purpose of this study is to investigate the role of personality traits in influencing the effects of technostress creators.

Table 2 personality characteristics (Srivastava)

Construct	Item ID	Items *(Prefix: I see myself as…)* *(Answers: 1 very unlikely … 7 very likely)*
Openness to Experience (OPE)	*Ope01*	Q: Creative.
	Ope02	Q: Imaginative.
	Ope03	Q: Unconventional.
Neuroticism (NEU)	*Neu01*	Q: Moody.
	Neu02	Q: Easily upset.
	Neu03	Q: Anxious.
Agreeableness (AGR)	*Agr01*	Q: Sympathetic.
	Agr02	Q: Warm.
	Agr03	Q: Kind.
Conscientiousness (CON)	*Con01*	Q: Dependable.
	Con02	Q: Self-disciplined.
	Con03	Q: Organized.
Extraversion (EXT)	*Ext01*	Q: Extraverted.
	Ext02	Q: Enthusiastic.
	Ext03	Q: Talkative.

ICTs characteristics

ICTs characteristics are derived from (Ayyagari et al., 2011). The research purpose of this study is to investigate the role of ICTs characteristics in inducing stress in individuals.

Table 3 ICTs characteristics (Ayyagari)

Construct	Item ID	Items (Answers: *1 very unlikely … 7 very likely)*
Usability (USE)	*Use01*	Q: Use of ICTs enables me to accomplish tasks more quickly.
	Use02	Q: Use of ICTs improves the quality of my work.
	Use03	Q: Use of ICTs makes it easier to do my job.
	Use04	Q: Use of ICTs enhances my effectiveness on the job.
Complexity (COM)	*Com01*	Q: Learning to use ICTs is easy for me.
	Com02	Q: ICTs are easy to use.
	Com03	Q: It is easy to get results that I desire from ICTs.
Reliability (REL)	*Rel01*	Q: The features provided by ICTs are dependable.
	Rel02	Q: The capabilities provided by ICTs are reliable.
	Rel03	Q: ICTs behave in a highly consistent way.
Presenteeism (PRE)	*Pre01*	Q: The use of ICTs enables others to have access to me.
	Pre02	Q: ICTs make me accessible to others.
	Pre03	Q: The use of ICTs enables me to be in touch with others.
	Pre04	Q: ICTs enable me to access others.
Anonymity (ANO)	*Ano01*	Q: It is easy for me to hide how I use ICTs.
	Ano02	Q: I can remain anonymous when using ICTs.
	Ano03	Q: It is easy for me to hide my ICTs usage.
	Ano04	Q: It is difficult for others to identify my use of ICTs.
Pace of Change (PAC)	*Pac01*	Q: I feel that there are frequent changes in the features of ICTs.
	Pac02	Q: I feel that characteristics of ICTs change frequently.
	Pac03	Q: I feel that the capabilities of ICTs change often.
	Pac04	Q: I feel that the way ICTs work changes often.

Eustress

Eustress characteristics are derived from (W. B. Schaufeli, Taris, & Van Rhenen, 2008; Srivastava et al., 2015). The original questionnaire is aimed at operationalizing job engagement. Job engagement is defined as a positive, fulfilling work-related state of mind, which is characterized by vigor, dedication and absorption (W. Schaufeli, Salanova, & Gonzalez-Roma, 2002). Since this construct appears reflect eustress as well, job engagement is deemed usable in the operationalization of techno-eustress.

Table 4 eustress (Schaufeli, Taris, & Van Rhenen)

Construct	Item ID	Items *(Prefix: Because of ICTs…)* *(Answers: 1 very unlikely … 7 very likely)*
Techno-eustress (EUS)	*Eus01*	Q: I get carried away when I am working.
	Eus02	Q: In my work, I feel bursting with energy.
	Eus03	Q: In my job, I feel strong and vigorous.
	Eus04	Q: I am enthusiastic about my job.
	Eus05	Q: My job inspires me.
	Eus06	Q: When I get up in the morning, I feel like going to work.
	Eus07	Q: I feel happy when I am working intensely.
	Eus08	Q: I am proud of the work that I do.
	Eus09	Q: I am immersed in my work.

Distress

Distress characteristics are derived from (Maslach, Jackson, Leiter, Schaufeli, & Schwab, 1986; Srivastava et al., 2015). The original questionnaire is aimed at operationalizing job burnout. Job burnout is a prolonged response to stressors on the job; comprises three dimensions: exhaustion, cynicism and inefficacy (Maslach, Schaufeli, & Leiter, 2001). Since this construct appears to reflect distress as well, job burnout is deemed usable in the operationalization of techno-distress.

Table 5 distress (Maslach, Jackson, Leiter, Schaufeli & Schwab)

Construct	Item ID	Items *(Prefix: Because of ICTs…)* *(Answers: 1 very unlikely … 7 very likely)*
Techno-distress (DIS)	Dis01	Q: I feel emotionally drained by my work.
	Dis02	Q: Working at my job all day long requires a great deal of effort.
	Dis03	Q: I feel like my work is breaking me down.
	Dis04	Q: I feel frustrated with my work.
	Dis05	Q: I feel I work too hard on my job.
	Dis06	Q: It stresses me too much to work on my job.
	Dis07	Q: I feel like I am at the end of my rope.
	Dis08	Q: I feel burned out from my work.
	Dis09	Q: I feel used up at the end of the workday.

Control variables

The sample population is diverse across several traits such as job title, gender, age, working experience, education and personality. Control variables are developed to capture these traits, with an exception for personality which will be part of the survey. The control variables are used to make a comparison with the characteristics of the sample population to determine the representativeness of the sample.

Table 6 control variables

Construct	Item ID	Items
Control Variable (CVa)	*CVa01*	Q: What is your gender?
	CVa02	Q: What is your age?
	CVa03	Q: What is your education level?
	CVa04	Q: What is your area of expertise?
	CVa05	Q: How many years of working experience do you have in this area of expertise?

ICTs categories

Given the explanatory nature of the research, an unstructured interview with the ICT architect of the sample organization will be held beforehand. The main goal is to explore and understand the mainly used ICTs across all areas of expertise within the organization. Afterwards, these ICTs are then grouped based on their main purpose and functionalities. From these groups the following four ICT categories are proposed:

- **Administrative ICTs:**
  ICTs in which employees keep their financial, time-based, experience and/or skills administration;
- **Collaborative ICTs:**
  ICTs that employees use to improve working together using communication and sharing features;
- **Managerial ICTs:**
  ICTs that management and staff use to monitor and manage the organizational assets;
- **Technical ICTs:**
  ICTs that employees use to develop technical solutions for themselves, their peers or their customers.

Survey Structure

The ICT categories are used to split the respondents into different branches in order to increase variation within the data. Every branch in the survey will start with a short introduction explaining what the ICT category entails. Furthermore, a couple of example ICTs from the sample company's architecture are given to further introduce and frame the respondents.

One of the main concerns of this approach is that all respondents choose the same ICT category branch. In order to prevent this from happening, a respondent split is proposed. Based on area of expertise, the respondent is assigned to one of the ICT categories. See Figure 2 for a graphical representation of the structure of the survey. The logic of this respondent split is discussed below.

Respondent split

Employees belonging to the Management Consultancy and Management & staff areas of expertise are the only groups that can use ICTs to monitor and manage the operational assets of the organization. Therefore, these areas of expertise are redirected to the Managerial ICTs branch.

Employees belonging to the Digital Experience and Software Development areas of expertise are the most technical groups and therefore are more likely to use Technical ICTs on a daily basis. Therefore, these areas of expertise are redirected to the Technical ICTs branch.

Employees belonging to the Digital Collaboration area of expertise are specialized in implementing ICTs that improve working together using communication and sharing features. Employees belonging to the Business Analytics area of expertise frequently use these ICTs to collaborate with their peers or customers. Therefore, these areas of expertise are redirected to the Collaborative branch.

Since all areas of expertise use ICTs to keep their financial, time-based, experience and/or skills administration, this category was last to be assigned. Employees belonging to the Cloud and Security area of expertise were not yet assigned to an ICT category. Therefore, these areas of expertise are redirected to the Administrative branch.

