# Challenge or Hindrance? The Moderating Role of Stress Appraisals in Technostress

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## Author's Note

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The topic of technostress has been a challenging yet rewarding discovery in which I have had the opportunity to experience technostress first hand. Countless nights spent struggling to understand SPSS output often left me feeling fatigued, anxious, sceptical and inefficacious regarding my technological proficiency. Despite this, it has been an enlightening voyage into my own perseverance and procrastination.

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Abstract

With *ICT*s becoming more pervasive in the workplace, it is becoming increasingly important to understand the stress outcomes experienced by employees when working with these technologies. The term *technostress* has been coined to understand this experience. However, the mechanisms through which employees experience technostress remains a murky affair. In this paper, we incorporate the Transactional Model of Stress and Coping (*TSMC*) into the relationship between *technodemands* and *technostress*. Specifically, we hypothesise that technodemands will have a positive relationship with technostress and the ICT user's *appraisal* of technodemands moderate the relationship between *technodemands* and *technostress*. We propose that a *challenge appraisal* has a buffering effect, while a *hindrance appraisal* has an enhancing effect on the technostress experienced by an ICT user. Three technodemands were selected in the study: *quantitative demands*, *mental demands* and *role ambiguity.* Data was collected from 188 participants who worked with ICTs to some extent in their jobs. Correlation and moderation analysis was used to test our hypotheses. *Quantitative demands* and *role ambiguity* were found to have a significant positive relationship with technostress. Moderate evidence was found to support the moderating roles of stress appraisals in the relationship between technodemands and technostress, particularly in the case of hindrance appraisals. Moderate support was found for an enhancing effect present when a hindrance appraisal is high for *quantitative* and *mental demands*, and for a buffering effect when a challenge appraisal is high for *mental demands*. Results will be discussed.

*Keywords*: ICT, TSMC, Technodemands, Technostress, Technostrain, Challenge and Hindrance Appraisals, Quantitative Demands, Mental Demands, Role Ambiguity, Scepticism, Fatigue, Anxiety, Inefficacy.

# Challenge or Hindrance? The Moderation of Technostrain by Stress Appraisals

Imagine the following situation: You have just secured your dream job, or at least you thought so. You have the opportunity to do work that is personally significant to you… but there's a catch! Most of your day is spent in front of a computer screen; which is disappointing as you have always found computers to be a nuisance. There are so many new applications to keep up to date with, emails to be replied to and staring at a screen all day leaves you feeling exhausted. What's more; your perky colleague can't get enough of these new technologies. They jump at the opportunity to learn a programme and seem unphased by all of the screen time. You leave work every day feeling drained; the beep of your microwave sends shots of anxiety through you; you're sceptical about whether you'll ever understand these new technologies; and worse you are beginning to develop creeping doubts about whether they are useful at all. Your colleagues report none of the same complaints. On paper, your colleagues should be having the same experience as you. So how can this be?

The person, described above, is experiencing a phenomenon known as "technostress" which is: "a modern disease of adaption resulting from an inability to cope with new computer technologies in a healthy manner" (Brod, 1984). This topic has received a lot of attention in recent years (e.g. Ayyagari et. Al, 2011; Ragu-Nathan et. Al, 2008; Salanova et al., 2007; 2013; Tarafdar et al., 2007). These studies excellently detail the experience of technostress, its antecedents as well as practical applications on how to prevent it. While these papers contribute to the body of literature on technostress, they all assume that technostress is inherently a negative experience. They posit that technology demands will slowly cause the technology user to gravitate, at a constant rate, towards technostress. This is the experience of the person described in the opening vignette. However, the negative aspects of technostress do not paint the whole picture. Contrary to the literature consensus, studies such as Tu et al. (2005) found that certain technodemands such as techno-overload (when a

user perceives there to be an excess amount of work generated through the use of technology) have an unexpectedly positive effect on the user's performance. According to a well-endorsed theory of stress, the transactional model of stress and coping (TSMC) stress can be responsible for both positive and negative outcomes for the individual, depending on how the focal person appraises the stress (Lazarus & Folkman, 1984). This may explain how employees experience technostrain to varying degrees despite being in similar positions, as described in the opening. In this paper, we will explore the relationship between technological demands and technostress. We will also investigate whether these stress appraisals affect the relationship between technostress antecedents and outcomes, specifically by acting as a moderator. Focusing solely on the negative aspects of technostress can only contribute to reducing negative outcomes while, viewing the technostress experience in a more holistic way could open opportunities to optimize technostress while reducing its negative outcomes. This could be beneficial for both the technology end user and organisation wishing to enhance its performance.

## Theoretical Background

### Pervasive technology

Upwards of 74% of workers in European countries are now using technology in their daily work while 93% use the internet for different facets of their lives (Llorens, Salanova, & Ventura, 2011). Information and Communication Technologies (ICTs) refer to any technology or device that has the ability to send, store, gather or process information (Cohendet & Steinmuller, 2000). These ICTs have resulted in significant improvements in a number of company performance parameters including: reduced operational costs, new possibilities for innovation, more efficient processes and new strategic directions (Dos Santos & Sussman 2000; Kudyba & Diwan, 2002). While companies often recognise these positive

outcomes for using technology, in terms of increased productivity and corporate competitiveness; the negative outcomes of using these technologies remains a somewhat messy affair with the costs not always apparent (Ayyagari, Grover & Purvis, 2011).

In recent years, studies of these information systems (IS) have found the implementation of ICTs in the workplace can have an influence on a number of job parameters including perceived workload, information overload and fatigue; of which can result in demoralized, demotivated, fatigued employees with a poorer work performance (Tarafdar et al., 2007; Ragu-Nathan et al., 2008). Organisational researchers have agreed that these technologies have a "dual nature" (Tarafdar et al., 2007). Often employees are left trying to keep up with the ongoing advancements in ICTs which can leave them scrambling to adjust in various ways (Marcoulides, 1989). Hence, the aforementioned term "technostress" was coined by researchers.