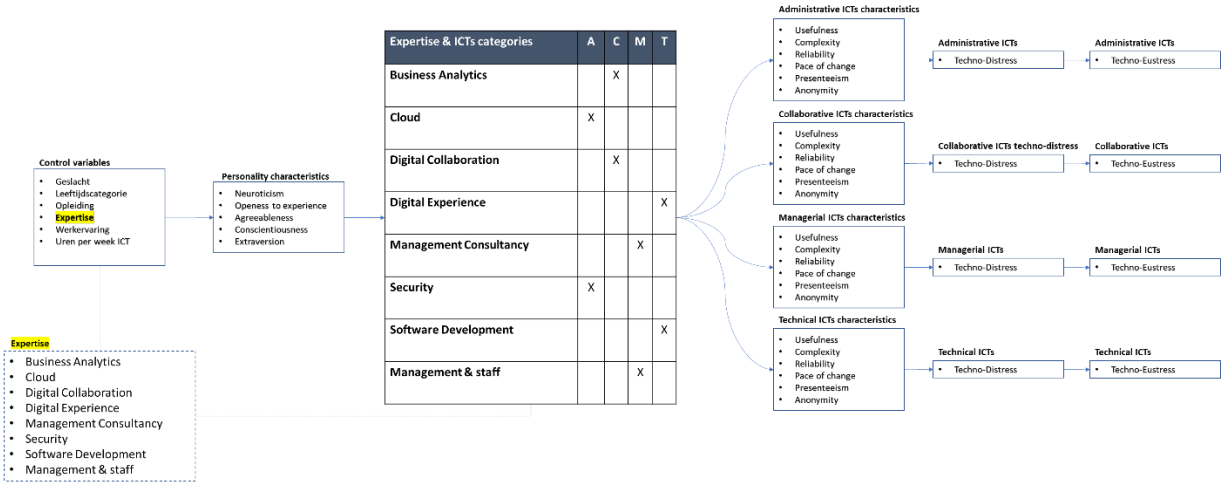

Figure 2 survey structure

Results

Once the questionnaire was developed, it was subjected to further refinement before sending out. Once satisfactory, the survey was sent out through the official communication channel of the sample company and remained active for an entire month. After a month enough data was collected to do the analysis and the survey was closed.

The analysis of the results is discussed below. First, the sample statistics of the entire dataset are presented. Next, the results of the data exploration through descriptive analysis are presented. After exploring the data, the reliability and validity of the data is analyzed by verifying convergent and discriminant validity. Afterwards, the outer loadings and paths of the overall dataset are presented. Finally, the multigroup analysis and the resulting subsets are presented and added to the insights of the overall dataset.

Sample statistics

In total 850 individuals had access to the survey tool. Of these 850 individuals 149 completed the survey. All items in the questionnaire were made mandatory and therefore had to be completed. An exception to this was an optional open question on the last page, before submitting the survey. Because of this there was no missing mandatory data. However, calculating the variance of the items for techno-distress (9 items), techno-eustress (9 items) and techno-distress and -eustress combined (18 items), resulted in 0 variance for 13 cases. These cases were considered invalid and therefore removed, resulting in a final sample size of 136. The demographics of the remaining survey respondents are presented in Table 7.

Table 7 sample statistics

Measures	Items	Frequency	Percentage
Gender	Male	116	85.29%
Gender	Female	20	14.71%
Age Category	21 to 30 years	38	27.94%
Age Category	31 to 40 years	42	30.88%
Age Category	41 to 50 years	33	24.26%
Age Category	Above 50 years	23	16.91%
Educational Level	MBO	12	8.82%
Educational Level	HAVO	6	4.41%
Educational Level	VWO	7	5.15%
Educational Level	HBO Bachelor	60	44.12%
Educational Level	WO Bachelor	5	3.68%
Educational Level	HBO Master	14	10.29%
Educational Level	WO Master	30	22.06%
Educational Level	PhD	2	1.47%
Area of Expertise	Business Analytics	36	26.47%
Area of Expertise	Cloud	14	10.29%
Area of Expertise	Digital Collaboration	1	0.74%
Area of Expertise	Digital Experience	11	8.09%
Area of Expertise	Management Consultancy	13	9.56%
Area of Expertise	Management & staff	21	15.44%
Working Experience	Less than 1 year	10	7.35%
Working Experience	1 to 2 years	12	8.82%
Working Experience	2 to 5 years	29	21.32%
Working Experience	5 to 10 years	24	17.65%
Working Experience	Above 10 years	61	44.85%
ICT Category	Administrative	19	13.97%
ICT Category	Collaborative	37	27.21%
ICT Category	Managerial	34	25.00%
ICT Category	Technical	46	33.82%

Analyzing the demographics of the respondents shows that 85% of the respondents were male. The most common age category (42, 30.88%) lies between 31 and 40 years old, followed by 21 to 30 years old (38, 27.94%). On average, the majority of the respondents have completed a higher education with 44.12% having an HBO Bachelor degree, and 22.06% having a WO Master degree. Given the reported demographics of IT specialists in the Netherlands by (CBS Statline, 2019) these estimates seem reasonable. The biggest group of respondents (36, 26.47%) are working in the Business Analytics area of expertise. 44.85% of the respondents work longer than 10 years within their area of expertise. In order, the most to the least common ICT categories are: technical (46, 33.82%), collaborative (37, 27.21%), managerial (34, 25.00%) and administrative (19, 13.97%).

Descriptive analysis

To further explore the data past the sample statistics a descriptive analysis was performed. For this analysis the data was transformed and loaded into the data visualization tool Power BI, by Microsoft. For the transformation of the data the following logic was applied to all constructs and their factors:

$$Construct\ x = \frac{(\frac{(\sum factor\ i)}{N\ factors} - 1)}{6}$$

For every construct, this formula calculates the mean value of all the construct's reflective factors. Then, it subtracts the value 1 from the calculated mean and divides this result by 6 to return a decimal value between 0 and 1. Because the model is fully reflective it's reasoned that applying this approach is a suitable method for efficiently extracting insights from the data. Instead of having to analyze all of the individual reflective factors (n = 55) only 'normalized' constructs (n = 13) have to be analyzed.

Personality characteristics

The data in Figure 3 and Figure 4 are presented together. The figures show that agreeableness is the most dominant trait that scores the highest within five areas of expertise. Neuroticism is the least dominant trait and has the lowest average value within all areas of expertise. Individuals working in the security area of expertise are the most neurotic (0.47), while individuals working within digital collaboration are the least neurotic (0.06). Security reports, though scoring the highest in neuroticism, the second lowest average value of techno-distress (0.12). The highest average value of techno-distress (0.37) is reported within management consultancy. This area of expertise is the only one that reports almost similar average values for both techno-eustress (0.38) and techno-distress (0.37). The highest average value of techno-eustress (0.70) are reported by the digital collaboration area of expertise.

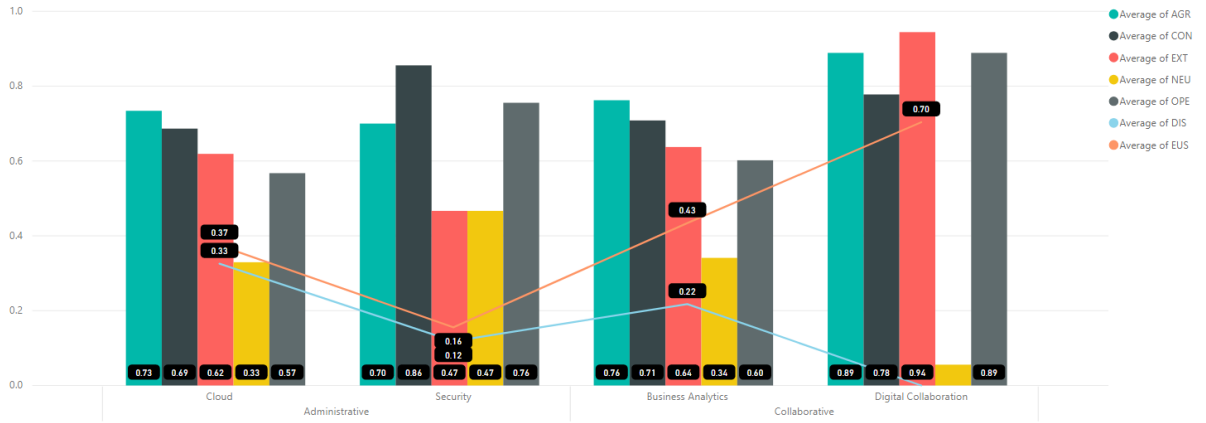

Figure 3 average of personality characteristics by administrative and collaborative

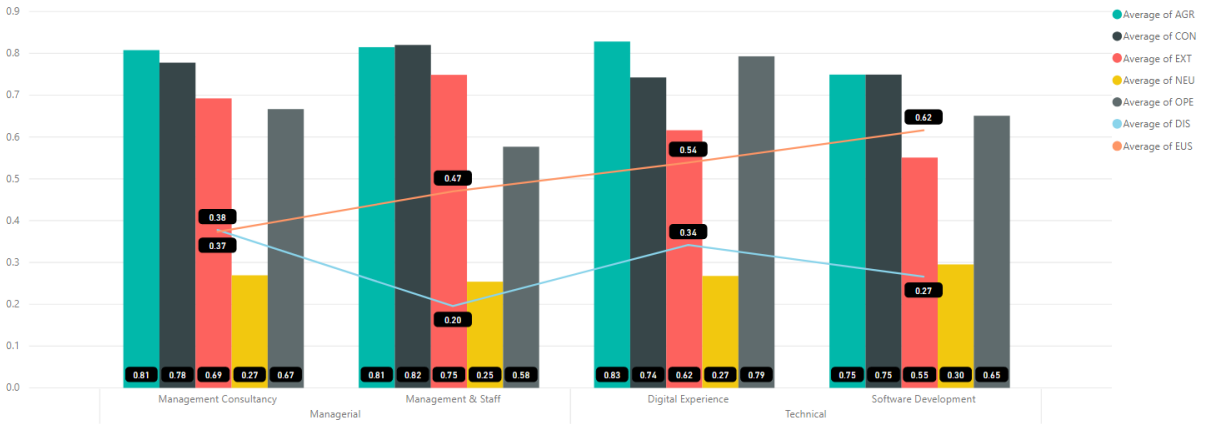

Figure 4 average of personality characteristics by managerial and technical

The data in Figure 5 report that individuals with a college degree report the highest average value of neuroticism (0.48) and techno-distress (0.28). The lowest average value of neuroticism (0.14) and techno-distress (0.06) is reported by individuals that have a doctor's degree. The average value of personality characteristics of individuals with a bachelor's degree or a master's degree only differ by a maximum of 0.02. However, these groups report a large difference of 0.12 in the average value of techno-eustress. As education increases, the average value of openness to experience increases as well.

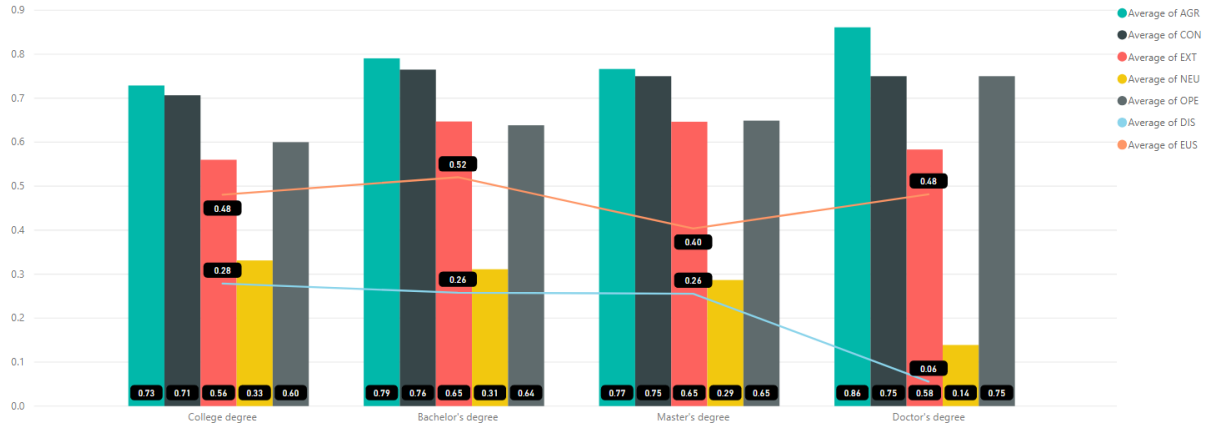

Figure 5 average of personality characteristics by degree

The data in Figure 6 reports that the average value of neuroticism stays the same for all buckets except the last one. Once the last bucket is reached it shows a decrease of 0.12. The highest average value of techno-eustress (0.52) is reported by individuals between 21 and 30 years old. This group also reports the highest average value of agreeableness (0.79) and extraversion (0.67). The highest average value of techno-distress (0.28) is reported by middle-aged individuals between 31 and 50 years old. Within this conjoined group, the average value of techno-eustress (0.44) starts low but increases by 0.06 once the age 41 is reached. After the age 50 it drops down to the lowest reported average value of techno-eustress (0.42).

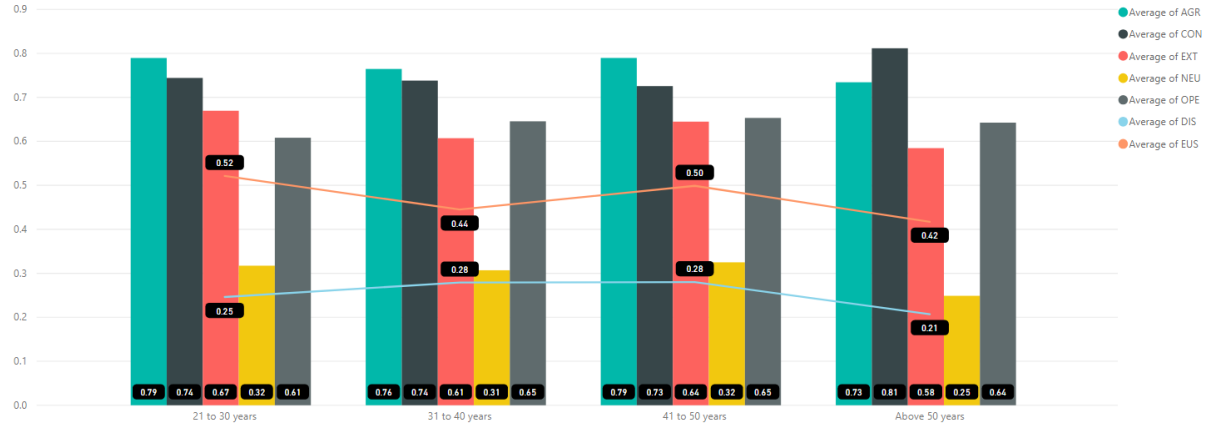

Figure 6 average of personality characteristics by age

The data in Figure 7 reports a comparable distribution to the data in Figure 6 for the personality characteristics. Individuals that have less than 1 year of working experience report the highest average value of techno-eustress (0.57). Figure 6 reported for individuals between 21 and 30 years old also the highest average value of techno-eustress (0.52). Once the working experience progresses between 1 or 2 years the average value of techno-eustress (0.38) and techno-distress (0.14) drop to the lowest reported average values. Once the working experience progresses past 2 years the reported average value of techno-eustress increases as well. The reported average value of techno-distress (0.31) reaches its maximum value between 2 to 5 years of working experience, then it gradually decreases as working experience increases.

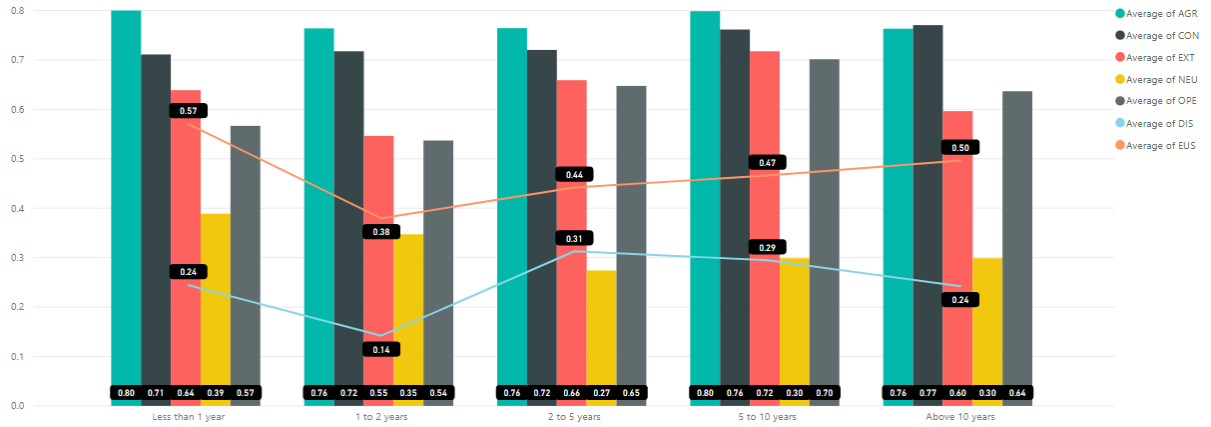

Figure 7 average of personality characteristics by working experience

ICTs characteristics

The data in Figure 8 report that anonymity has the lowest average value across all ICT categories. Administrative ICTs report the lowest average value of usability (0.46) and anonymity (0.32). They also report the highest average value of techno-eustress (0.32). Technical ICTs report the highest average value of usability (0.85), complexity (0.74) and reliability (0.66). They also report the highest average value of techno-eustress (0.60) and techno-distress (0.28). Collaborative ICTs report the highest average value of presenteeism (0.70). They also report the lowest average value of techno-distress (0.21).