**From Technostress to Technostrain**

The antecedents/causes of technostress are referred to as technodemands. Early studies into this phenomenon were concerned with how librarians may struggle to adjust to advancements in library systems in the form of automation (Bichteler, 1987; Kupersmith, 1992). As technologies expanded past the confines of bookshelves, numerous new definitions were put forward to understand technostress in varying settings (Wang, Shu & Tu, 2008). Most of these definitions contain a combination of physical, social, psychological or behavioural strain responses to technostressors (Al-Fudail & Mellar, 2008). Focusing on the workplace setting, Salanova, Llorens, Cifre & Nogareda (2007) posited that technostress is "a negative psychological state associated with the use or threat of ICT in the future. The experience is related to feelings of anxiety, mental fatigue, scepticism or inefficacy".

The same group of researchers later attempted to make technostress only an umbrella term encompassing two phenomena: the more orthodox view of technostress (defined above), now referred to as technostrain; and technoaddiction (Salanova, Llorens & Cifre, 2013). The development of the technoaddiction concept is heavily influenced by workaholism literature and refers to employees tendency to work excessively hard (i.e. by allocating unreasonable amounts of time to working with ICT and technology) and by working with ICT in a compulsive way (i.e. by excessive, persistent and frequent thinking about the use of ICT and work) (Schaufeli, Taris & Bakker, 2008). Technoaddiction has been omitted from the present research. In simpler terms, technoaddiction promotes more use whereas technostrain promotes less use. Instead, we will continue to use their previous definition as technostress, as being "a negative psychological state related to feelings of anxiety, mental fatigue, scepticism and inefficacy". However, this definition will herein after refer to technostrain to avoid confusion surrounding the "umbrella" nature of the term technostress.

**The Technostrain Experience**

The literature refers to four distinct cognitive components that categorise the technostrain experience: anxiety, fatigue, scepticism and inefficacy (Salanova et al., 2007). Of these, anxiety and fatigue are the most commonly experienced affective states. In the realm of human-computer interaction literature, computer anxiety remains the most researched phenomenon (Cambre & Cook, 1985; Gaudron & Vignoli, 2002). *Anxiety*, in this context, describes the fear, apprehension, and agitation users feel when interacting with, or thinking about computers (Gaudron & Vignoli, 2002). An anxious computer user may find the ICT or technology: to be intimidating; have doubts about their use of ICT for fear of making a mistake; or be fearful of making a mistake by hitting the wrong key and losing information (Ragu-Nathan et al., 2008). The second component, *fatigue* can be categorised

by lower levels of psychological activation (Salanova et al., 2013). The ICT user may experience difficulties in memorizing or remembering, poor decision making and reduced attention span. The third component of the technostrain experience is *scepticism* (Salanova et al., 2007). This phenomenon is based on job burnout literature and is related to the concept of cynicism (Schaufeli & Enzmann, 1998). The user may experience indifferent or distant attitudes towards the use of ICT and technology and over time develops a cynical attitude (Schaufeli & Salanova, 2007). The fourth and final component of technostrain is *inefficacy* (Salanova et al., 2007). Salanova and colleagues argue that the ICT user experiences a reduction in their perceived sense of efficacy when using ICT due to the effects it can have on anxiety, fatigue and scepticism. When a user is exhausted from using ICT, anxious about pressing the wrong key and overall doubts the benefits of using ICT; it can be reasoned that they will soon feel helpless or inefficacious working with the technology. Inefficacy will affect whether a person chooses to use ICT, the efforts they expend when using ICT, their persistence in using it and the performance they achieve when using ICT (Salanova, Grau, Cifre & Llorens, 2000). For the present paper, we will use these four components to measure technostrain.

**Technodemands**

The antecedents of technostrain are known as technostressors or technodemands (Salanova et. Al, 2013). Llorens et al. (2011) describe them as “those physical and/or psychological, social and organisational aspects related to technology that require a sustained physical and/or psychological effort from the worker, and which are associated to certain physiological and/or psychological costs”. Salanova et al. (2013) categorise technostressors into four distinct categories: task level, social level, organisational level and extra-organisational level.

First of all, task level technostressors are the ones closest to the user and are related to tasks that employees use ICTs to perform. Social level technostressors refer to the relationships that are formed in the workplace either through the use of technology or how these pre-existing relationships can be changed through the use of technology. Organisational level technostressors refer to technology's role in the maintaining a competitive advantage in the labour market. They can include organisationally implemented technologies, employee trainings surrounding these technologies and the extent to which employees feel as if their job is secure in their organisation with advancements in technology. Finally, extra-organisational technostressors mainly refer to the work-family conflict that can arise from being "plugged in" to technologies constantly which can gradually erode away quality time spent with family. We choose to focus only on task level technostressors as these were the ones closest to the user and most likely to have a direct impact on the end user.

Salanova et al. (2013) proposed six main task-level technostressors; of these, three were selected for this study. Firstly, *quantitative demands* refer to the degree to which a technology user perceives there to be an excess amount of work generated as a result of the use of technology or through network outages. Secondly, *mental demands* refer to the extent of excessive attentional demands required when working with technology such as concentration, precision and multitasking to solve problems and in order to prevent and correct problems. Our third technodemand will be *role ambiguity* which refers to the extent to which tasks performed with technologies are vague, unclear, and ill-defined.

**Transactional Model of Stress and Coping**

While the technostrain phenomenon has been well categorised and researched, the mechanisms through which the ICT user experiences the stress has remained a murky affair. Lazarus and Folkman (1984) developed the Transactional Model of Stress and Coping (TSMC) to better understand how individuals react uniquely to stressful situations. The

TSMC focuses on the interaction between the person and environment and assumes that stress itself is neither positive nor negative. It's not until the focal person appraises the situation that it becomes positive or negative. They proposed the idea of two appraisals that occur simultaneously when an individual encounters a stressful situation or event. The primary appraisal evaluates the given situations potential for loss or gain, while the secondary appraisal evaluates whether or not the individual feels they have the personal resources necessary to cope. The primary appraisal results in one of two outcomes: a hindrance appraisal (anticipated harm or loss), and a challenge appraisal which focuses on the potential for gain or growth inherent in a situation.