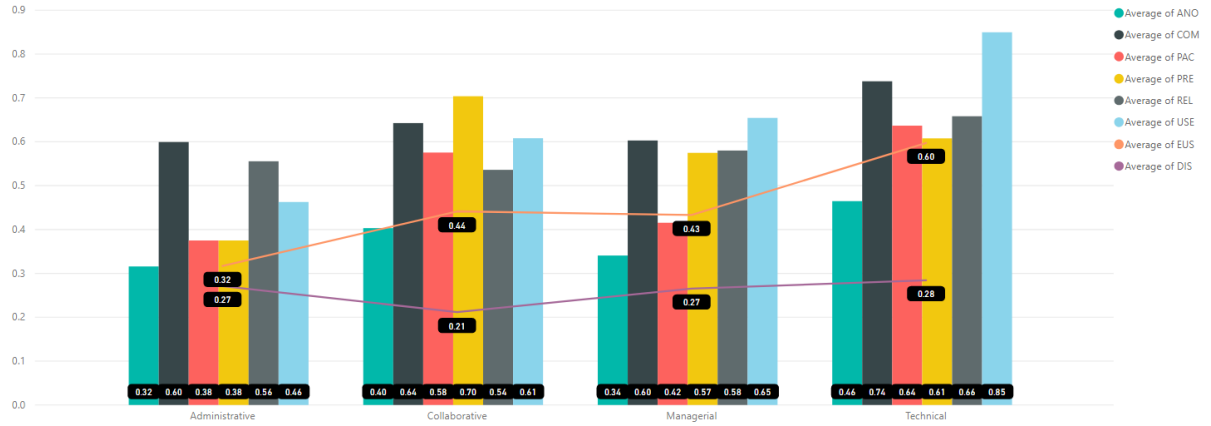

Figure 8 average of ICTs characteristics by ICT category

Reliability and validity analysis

During the reliability and validity analysis the convergent validity and discriminant validity are verified. Convergent validity detects whether the factors for a construct are more correlated with one another than with the factors of another construct. Discriminant validity detects whether the constructs that show convergent validity are not highly correlated with other constructs in the model.

Content validity is a third type of validity. Content validity detects whether the chosen factors capture the full domain of the construct. In this study, content validity is achieved by adopting the measurement items from previous research wherein this type of validity was already examined and pre-tested.

Convergent validity

Factor loadings express the strength of the correlation between factors and their corresponding construct. Initial analysis of the data report low outer loadings for [ope3] ($\beta = 0.286$) and [ano4] ($\beta = 0.498$). Because these factors do not reflect their construct well, they were removed from the model. After recalculating the model, the factors [teu01] and [teu09] both showed a loading lower than 0.7 while all other factors showed a loading higher than 0.7. It was therefore decided to remove these two factors from the model as well.

The factor loadings can be observed in Table 12 within Appendix A. This table reports that all factor loadings are larger than 0.70. Considering that 0.50 is an acceptable minimum value, these values mean that there is a strong correlation between each of the factors and their corresponding constructs. Convergent validity is demonstrated as the loadings of the inner construct's factors are higher than the factors of other constructs. However, it can be observed that the factors [com02] and [com3] show high loadings (> 0.7) within the reliability construct. Vice versa, the factors [rel01] and [rel02] show high loadings (> 0.7) within the complexity construct. These observations might indicate a problem with discriminant validity and will be further assessed below. The reported t-statistics and p-values in Table 13 indicate that the reported loadings are significant.

Convergent validity was further tested by examining composite reliability, average variance extracted and Cronbach's alpha. The recommended threshold for composite reliability is a value of 0.70, the acceptable value for average variance extracted is 0.50, and the recommended threshold for Cronbach's alpha is a value of 0.70. As reported in Table 8, the values of all research constructs are greater than the thresholds or acceptable values as discussed earlier. For composite reliability and average variance extracted this means that convergent validity is demonstrated. For Cronbach's alpha this means that the research constructs are reliable.

Table 8 composite reliability, average variance extracted and Cronbach's alpha

Construct	Composite reliability	Average variance extracted	Cronbach's alpha
AGR	0.890	0.734	0.822
ANO	0.899	0.751	0.834
COM	0.923	0.801	0.875
CON	0.801	0.597	0.714
DIS	0.961	0.734	0.954
EUS	0.965	0.798	0.958
EXT	0.887	0.738	0.848
NEU	0.848	0.659	0.758
OPE	0.876	0.788	0.764
PAC	0.961	0.861	0.946
PRE	0.936	0.788	0.910
REL	0.937	0.833	0.899
USE	0.974	0.904	0.965

Discriminant validity

Discriminant validity is verified by reporting the square root of the average variance extracted values for all constructs that show convergent validity. The square root values are reported on the diagonal line in Table 10 on page 19. The values on the diagonal line are all greater than the correlations with other constructs, thus this table indicates satisfactory discriminant validity.

The constructs complexity and reliability reported in Table 10 a high correlation (0.784) which might indicate an issue with discriminant validity. To assess this potential issue the Heterotrait-Monotrait Ratio is evaluated and presented in Table 11 on page 19. Again, the value on the crossline between complexity and reliability turned out to be high (0.874). However, since all values are lower than 0.90, which is suggested to be the acceptable level of discriminant validity by (Henseler, Ringle, & Sarstedt, 2015), it's concluded that discriminant validity has been established between all reflective constructs.

Paths and effects

The reliability and validity analysis demonstrate an appropriate model fit with the data. To test the hypotheses of this study the path coefficients and indirect effects of the proposed research model are evaluated. First, the results of the path coefficients are reported. Then, the results of the indirect effects are reported.

Path coefficients

Significant direct effects have been observed within the path coefficients and are presented in Figure 9. For readability, insignificant paths have been hidden from the figure together with unaffected constructs. Although direct effects are not main focus of this study, these direct effects are still interesting and could be used for deeper analysis later in the study.

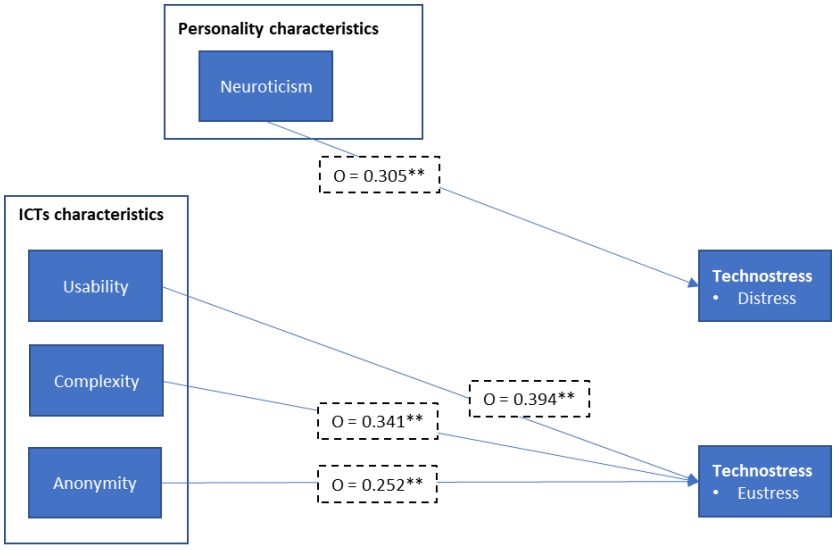

Figure 9 path coefficients overall dataset

Indirect effects

The target of this study is to identify which individual level characteristics impact an individual's appraisal of technology related stressors as either eustress or distress. To test the support for this study's proposed hypotheses the indirect effects need to be examined from a personality point of view. The lowest p-value is taken for every indirect effect of a personality trait on ICT characteristic and techno-distress or techno-eustress. If the lowest p-value is insignificant then it is used to represent ICT characteristics as a single group. The reported p-values in Table 9 show no support for the proposed hypotheses.

Table 9 summary of proposed hypotheses

Code	Hypotheses	Supported
H1a	Agreeableness negatively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to lower techno-distress when agreeableness is higher.	No ($p > 0.90$)
H1b	Agreeableness positively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to higher techno-eustress when agreeableness is higher.	No ($p > 0.75$)
H2a	Conscientiousness positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to higher techno-distress when conscientiousness is higher.	No ($p > 0.83$)
H2b	Conscientiousness negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to lower techno-eustress when conscientiousness is higher.	No ($p > 0.57$)
H3a	Extraversion positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to higher techno-distress when extraversion is higher.	No ($p > 0.76$)
H3b	Extraversion negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to higher techno-eustress when extraversion is higher.	No ($p > 0.24$)
H4a	Neuroticism positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICT characteristics lead to higher techno-distress when neuroticism is higher.	No ($p > 0.19$)
H4b	Neuroticism negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to lower techno-eustress when neuroticism is higher.	No ($p > 0.97$)
H5a	Openness to experience positively impacts an individual's appraisal of ICTs characteristics as techno-distress such that ICTs characteristics lead to higher techno-distress when openness to experience is higher.	No ($p > 0.80$)
H5b	Openness to experience negatively impacts an individual's appraisal of ICTs characteristics as techno-eustress such that ICTs characteristics lead to lower techno-eustress when openness to experience is higher.	No ($p > 0.74$)

Table 10 Fornell-Larcker Criterion (FLC)

	AGR	ANO	COM	CON	DIS	EUS	EXT	NEU	OPE	PAC	PRE	REL	USE
AGR	**0.859**												
ANO	0.041	**0.867**											
COM	0.232	0.292	**0.897**										
CON	0.196	-0.028	0.159	**0.786**									
DIS	-0.064	-0.097	-0.367	-0.147	**0.858**								
EUS	0.153	0.417	0.475	0.053	-0.267	**0.894**							
EXT	0.405	0.014	-0.029	0.188	-0.097	0.093	**0.870**						
NEU	0.043	0.001	-0.036	-0.179	0.346	-0.046	-0.24	**0.816**					
OPE	0.244	0.152	0.116	0.004	0.023	0.125	0.271	0.059	**0.890**				
PAC	0.108	0.290	0.033	-0.003	0.094	0.241	0.043	0.098	0.268	**0.928**			
PRE	0.189	0.197	0.504	0.223	-0.231	0.304	0.146	-0.078	0.062	0.316	**0.889**		
REL	0.182	0.312	0.784	0.129	-0.334	0.355	-0.043	-0.032	0.022	-0.054	0.383	**0.914**	
USE	0.242	0.276	0.658	0.199	-0.257	0.529	-0.074	-0.063	0.061	0.195	0.474	0.613	**0.951**

Table 11 Heterotrait-Monotrait Ratio (HTMT)

	AGR	ANO	COM	CON	DIS	EUS	EXT	NEU	OPE	PAC	PRE	REL	USE
AGR													
ANO	0.082												
COM	0.270	0.339											
CON	0.223	0.121	0.177										
DIS	0.083	0.109	0.388	0.178									
EUS	0.170	0.449	0.509	0.131	0.267								
EXT	0.464	0.044	0.086	0.213	0.109	0.093							
NEU	0.096	0.079	0.044	0.291	0.376	0.075	0.311						
OPE	0.303	0.172	0.139	0.163	0.071	0.138	0.310	0.118					
PAC	0.118	0.333	0.087	0.030	0.109	0.245	0.090	0.103	0.285				
PRE	0.208	0.238	0.564	0.236	0.232	0.323	0.154	0.141	0.176	0.332			
REL	0.211	0.361	0.874	0.137	0.350	0.375	0.064	0.048	0.063	0.112	0.428		
USE	0.268	0.306	0.706	0.236	0.253	0.546	0.112	0.078	0.081	0.201	0.504	0.650	

Multigroup analysis

The primary analysis is performed on the overall dataset. However, personality effects might differ for different types of technologies. To evaluate if this is the case a multigroup analysis is performed. This analysis separates the overall dataset into four different subsets that each represent a single ICT category: administrative, collaborative, managerial and technical. The analysis of these subsets is conducted the same way as the overall dataset. Identical to the overall dataset, the subsets didn't report any support for the proposed hypotheses. However, they do report direct effects which have been added to the existing path model and reported in Figure 10.

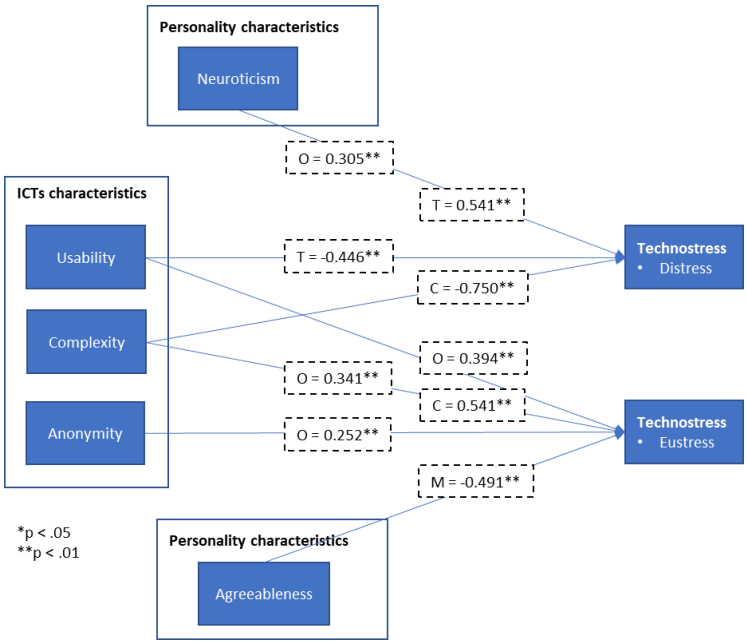

Figure 10 path coefficients all datasets

The multigroup analysis introduced one new construct (agreeableness) and three new paths (usability and complexity to distress, agreeableness to eustress) to the path model. The path neuroticism to distress occurs in both the overall dataset and the technological subset. Also, the path complexity to eustress occurs in both the overall dataset and the collaborative subset. However, the paths of both the technological and collaborative subsets are stronger than those of the overall dataset.

Note: the administrative subset is missing from the path model because it couldn't be analyzed. The reason for this is that because the data of this subset didn't have enough variance it resulted into a singular matrix error. A singular matrix error occurs when multiple factors share the same observations and therefore perfectly correlate with each other. This error can be resolved by removing some of these factors or by increasing the variance through gathering more response.

Discussion

The primary research goal of this study is to identify which individual level characteristics impact an individual's appraisal of technology related stressors as either eustress or distress. As reported in Table 9, the developed research model argues that personality characteristics have no impact on an individual's appraisal of technology related stressors as either eustress or distress. In this discussion, the non-support for the proposed hypotheses is explained while also paying attention to insights gained from previous research and non-hypothesized observations from this study.

The presentation of this discussion is as follows. First, the possible causes for the non-support of this study's proposed hypotheses are discussed. Then, the discussion continues by relating the non-hypothesized observations from this study to the insights gained from previous research.

Non-supported hypotheses

The results of this study reported in Table 9 suggest that personality characteristics have no impact on an individual's appraisal of technology related stressors as either eustress or distress. The observations and results are discussed below from a personality characteristics point of view.

Agreeableness

A possible explanation for the non-support of H1a and H1b is that agreeable individuals are more accommodating when asked to use ICTs within an organizational context. In previous studies it was indicated that agreeable individuals tend to use new ICTs even without having the required capabilities (Srivastava et al., 2015). Individuals that feel encouraged by their agreeableness trait to take on more work might not possess the right capabilities to perform their tasks and therefore might suffer from work overload. On the other hand, individuals that do possess the right capabilities to perform these additional tasks might not see them as threatening, but as challenging. A plausible explanation for the non-significant mediation effects is that additional unobserved factors such as computer self-efficacy are causing mixed positive and negative influences.

Conscientiousness

A possible explanation for the non-support of H2a and H2b is that in previous research conscientious individuals were characterized by their motivation to achieve, perform at a high level and take actions to improve their job performance, even if that means adopting new ICTs (Srivastava et al., 2015). The same research observed that conscientiousness can shield individuals from experiencing stress. Following this reasoning, a plausible explanation for the non-significant mediation effects is that an intrinsic motivation to perform combined with the shielding effect causes conscientious individuals to not experience technology related stressors as either challenges or threats.