As it has been reasoned that stressors are neither positive nor negative but depend on the appraisal by the individual (Hobfoll, 1989, p.519), in this paper, we will examine how these differing appraisals (challenge or hindrance) affect the relationship between technodemands and technostress. We reason that if a ICT user appraises their technology as a challenge, then they will experience less technostrain because they view it as a positive opportunity for growth. Inversely, if the user appraises the technology as a hindrance, then working with that technology is perceived to thwart their opportunities for growth and hence will increase the experienced technostrain.

These appraisals have been operationalised in a number of ways when using the TSMC, however, these are often problematic. Searle and Auton (2014) conducted an extensive review of these various ways to operationalise an appraisal. They posit that often in the study of the challenge-hindrance framework, stressors are organised in an a-priori fashion; certain stressors are deemed to be challenging, while others are hindering. For example, Cavanaugh et al. (2000) categorised stressors according to their potential to support employee growth (*challenge stressors,* such as workload and time pressure) or to obstruct goal attainment (*hindrance stressors,* such as role ambiguity). The stress resulting from

challenge appraisals was positively associated with job satisfaction and negatively with intention to leave, while the inverse was true for hindrance stressors. Further studies have also used this a-priori approach (e.g. LePine, LePine & Jackson, 2004; Podsakoff, LePine & LePine, 2007). The issue with this research is that the categorizations are formed based on assumptions about a stressors nature. This approach bypasses the subjective nature of appraisals and instead assumes that stressors are appraised consistently across individuals. Consistent with the TSMC, Webster, Beehr & Love (2011) found that several stressors were appraised as both challenges and hindrances, depending on the individual.

Further studies have encountered problems when attempting to operationalise appraisals. Some have created measurement bias by asking participants remember stressful situations from the past year (Scheck, Kinicki & Davy, 1997), while others have asked about the past three years (Bhagat, McQuaid, Lindholm & Segovis, 1985). In both cases, participants were asked to assess the impact of these events. There are obvious measurement biases in these approaches for example, memory bias, where details may be forgotten. Certain events may be remembered more favourably when put in the context of the subsequent events. For example, an employee could remember a time where they were under tremendous workload, however, after all of the workload induced stress, they received a well-earned promotion. Put in the context of the promotion, they may have rated the situation as a positive challenge, however, their appraisal in the moment of the situation would not be accurately measured. Another employee who wasn't promoted, yet experienced the same amount of stress, may not appraise workload as a challenge. Another problematic way in which appraisals were operationalised was by measuring affective states where the participants were asked to rate a situation as either "exhilarating", "exciting" or "frustrating" (Ferguson, Mathews & Cox, 1999). This paper measured emotional responses to appraisals as opposed to the appraisals themselves. A third issue with operationalising appraisals was

categorising stressors in an a-priori fashion through personality traits (Srivastava, Chandra & Shirish, 2015). This paper based their categorisations from the Big-Five personality index (Goldberg, 1992). While this practically makes sense, again this approach bypasses the subjective nature of appraisals and instead asserts what appraisal an individual will make based solely on their personality.

All of these studies have failed to operationalise an appraisal as both *subjective* to the individual and *in the moment.* The present paper will operationalise the appraisal in a similar fashion to that devised by Searle and Auton (2014) who did so by presenting the participant with a demanding situation in the present tense and asking a series of questions related to it being either a challenge or a hindrance. This operationalisation closely adheres to the theoretical underpinnings of what exactly a challenge and hindrance appraisal are.

**Hypotheses development**

A process model of these variables can be seen in Figure 1 to visualise the hypothesised relationship between the variables in the present study. Based on the above literature review, two hypotheses were developed.

1. Technological demands (quantitative demands, mental demands and role ambiguity) will be positively related to technostrain so that higher technodemands will be related to higher technostrain and vice versa.

2. An individual's challenge appraisal will act as moderator and have a buffering effect on the relationship between technodemands and technostrain so that:
    a. When a quantitative demands challenge appraisal is high, the relationship between quantitative demands and technostrain will be less positive
    b. When a mental demands challenge appraisal is high, the relationship between mental demands and technostrain will be less positive
    c. When a role ambiguity challenge appraisal is high, the relationship between role ambiguity demands and technostrain will be less positive
3. An individual's hindrance appraisal will act as a moderator and have an enhancing effect on the relationship between technodemands and technostrain.
    a. When a quantitative demands hindrance appraisal is high, the relationship between quantitative demands and technostrain will be more positive
    b. When a mental demands hindrance appraisal is high, the relationship between mental demands and technostrain will be more positive
    c. When a role ambiguity hindrance appraisal is high, the relationship between role ambiguity demands and technostrain will be more positive