Extraversion

A possible explanation for the non-support of H3a and H3b is that extraverted individuals are referred to as confident, self-expressing and social. Extraverted individuals dedicate a significant amount of time interacting and socializing with other individuals. Through this interacting and socializing emotional exhaustion is reduced. In this time of increasing digitalization, ICTs with a high presenteeism trait are replacing the need for face-to-face contact. In previous research, presenteeism is significantly related to the stressors work overload, work-home conflict and invasion of privacy (Ayyagari et al., 2011). The same research related the stressors work overload and work-home conflict to strain. A plausible explanation for the non-significant mediation effects is that extraverted individuals experience the positive effects of socializing at the same time as the negative effects caused by the presenteeism trait.

Neuroticism

The non-support for H4a could be explained by the strong direct impact of neuroticism on techno-distress as observed in Results. It's possible that because of the strong impact neuroticism has on techno-distress it is not significantly enhancing the relative influences of ICTs characteristics on techno-distress. The non-support for H4b could be explained that neuroticism induces a significant amount of distress by itself. It's possible that the effects of neuroticism on techno-distress cancels out any positive effects caused by the characteristics of ICTs.

Openness to experience

A possible explanation for the non-support for H5a and H5b is that individuals with a high openness to experience trait are creative, curious, and do not feel threatened by new experiences or technologies. It is likely that they embrace any opportunity to expand their current knowledge and experience, even if that means using ICTs that might impose negative effects. In previous research, constantly changing the ICTs environment was significantly related to the stressors work overload, role ambiguity and job insecurity (Ayyagari et al., 2011). The same research related all these stressors to strain. A plausible explanation for the non-significant mediation effects is that the eustress of learning and gaining new experiences combined with the distress from these stressors cancel each other out.

Predictors of techno-eustress

Although not hypothesized, this study observed that usability has a significant direct positive effect (β = 0.394) on techno-eustress. This observation supports previous research wherein was observed that individuals who find ICTs to be useful and reliable experience lower levels of the stressor work overload (Ayyagari et al., 2011). Interestingly, the previous study observed a moderated negative effect of usability on techno-distress, this study observed a direct positive effect of usability on techno-eustress.

This study also observed that anonymity has a significant direct positive effect (β = 0.252) on techno-eustress. The same previous research observed that high anonymity features result into lower levels of the stressor invasion of privacy (Ayyagari et al., 2011). However, the previous research couldn't link this stressor to strain. The observations from this study might indicate that the stressor invasion of privacy should be significantly related to techno-eustress rather than techno-distress. Users who perceive to be anonymous while using ICTs feel more secure and less invaded in their privacy.

Within the managerial subset, it was observed that the personality trait agreeableness has a significant direct negative effect (β = -0.491) on techno-eustress. A possible explanation could be that individuals who work with managerial ICTs are most likely having a management position. It's reasonable to assume that managers who give in to any request they receive have more difficulty performing their own tasks, and therefore suffer from work overload. Previous research related work overload to an increase in techno-distress. The observations from this study might indicate that in some cases work overload can also be related to a decrease in techno-distress.

This study observed that complexity has a significant direct positive effect on techno-eustress in both the overall dataset (β = 0.341) and the collaborative subset (β = 0.541). The observations of this study are contradicting the expectations of previous research, wherein complexity was expected to significantly increase the relationship with techno-distress (Ayyagari et al., 2011). A plausible explanation could be that given the nature of the sample organization the efficacy level of ICTs amongst the sampled individuals could be very high. This could cause individuals to see more complex ICTs as challenges to overcome, rather than threats they have to deal with. This reasoning could indicate computer self-efficacy to play an important role in the primary appraisal of technology related stressors.

Predictors of techno-distress

This study observed that neuroticism has a significant direct positive effect on techno-distress in both the overall dataset (β = 0.305) and the technical subset (β = 0.541). These observations support previous research wherein neurotic individuals are described as the embodiment of stress and anxiousness , and that individuals who score high on neuroticism are more likely to perceive ICTs as negative (Landers & Lounsbury, 2006). Furthermore, this observation supports the observation from previous research wherein neuroticism has a significant direct positive effect on job burnout (Srivastava et al., 2015).

Within the collaborative subset, it was observed that complexity has a significant direct negative effect (β = -0.750) on techno-distress. Similar to the observation of complexity having a significant direct positive effect on techno-eustress, this observation is contradicting the expectations of previous research (Ayyagari et al., 2011). The same explanation can be given for this observation. Given the nature of the sample organization the efficacy level of ICTs amongst the sampled individuals could be very high. This could cause individuals to see more complex ICTs as challenges to overcome, rather than threats they have to deal with.

Within the technological subset, it was observed that the usability trait has a significant direct negative effect (β = -0.446) on techno-distress. This observation supports previous research wherein was stated that individuals who find ICTs useful enhance their abilities to do things faster or in a more productive manner and therefore reduce their perception of work overload (Straub & Karahanna, 1998). Arguably, individuals within the technological subset work most intensively with ICTs and therefore benefit the most from the usability trait.

Implications

This study made several contributions that have implications for research and practice. First, this study extends past stress research by showing that personality characteristics have no impact on an individual's appraisal of technology related stressors as either eustress or distress. Second, the present work offers managerial implications that could be used to mitigate some of the unwanted effects of working with ICTs. These implications for research and practice are discussed below.

Implications for research

Previous research on technostress examined the role of technostress creators resulting in undesirable outcomes such as job dissatisfaction and decreased productivity (Ayyagari et al., 2011; Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008; Tarafdar, Tu, Ragu-Nathan, & Ragu-Nathan, 2011). Additionally, previous research distinguished technostress between techno-eustress and techno-distress. Furthermore, previous research placed technostress as part of a transactional process wherein individuals first consider the potential consequences of stressful events in terms of its severity (Cohen et al., 1984; Galluch, 2015; Selye, 1974). Previous research also established significant relationships between the characteristics of ICTs, techno-stressors and strain (Ayyagari et al., 2011). Finally, previous research established significant moderation of personality characteristics on the relationship between technostress creators and job burnout or job engagement (Srivastava et al., 2015). These last two branches of stress research offered an understanding of how characteristics of ICTs can lead to technostress creators, and how personality characteristics moderate these technostress creators into positive or negative job outcomes.

Despite the importance of understanding the impact of personal and organizational factors in the appraisal of techno-stressors as techno-eustress or techno-distress, it has not yet been covered in technostress literature (Tarafdar et al., 2019). Grounded in the Person-Environment fit model, this study extends the present understanding of technostress by theorizing and empirically testing the impact of individual level characteristics on the appraisal of technology related stressors as techno-eustress or techno-distress. This study is important to explain why some groups of individuals feel challenged by the characteristics of ICTs, while other groups of individuals feel threatened by the same characteristics.

The results of this study report that individual level characteristics have no impact on an individual's appraisal of technology related stressors as techno-eustress or techno-distress. However, the multigroup analysis and non-hypothesized results from this study reports different outcomes of personality- and technology characteristics on techno-eustress and techno-distress for different types of technologies. It will be interesting to know why these different types of technologies have different outcomes. Finally, it will be interesting to know if there are other contextual conditions, such as computer self-efficacy, that impact an individual's appraisal of technology related stressors as techno-eustress or techno-distress.

Implications for practice

Previous research underscored the importance of using ICTs that demonstrate usability and reliability characteristics (Ayyagari et al., 2011). This study supports the importance of usability characteristics by demonstrating that, within the context of technological ICTs, increasing an individual's perception of usability characteristics results in experiencing lower levels of techno-distress. This study also suggests that, within the context of the ICT organization, the characteristics anonymity and complexity are likely as important. The results of this study reported that experiencing techno-eustress can be increased by improving the individual's perception of the anonymity trait. From a collaborative ICTs point of view, it was reported that through improving the individual's perception of the complexity characteristic they'll experience more techno-eustress and less techno-distress. These insights are valuable from an ICTs adoption point of view. Organizations can use this model to estimate how new ICTs will be experience by their employees. Also, organizations can use this model to select the ICTs best suited for their employees. For example, increasing the perception of usability is recommended for the adoption of technological ICTs, while increasing the perception of complexity is recommended for the adoption of collaborative ICTs.

This study reinforces the role of personality characteristics within the organizational behavior stress literature. The results of this study report a significant positive relationship between neuroticism and techno-distress. Within a managerial context, this study reports a significant negative relationship between agreeableness and techno-eustress. The advantage of understanding and recognizing these traits can aid in the development of better organizational stress management strategies to leverage the influence of these characteristics on techno-eustress and techno-distress. For example, for neuroticism organizations can use this model to include a strategy to provide more social or technical support to alleviate the negative effects of technology related stressors during the secondary appraisal. For agreeableness within a managerial context, organizations can use this model to train their managers into understanding the importance of balancing their likeability, friendly compliance and social adaptability.

Limitations

This study reports limitation that may have impacted the results and conclusions. Firstly, the suggested ICT categories are not based on proven ontologies. Using proven ontologies can help in preventing misunderstandings and in increasing the reuse of knowledge (Chandrasekaran, Josephson, & Benjamins, 1999). Even though within the survey the ICT categories were explained and examples were given, not using a proven ontology could have led to misunderstandings within the respondents, resulting in non-response or mis measured scales.

The respondents were all individuals working for the same organization. Therefore, it was not possible for this study to investigate organizational differences. Also, this study utilized data that were collected at a single point in time during which the sample organization was merging with another organizations. This external factor might have caused a constant flow of change and stress within the sample organization which could be the reason why none of the hypotheses of this study were supported.

The highest level of analysis for this study was the level of ICT characteristics. Since ICT categories contain several ICT systems, and each respondent filling in the survey might have had a different specific ICT system in mind, it's difficult to determine if individual level characteristics impact an individual's appraisal of technology related stressors as either eustress or distress. The survey did ask for which specific ICT system the respondent had in mind during answering the survey, however this question was left optional and wasn't always filled by respondents.

The analysis only paid attention to the scales of completed surveys. Incomplete surveys were not analyzed. These surveys might contain valuable insights which are not included into this study's results. For example, someone who is suffering from techno-distress might be more inclined to stop answering the survey. It would be interesting to know the reason for this, and if personality traits or working condition have contributed to this decision. The setup of the survey made it impossible to identify which individual accessed the survey. This was done to guarantee fill anonymity within the study to prevent social bias.

Future research

This study made several suggestions for future research. In the results section it was stated that some ICT categories couldn't be analyzed because the lack of enough response within the category led to variance issues. Future research could choose to expand upon these categories and gather additional response to add them to the path model of this study. However, a better approach for future research would be to expand upon one (or more) ICT categories and increase the level of analysis to specific ICTs. For example, one of the most mentioned ICT systems within the collaborative category was Microsoft Teams. Unfortunately, combining all the response that mentioned Microsoft Teams wasn't enough to make a statistical analysis. Future research could do a case study for Microsoft Teams to better explain to which extend individuals rate the ICTs characteristics of this system and how these characteristics are experienced in terms of techno-eustress or techno-distress. While doing so, future research could also verify and explain why raising the perception of complexity by individuals that work with collaborative ICTs results in experiencing higher techno-eustress and lower techno-distress.

In the discussion it was proposed that given the nature of the sample organization computer self-efficacy might have had a strong impact on the appraisal of technology related stressors as techno-eustress or techno-distress, and therefore caused the non-support for the hypotheses. It will be interesting to know if computer self-efficacy, or other unobserved contextual conditions, significantly impact an individual's appraisal of technology related stressors. Therefore, this study calls for deeply examining what these contextual conditions are and how they strengthen the relationship between technology created stressors and techno-distress or techno-eustress.

The limitations addressed that the respondents consisted of individuals working for the same organization and that the data was collected at a single point in time during which the sample organization was merging with another organization. The first limitations made it not possible to take the differentiating effects of organizational factors into account. The external factor addressed in the second limitation might have caused a constant flow of change and stress within the organization which might have led to the non-supported hypotheses. To address these limitations, future study should consider using a longitudinal design with different organizations within a more stable setting.

Conclusion

Recent technostress literature has made significant advances in understanding the role of technostress creators (Ayyagari et al., 2011; Ragu-Nathan et al., 2008; Tarafdar et al., 2011). Moreover, researchers distinguished between positive and negative stress as part of a transactional process (Cohen et al., 1984; Galluch, 2015; Selye, 1974). Finally, research offered a nuanced understanding of how ICTs characteristics can lead to technostress creators and how personality traits moderate these characteristics into creating positive or negative effects (Ayyagari et al., 2011; Srivastava et al., 2015). Yet the role of personal factors in appraising ICTs created stressors as challenges or threats needs deeper examination (Tarafdar et al., 2019).

Grounded in the Person-Environment fit (PE-fit) model, this study extends the present understanding of technostress by theorizing and empirically testing the mediating influence of personality traits on the relationship between the characteristics of ICTs and techno-eustress and techno-eustress. The present research shows that personal factors by themselves do not have a significant effect on this relationship. Therefore, it calls for additional research to deeply examine the role of other contextual conditions under which the effects of the characteristics of ICTs on techno-distress and techno-eustress will be mediated. For example, personality traits may only show a mediating effect when it's combined with other contextual conditions, such as organizational factors, computer self-efficacy and social support. Hopefully, the conceptualizations presented in this study will serve as a catalyst for more research on the appraisal of techno-stressors caused by ICTs as either challenges or threats.