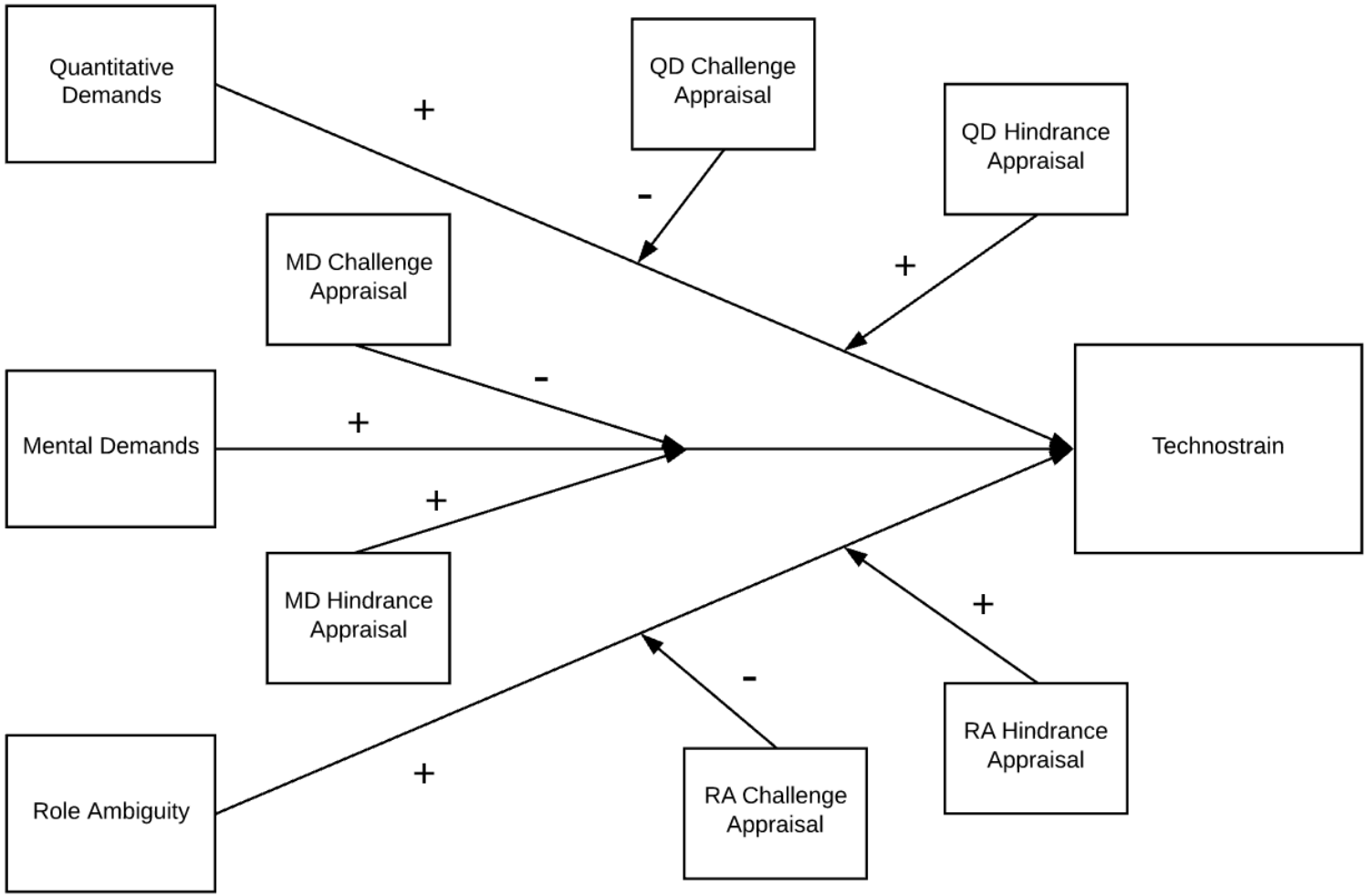


*Figure 1*. Process model of relationship between technodemands and technostrain, moderated by appraisals

# Method

## Procedure

Data was collected from an Irish population using two methods. Firstly, a number of companies were contacted to participate in the study in return for a personalised report on their employees' experience of technostress. Four companies agreed to participate in the study: one biotechnology company, one technology company, one technology services company, and one not-for-profit organisation. A company code was created for each participating company which allowed them to receive a personalised report on their employees' experiences with technostrain. The remainder of the participants were sourced using convenience sampling. Participants were required to be over 18, in full-time employment and work with computers as part of their daily tasks. In total, 150 questionnaires were distributed (including both the companies contacted and participants through convenience sampling), of which 118 were returned completed (79%). All data was collected using the online survey software Qualtrics and analysed using SPSS. Each participant was sent a link to the survey which began with an informed consent sheet which detailed briefly the purpose of their participation, their right to withdraw at any time and the confidentiality with which their data would be treated.

## Participants

In the study there were fifty-one males (43.2%) and sixty-seven females (56.8%). The average age of the employee was 35.9 years (*SD* = 14.04), with minimum being 21 years and maximum being 65 years. Regarding educational attainment, 79.6% of the participants had a Bachelor's Degree or higher and the mean industry tenure was 9.6 years (*SD* = 10.63), with the maximum industry tenure being forty years. The main occupations participating in the study were: Architecture and Engineering (14.4%), Management (11%), Business and

Finance (11%), Healthcare (11%). The average amount spent with ICT per day was 6 hours (*SD* = 2.9).

**Measurements**

For the present research, a number of well-endorsed existing measurements were used and, in some cases, adapted. In total ten individual scales were used: three scales were used to measure technological demands (*quantitative demands*, *mental demands* and *role ambiguity*); six scales were used to measure appraisals (one *challenge* and one *hindrance* scale for each of the technological demands); and one scale was used to assess technostrain. The full questionnaire can be seen in Appendix A. The reliability of each scale will be reported. Cortina (1993) states that values over 0.70 are considered acceptable, while values over 0.80 are considered excellent.

**Quantitative demands.** Quantitative demands were assessed using a five-item scale adapted from Van Veldhoven & Meijman's (1994), Questionnaire on the Experience and Evaluation of Work (QEEW) 2.0. The items were reworded to encapsulate experiences of working with technology and ICT as the original questionnaire deals with more general experiences of work demands. For example, "My work requires me to work very fast" was reworded to "Working with technology requires me to work very fast". (1 = "never", 7 = "always").

**Mental demands.** Mental demands were also measured again using Van Veldhoven & Meijman (1994), QEEW 2.0. Four items were adapted to suit the context of the study from the Mental Overload section of the QEEW 2.0 (Veldhoven & Meijman, 1994). These items were adapted in a similar fashion to quantitative demands. An example of an item is "My work with technology requires me to concentrate deeply" (1 = "never", 7 = "always").

**Role ambiguity**. Role ambiguity was measured using an adapted version of the QEEW 2.0 (Veldhoven & Meijman, 1994). Three items were adapted to the present research. An example of an adapted item is "Its clear to me exactly what my tasks are when working with technology" (1 = "never", 7 = "always"). These items were reverse coded in the data analysis stage to reflect an ambiguous work role.

**Appraisals.** Cognitive appraisals were operationalized as an individual disposition to appraise certain demands consistently (Lazarus, 1991). Participants were presented with three objectively demanding situations (one based on each of the technodemands chosen above) and asked a series of statements devised to encapsulate the experience as being either a challenge or hindrance. The scale used to measure the challenge/ hindrance appraisal was heavily informed by the work of Searle & Auton (2014) who extensively aggregated the findings on the measurement of the challenge-hindrance framework to develop a succinct eight-item scale measuring both challenge and hindrance appraisal (four items measure a challenge appraisal and four items measure a hindrance appraisal). They state that the appraisal scales must be framed in relation to a situation so that participants understand what they are appraising. To create this framing, each technodemand and their respective items were crafted into the most demanding situation possible (i.e. one quantitatively demanding event, one mentally demanding event and one role-ambiguous event). Taking the example of quantitative demands, the framing was as follows "Imagine the following situation: Mary says, 'Working with technology, my job requires me to work very fast. I often have too much work to do and must work extra hard to finish some tasks. I must work quickly as some of my tasks have a time limit'". The main question was then "In general, I believe having a job like Mary…", followed by Searle & Auton's (2014) two four-item scales one dealing with a challenge appraisal ("…will help me learn a lot") and one dealing with a hindrance appraisal ("…will hinder any achievements I might have") (1 = strongly disagree, 7 = strongly

agree). Similar framings were compiled for the other technodemands being studied (i.e. mental demands and role ambiguity). The role ambiguity appraisal section described an unambiguous situation followed by the challenge and appraisal items. This was due to the nature of the source material from the QEEW 2.0 in which the items described unambiguous demands. Each subscale consisted of four items. For the reliability of each scale see Table 1.

**Technostrain.** Technostrain was measured with sixteen items measuring four dimensions namely: *scepticism*, *anxiety*, *fatigue* and *inefficacy*. The items were taken from RED Technostress Questionnaire (Llorens, Salanova & Ventura, 2011). The scale was shortened to omit the items referring to technoaddiction. Items included: "I doubt the significance of working with these technologies" (*scepticism*); "I hesitate to use technologies for fear of making mistakes" (*anxiety*); "I'm so tired when I finish working with technologies that I can't do anything else (*fatigue*); and "People say I'm inefficient when using technology" (*inefficacy*). All responses ranged from 1 ("never") to 7 ("always").

**Statistical analysis**

To begin with, the raw data from Qualtrics was imported into SPSS. The data require rigorous cleaning, including the removal of any identifying component such as IP address. A Pearson's correlation was run to test the intercorrelations between all of the studies variables. This was also used to test hypothesis 1. This can be seen in Table 1.

Table 1
*Table of variable intercorrelations*

| Subscale | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. QD | (.71) | | | | | | | | | | | | | |
| 2. MD | .618** | (.87) | | | | | | | | | | | | |
| 3. RA | .032 | -.174 | (.83) | | | | | | | | | | | |
| 4. QD Chal | .080 | .143 | -.191* | (.89) | | | | | | | | | | |
| 5. QD Hind | -.178 | -.131 | .314** | -.437** | (.89) | | | | | | | | | |
| 6. MD Chal | -.061 | .059 | -.227* | .527** | -.085 | (.87) | | | | | | | | |
| 7. MD Hind | .018 | -.039 | .314** | -.123 | .524** | -.369** | (.91) | | | | | | | |
| 8. RA Chal | .000 | -.099 | .126 | -.240** | -.118 | -.449** | -.043 | (.93) | | | | | | |
| 9. RA Hind | -.020 | .025 | -.126 | -.124 | -.225* | .038 | -.360** | -.454** | (.90) | | | | | |
| 10. Anxiety | .149 | .047 | .368** | .014 | .384** | -.031 | .469** | -.032 | -.302* | (.86) | | | | |
| 11. Scepticism | .145 | -.142 | .367** | -.321** | .266** | -.269** | .259** | .228* | -.203* | .437** | (.86) | | | |
| 12. Fatigue | .452** | .220* | .139 | -.088 | .156 | -.069 | .199* | -.044 | -.071 | .527** | .380** | (.88) | | |
| 13. Inefficacy | .175 | -.153 | .452** | -.090 | .281** | -.163 | .364** | .062 | -.290** | .745** | .532** | .449** | (.85) | |
| 14. Mean Technostrain | .284** | -.013 | .424** | -.159 | .342** | -.171 | .404** | .074 | -.271** | .855** | .752** | .743** | .847** | - |
| *M* | 3.90 | 5.17 | 2.46 | 4.11 | 4.37 | 5.11 | 3.49 | 2.66 | 4.89 | 3.21 | 2.81 | 3.81 | 2.77 | 3.96 |
| *SD* | .93 | 1.32 | 1.09 | 1.46 | 1.43 | 1.23 | 1.34 | 1.32 | 1.36 | 1.23 | 1.35 | 1.18 | 1.17 | .74 |

Note. $N = 118$. Entries on the main diagonal are Cronbach's Alpha. QD = Quantitative Demands; MD = Mental Demands; RA = Role Ambiguity; QD Chal = Quantitative Demands Challenge Appraisal; QD Hind = Quantitative Demands Hindrance Appraisal; MD Chal = Mental Demands Challenge Appraisal; MD Hind = Mental Demands Hindrance Appraisal; RA Chal = Role Ambiguity Challenge Appraisal; RA Hind = Role Ambiguity Hindrance Appraisal

*p < 0.05, **p < 0.01

To test the moderating effect of the appraisals, a SPSS macro was used called "PROCESS" developed by Hayes (2012). A regression was run a total of six times: once for each appraisal of each demand moderating the relationship between their respective demand and technostrain. The macro centred the independent variables and moderating variables around zero to control for multicollinearity. PROCESS then calculated the interaction effect. Simple slopes analysis was conducted to understand how the moderating variables affect the relationship between technodemands and technostrain at low, average and high levels of the appraisal as advised by Aiken and West (1991).