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Appendix A: Loadings

Cross loadings

Table 12 Cross loadings

	ANO	COM	PAC	AGR	CON	EXT	NEU	OPE	PRE	REL	DIS	EUS	USE
ano[ano01]	**0.746**	0.248	0.264	-0.053	-0.061	-0.006	-0.016	0.133	0.206	0.259	-0.069	0.237	0.216
ano[ano02]	**0.920**	0.280	0.250	0.096	0.001	0.061	0.000	0.112	0.132	0.299	-0.085	0.439	0.274
ano[ano03]	**0.924**	0.237	0.255	0.028	-0.029	-0.030	0.013	0.158	0.198	0.258	-0.097	0.372	0.227
com[com01]	0.182	**0.855**	-0.066	0.187	0.199	-0.077	-0.013	-0.003	0.369	0.613	-0.308	0.386	0.520
com[com02]	0.285	**0.916**	0.043	0.200	0.082	0.017	-0.008	0.095	0.471	0.746	-0.344	0.391	0.533
com[com03]	0.309	**0.919**	0.096	0.233	0.148	-0.021	-0.068	0.199	0.506	0.743	-0.336	0.490	0.696
pac[pac01]	0.277	0.068	**0.901**	0.144	0.002	0.026	0.095	0.259	0.287	-0.035	0.121	0.262	0.196
pac[pac02]	0.311	-0.014	**0.938**	0.040	-0.016	0.043	0.070	0.212	0.254	-0.087	0.076	0.184	0.141
pac[pac03]	0.250	0.101	**0.943**	0.110	-0.002	0.040	0.082	0.205	0.381	0.041	0.022	0.291	0.268
pac[pac04]	0.242	-0.044	**0.930**	0.089	0.003	0.051	0.112	0.308	0.245	-0.127	0.122	0.144	0.107
pch[agr01]	0.038	0.175	0.114	**0.808**	0.058	0.269	0.026	0.208	0.131	0.169	-0.073	0.111	0.154
pch[agr02]	0.044	0.205	0.088	**0.886**	0.231	0.452	-0.009	0.229	0.156	0.186	-0.050	0.162	0.244
pch[agr03]	0.024	0.217	0.079	**0.882**	0.198	0.306	0.096	0.192	0.197	0.114	-0.044	0.117	0.216
pch[con01]	-0.107	0.204	-0.008	0.324	**0.853**	0.171	-0.078	0.071	0.247	0.158	-0.125	0.054	0.160
pch[con02]	0.065	0.029	-0.008	0.017	**0.748**	0.169	-0.175	-0.012	0.120	0.025	-0.101	0.120	0.210
pch[con03]	0.045	0.088	0.016	-0.019	**0.753**	0.087	-0.240	-0.116	0.107	0.083	-0.123	-0.072	0.097
pch[ext01]	0.001	-0.096	-0.082	0.301	0.053	**0.793**	-0.221	0.222	0.022	-0.075	-0.031	0.046	-0.131
pch[ext02]	0.011	0.011	0.107	0.404	0.231	**0.921**	-0.122	0.255	0.179	-0.049	-0.092	0.137	-0.007
pch[ext03]	0.021	-0.035	0.011	0.330	0.143	**0.892**	-0.330	0.229	0.122	-0.003	-0.107	0.030	-0.107
pch[neu01]	0.039	-0.039	0.129	0.010	-0.114	-0.177	**0.859**	0.124	-0.071	-0.038	0.342	-0.084	-0.041
pch[neu02]	-0.042	-0.026	0.001	0.088	-0.162	-0.130	**0.749**	0.059	-0.105	0.002	0.167	-0.013	-0.074
pch[neu03]	-0.021	-0.020	0.071	0.034	-0.184	-0.268	**0.835**	-0.053	-0.030	-0.029	0.289	0.004	-0.051
pch[ope01]	0.083	0.050	0.158	0.199	0.074	0.176	-0.042	**0.812**	-0.121	0.003	0.076	0.062	0.081
pch[ope02]	0.164	0.132	0.286	0.234	-0.029	0.281	0.099	**0.963**	0.139	0.029	-0.004	0.138	0.045
pre[pre01]	0.125	0.529	0.171	0.147	0.217	0.047	0.066	0.015	**0.824**	0.457	-0.217	0.254	0.450
pre[pre02]	0.216	0.425	0.268	0.084	0.123	0.096	-0.002	0.065	**0.873**	0.313	-0.136	0.294	0.353
pre[pre03]	0.197	0.438	0.356	0.202	0.187	0.171	-0.126	0.073	**0.921**	0.345	-0.215	0.268	0.440
pre[pre04]	0.168	0.419	0.309	0.210	0.246	0.179	-0.163	0.065	**0.934**	0.274	-0.236	0.274	0.435
rel[rel01]	0.313	0.743	0.016	0.147	0.102	-0.074	-0.038	0.028	0.395	**0.940**	-0.300	0.315	0.552
rel[rel02]	0.283	0.765	-0.012	0.184	0.139	-0.017	-0.012	0.069	0.364	**0.941**	-0.349	0.369	0.638
rel[rel03]	0.259	0.629	-0.172	0.166	0.108	-0.032	-0.042	-0.052	0.286	**0.857**	-0.257	0.277	0.473
tdi[tdi01]	0.024	-0.295	0.132	-0.067	-0.182	-0.136	0.341	0.039	-0.158	-0.302	**0.842**	-0.219	-0.175
tdi[tdi02]	-0.047	-0.210	0.242	0.000	-0.074	-0.126	0.210	0.030	-0.063	-0.244	**0.777**	-0.106	-0.093
tdi[tdi03]	-0.156	-0.426	0.071	-0.040	-0.141	-0.023	0.295	0.106	-0.238	-0.345	**0.912**	-0.292	-0.323
tdi[tdi04]	-0.210	-0.434	0.044	-0.011	-0.079	-0.077	0.299	-0.008	-0.199	-0.343	**0.837**	-0.376	-0.313
tdi[tdi05]	-0.096	-0.231	0.060	0.029	-0.022	-0.094	0.275	0.004	-0.096	-0.232	**0.807**	-0.202	-0.128
tdi[tdi06]	-0.028	-0.268	0.050	-0.087	-0.144	-0.107	0.322	-0.028	-0.229	-0.219	**0.880**	-0.203	-0.198
tdi[tdi07]	-0.062	-0.328	0.068	-0.099	-0.155	-0.006	0.318	0.013	-0.281	-0.299	**0.880**	-0.233	-0.276
tdi[tdi08]	-0.030	-0.283	0.033	-0.111	-0.151	-0.108	0.302	0.011	-0.245	-0.249	**0.895**	-0.199	-0.222
tdi[tdi09]	-0.101	-0.265	0.081	-0.081	-0.155	-0.115	0.287	-0.008	-0.196	-0.302	**0.881**	-0.153	-0.15
teu[teu02]	0.329	0.416	0.122	0.132	0.125	0.104	0.011	0.121	0.186	0.366	-0.265	**0.863**	0.437
teu[teu03]	0.357	0.468	0.221	0.145	0.014	0.063	-0.054	0.080	0.281	0.380	-0.254	**0.913**	0.534
teu[teu04]	0.416	0.474	0.260	0.142	0.031	0.098	-0.084	0.113	0.334	0.344	-0.285	**0.938**	0.506
teu[teu05]	0.383	0.472	0.303	0.180	0.107	0.103	-0.031	0.209	0.337	0.331	-0.228	**0.921**	0.503
teu[teu06]	0.321	0.396	0.189	0.164	0.079	0.111	-0.099	0.139	0.253	0.266	-0.257	**0.878**	0.456
teu[teu07]	0.347	0.368	0.153	0.148	-0.029	0.022	-0.004	0.002	0.210	0.261	-0.203	**0.875**	0.459
teu[teu08]	0.453	0.355	0.230	0.035	-0.003	0.073	-0.017	0.094	0.275	0.254	-0.172	**0.864**	0.399
use[use01]	0.231	0.626	0.201	0.226	0.228	-0.075	-0.041	0.038	0.490	0.574	-0.205	0.453	**0.952**
use[use02]	0.316	0.574	0.177	0.192	0.167	-0.014	-0.077	0.056	0.439	0.539	-0.270	0.539	**0.942**
use[use03]	0.240	0.661	0.197	0.231	0.174	-0.096	-0.042	0.069	0.446	0.605	-0.262	0.508	**0.947**
use[use04]	0.262	0.642	0.167	0.270	0.193	-0.096	-0.076	0.069	0.432	0.614	-0.237	0.509	**0.965**

Outer loadings

Table 13 Outer loadings

Outer Loadings	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
ano[ano01] <- ANO	0.747	0.082	9.143	0.000
ano[ano02] <- ANO	0.916	0.021	44.474	0.000
ano[ano03] <- ANO	0.921	0.018	50.307	0.000
com[com01] <- COM	0.852	0.034	25.391	0.000
com[com02] <- COM	0.914	0.019	48.851	0.000
com[com03] <- COM	0.916	0.016	55.981	0.000
pac[pac01] <- PAC	0.898	0.022	41.872	0.000
pac[pac02] <- PAC	0.939	0.015	64.146	0.000
pac[pac03] <- PAC	0.944	0.013	74.384	0.000
pac[pac04] <- PAC	0.929	0.017	54.938	0.000
pch[agr01] <- AGR	0.807	0.055	14.583	0.000
pch[agr02] <- AGR	0.882	0.062	14.373	0.000
pch[agr03] <- AGR	0.873	0.057	15.351	0.000
pch[con01] <- CON	0.810	0.143	5.97	0.000
pch[con02] <- CON	0.727	0.171	4.367	0.000
pch[con03] <- CON	0.729	0.165	4.551	0.000
pch[ext01] <- EXT	0.827	0.122	6.503	0.000
pch[ext02] <- EXT	0.856	0.125	7.355	0.000
pch[ext03] <- EXT	0.871	0.089	10.017	0.000
pch[neu01] <- NEU	0.837	0.080	10.767	0.000
pch[neu02] <- NEU	0.747	0.130	5.761	0.000
pch[neu03] <- NEU	0.831	0.066	12.591	0.000
pch[ope01] <- OPE	0.827	0.114	7.139	0.000
pch[ope02] <- OPE	0.934	0.087	11.087	0.000
pre[pre01] <- PRE	0.821	0.049	16.751	0.000
pre[pre02] <- PRE	0.872	0.042	21.028	0.000
pre[pre03] <- PRE	0.918	0.022	42.149	0.000
pre[pre04] <- PRE	0.932	0.016	56.869	0.000
rel[rel01] <- REL	0.940	0.014	68.34	0.000
rel[rel02] <- REL	0.939	0.013	70.152	0.000
rel[rel03] <- REL	0.856	0.034	25.279	0.000
tdi[tdi01] <- DIS	0.839	0.031	27.234	0.000
tdi[tdi02] <- DIS	0.776	0.044	17.73	0.000
tdi[tdi03] <- DIS	0.912	0.028	32.904	0.000
tdi[tdi04] <- DIS	0.836	0.033	25.447	0.000
tdi[tdi05] <- DIS	0.804	0.043	18.78	0.000
tdi[tdi06] <- DIS	0.877	0.033	26.92	0.000
tdi[tdi07] <- DIS	0.877	0.023	38.243	0.000
tdi[tdi08] <- DIS	0.893	0.023	38.447	0.000
tdi[tdi09] <- DIS	0.880	0.029	30.75	0.000
teu[teu02] <- EUS	0.863	0.025	34.005	0.000
teu[teu03] <- EUS	0.913	0.015	61.375	0.000
teu[teu04] <- EUS	0.938	0.011	88.206	0.000
teu[teu05] <- EUS	0.921	0.019	48.367	0.000
teu[teu06] <- EUS	0.878	0.023	38.056	0.000
teu[teu07] <- EUS	0.874	0.025	35.281	0.000
teu[teu08] <- EUS	0.862	0.025	34.555	0.000
use[use01] <- USE	0.952	0.012	78.873	0.000
use[use02] <- USE	0.941	0.017	54.427	0.000
use[use03] <- USE	0.946	0.012	76.242	0.000
use[use04] <- USE	0.964	0.007	134.822	0.000