## Results

Results from the Pearson correlation can be seen in the table of correlations (Table. 1). Our first hypothesis, that technodemands would be positively correlated to technostrain was confirmed in the correlation analysis. Our second hypothesis, that a challenge appraisals act as a moderator and buffer the relationship between technodemands and technostrain, received support in two of our three chosen technodemands (mental demands and role ambiguity). Finally our third hypothesis, that hindrance appraisals act as a moderator and enhance the relationship between technodemands and technostrain, was confirmed. We will discuss significant and noteworthy correlations and subsequently the results of our moderation analysis. Each appraisal scale (challenge and hindrance) was negatively correlated with its respective counterpart, as was to be expected.

### Pearson's correlation

Quantitative Demands (QD) was found to be significantly correlated with both fatigue ($r = .45$, $p < 0.01$), and total technostrain ($r = .28$, $p < .01$). Additionally, Mental Demands (MD) were found to be positively correlated with fatigue ($r = .22$, $p < 0.05$). Role Ambiguity

(RA) was significantly correlated with mean technostrain ($r = .42$, $p < .01$ three of the technostrain components: anxiety ($r = .37$, $p < .01$); scepticism ($r = .37$, $p < .01$); and inefficacy ($r = .45$, $p < .01$). Role ambiguity was also significantly correlated to a number of the appraisal scales.

A QD challenge appraisal was positively correlated with an MD challenge appraisal ($r = .53$ , $p < .01$), however was negatively correlated to an RA challenge appraisal ($r = -.24$, $p < .01$). With regards to the components of technostrain, a QD challenge appraisal significantly negatively correlated to scepticism ($r = -.32$, $p < .01$). A QD hindrance appraisal was positively correlated with a MD hindrance appraisal ($r = .52$, $p < .01$) and negatively correlated with an RA hindrance appraisal ($r = -.26$, $p < .05$). With regards to components of technostrain, a QD hindrance appraisal was significantly positively correlated with anxiety ($r = .38$, $p < .01$); scepticism ($r = .27$, $p < .01$); and inefficacy ($r = .28$, $p < .01$).

An MD challenge appraisal was negatively correlated to and RA challenge appraisal ($r = -.45$, $p < .01$). MD challenge appraisal also was negatively correlated to scepticism ($r = .27$, $p < .01$). A MD hindrance appraisal was negatively correlated to RA hindrance appraisal ($r = -.36$, $p < .01$) however was positively correlated to all components of technostrain: anxiety ($r = .47$, $p < .01$); scepticism ($r = .26$, $p < .01$); fatigue ($r = .20$, $p < .05$); and inefficacy ($r = .36$, $p < .01$).

Finally RA challenge appraisal was also positively correlated to scepticism, $r = .23$, $p < 0.05$. RA hindrance appraisal was negatively correlated to three of the components of technostrain: anxiety ($r = -.30$, $p < 0.05$); scepticism ($r = -.20$, $p < 0.05$); and inefficacy ($r = -.29$, $p < 0.01$).

**Moderation Analysis**

Andrew Hayes' (2012) PROCESS macro was used to test the hypotheses that an individual's appraisal of a technodemands moderates the relationship between technodemands and technostrain. In total there were six interactions: one challenge and one hindrance appraisal for each of the three technodemands being studied: quantitative demands (QD), mental demands (MD) and role ambiguity (RA).

To begin, the main effect of quantitative demands was highly significantly related to technostrain (see Table 2 & 3). The overall model when examining the QD and technostrain moderated by CA was significant, $F(3, 114)$, $p < .001$, $R^2 = .14$. Next, the interaction term between QD and a CA was added to the regression but did not account for a significant proportion of variance, $\Delta R^2 = .03$, $\Delta F(1, 114) = 3.55$, $p = .06$, $\beta = -.1146$, $t(114) = -1.89$, $p = .06$. This does not show support for hypothesis 2a.

The overall model when examining QD and technostrain moderated by a HA was significant, $F(3,114) = 18.21$, $p < .001$, $R^2 = .32$. Moreover, when the interaction term between QD and HA was added to the regression, it accounted for a significant proportion of variance $\Delta R^2 = .08$, $\Delta F(1, 114) = 14.2$, $p < .001$, $\beta = .2015$, $t(114) = 3.77$, $p < .001$. This interaction can be seen in Figure 2. Examination of the interaction plot showed an enhancing effect that as QD and HA increased, technostrain increased. At low QD levels, technostrain was relatively similar for ICT users with low, average, or high HA. ICT users with high QD and had a high HA experienced the most technostrain. This shows support for hypothesis 3a.

*Table 2. Technostrain predicted by Quantitative Demands and QD Challenge Appraisal*

| Predictor | β | *se* | *p* | 95% CI | | $r^2$ |
|---|---|---|---|---|---|---|
| Quantitative Demands (QD)* | .33 | .093 | .006 | .145 | .513 | - |
| QD Challenge Appraisal* | -.14 | .059 | .021 | -.245 | -.021 | - |
| QD x QD Challenge Appraisal | -.11 | .061 | .062 | -.235 | .006 | .027 |

*Note.* $*p \leq .05$

*Table 3. Technostrain predicted by Quantitative Demands and QD Hindrance Appraisal*

| Predictor | β | *se* | *p* | 95% CI | | $r^2$ |
|---|---|---|---|---|---|---|
| Quantitative Demands (QD)* | .33 | .083 | .000 | .239 | .569 | - |
| QD Hindrance Appraisal* | .28 | .054 | .000 | .169 | .383 | - |
| QD x QD Hindrance Appraisal* | .20 | .054 | .000 | .096 | .307 | .084 |

*Note.* $*p \leq .05$

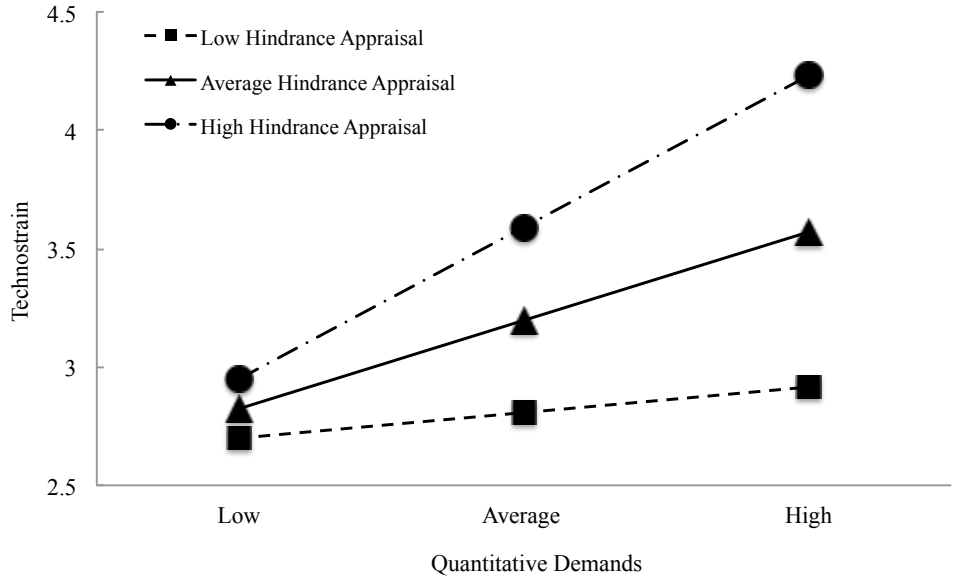


*Figure 2.* The moderation of Quantitative Demands by Hindrance Appraisals

Secondly, the main effect of MD was not significantly related to technostrain (Table 4 & 5). The overall model when examining MD and technostrain moderated by CA was significant, $F$ (3, 114) = 3.37, $p < .05$, $R^2 = .08$. Next, the interaction term between MD and CA was added and accounted for a significant proportion of variance in the regression, $\Delta R^2 = .05$, $\Delta F(1, 114) = 6.49$, $p < .05$, $\beta = -.1552$, t (114) = -2.55, $p < .05$. This interaction can be seen in Figure 3. Examination of the interaction plot shows a buffering effect that as MD and CA increased, technostrain decreased. At low MD, technostrain was similar for ICT users with low average and high CA. An ICT user with high MD and a high CA experienced the lowest technostrain. This supports hypothesis 2b.

Additionally, the model summary for MD and technostrain moderated by HA was also significant, $F(3, 114) = -11.04$, $p < .001$, $R^2 = .26$. When the interaction term between MD and HA was added to the regression, it accounted for a significant proportion of variance, $\Delta R^2 = .06$, $\Delta F(1, 114) = 9.16$, $p < .01$, $\beta = .13$ t(114) = 3.03, $p < .01$. This interaction can be seen in Figure 4. Examination of the interaction plot shows the enhancing effect so that as MD and HA increased, so too did technostrain. At low levels of MD, technostrain will be relatively similar for ICT users with low, average and high HA. Technostrain will be highest when an ICT user has both high MD and HA. This supports our hypothesis 3b.

*Table 4. Technostrain predicted by Mental Demands and MD Challenge Appraisal*

| Predictor | β | *se* | *p* | 95% CI | | $r^2$ |
|---|---|---|---|---|---|---|
| Mental Demands (MD) | -.03 | .068 | .672 | -.163 | .106 | - |
| MD Challenge Appraisal* | -.16 | .073 | .028 | -.306 | -.018 | - |
| MD x MD Challenge Appraisal* | -.12 | .045 | .012 | -.205 | -.026 | .052 |

*Note.* $*p \leq .05$

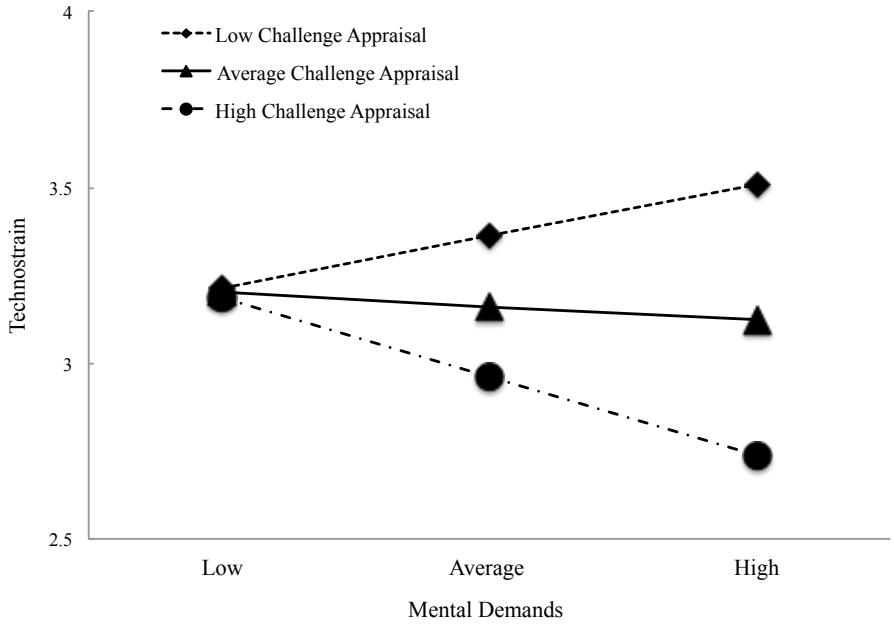


*Figure 3.* The moderation of Mental Demands by Challenge Appraisals

*Table 5. Technostrain predicted by Mental Demands and MD Hindrance Appraisal*

| Predictor | β | *se* | *p* | 95% CI | | $r^2$ |
|---|---|---|---|---|---|---|
| Mental Demands (MD) | .04 | .068 | .542 | -.086 | .163 | - |
| MD Hindrance Appraisal* | .32 | .061 | .000 | .196 | .438 | - |
| MD x MD Hindrance Appraisal* | .13 | .042 | .003 | .044 | .211 | .062 |

*Note.* $*p \leq .05$

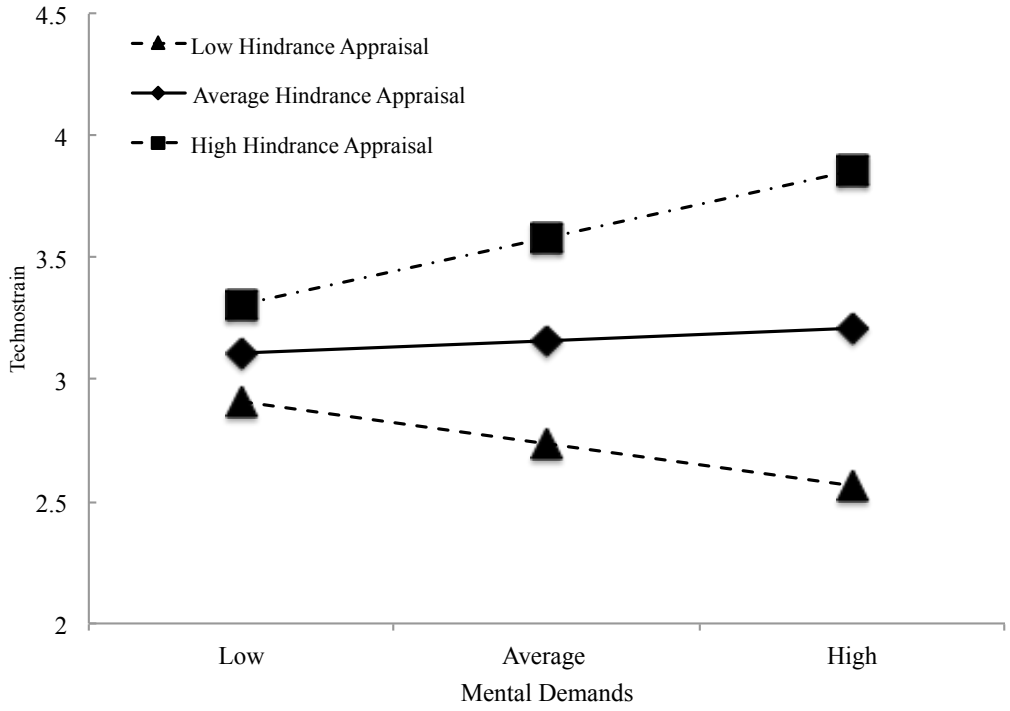


*Figure 4. The moderation of Mental Demands by Hindrance Appraisals*

Finally, RA was significantly related to technostrain when examining both CA and HA (Table 6 & 7). The main effects for a CA and HA were not significant. The model summary of the regression for RA and technostrain moderated by CA was significant, $F(3, 114) = 8.75$, $p = <.001$, $R^2 = .19$. When the interaction term between RA and CA was added to the regression, it did not account for a significant proportion of variance, $\Delta R^2 = .007$, $\Delta F(1, 114) = 1.01$, $p = .32$, $\beta = -.04$ t(114) = -1.01, $p = .32$. This shows that the null hypothesis should be accepted on hypothesis 2c.

The overall model summary for RA and technostrain moderated by HA was found to be significant, $F(1, 114) = 11.37$, $p < .001$, $R^2 = .23$. When the interaction term between RA and HA was added to the regression, it did not account for a significant amount of variance, $\Delta R^2 = .002$, $\Delta F(1, 114) = .36$, $p = .55$, $\beta = .34$, t(114) = .59, $p = .55$. This shows that the null hypothesis can be accepted on hypothesis 3c.

*Table 6. Technostrain predicted by Role Ambiguity and RA Challenge Appraisal*

| Predictor | β | *se* | *p* | 95% CI | | $r^2$ |
|---|---|---|---|---|---|---|
| Role Ambiguity (RA)* | .04 | .077 | .000 | .234 | .538 | - |
| RA Challenge Appraisal | .02 | .064 | .707 | -.103 | .151 | - |
| RA x RA Challenge Appraisal | -.04 | .042 | .317 | -.126 | .041 | .007 |

*Note.* *$p \leq .05$

*Table 7. Technostrain predicted by Role Ambiguity and RA Hindrance Appraisal*

| Predictor | β | *se* | *p* | 95% CI | | $r^2$ |
|---|---|---|---|---|---|---|
| Role Ambiguity (RA)* | .35 | .075 | .000 | .201 | .498 | - |
| RA Hindrance Appraisal* | -.156 | .061 | .011 | -.276 | .036 | - |
| RA x RA Hindrance Appraisal | -.034 | .056 | .552 | -.078 | .145 | .002 |

*Note.* $*p \leq .05$

## Discussion

In this paper, we aimed to explore the relationship between technodemands and technostrain and whether challenge/ hindrance appraisals may moderate this relationship. Three main hypotheses were formed. We proposed first that technodemands would be significantly positively correlated to technostrain. This was confirmed in our correlation analysis. Secondly, we hypothesised that challenge appraisals (CA) would act as moderator and buffer the relationship between technodemands and technostrain. Finally, we hypothesised that hindrance appraisals (HA) would act as a moderator and enhance the relationship between technodemands and technostrain.

Technodemands were indeed positively correlated to technostrain. While this does not imply a causal effect, it does show a clear relationship between these variable. Both quantitative demands and role ambiguity were strongly correlated to the mean technostrain score and to a number of its subcomponents; whereas mental demands had a moderate positive correlation with one technostrain subcomponent fatigue. Quantitative demands also had a strong positive correlation with fatigue. This is finding is logical as we would expect an ICT user who is required to work at a fast pace and with a lot of precision to report higher levels of fatigue.

Role ambiguity had a moderate positive correlation to anxiety, scepticism and inefficacy. Again, it can be reasoned that a ICT user who is very unsure of their role when using technology may experience heightened anxiety. Grappling with the ambiguous nature of their tasks, the may also begin to develop a scepticism towards the technology and doubt their usefulness when using the technology.

Our second and third hypotheses, related to moderating role of challenge or hindrance appraisals received moderate support. Our second hypothesis was supported only in the case of mental demands where a high CA appeared to have a weak buffering effect. However, the interaction was not significant for quantitative demands or role ambiguity. While it is not enough evidence to confirm our hypothesis fully, it shows that there is a moderation relationship present for at least mental demands. When an ICT user appraises mentally demanding tasks as a positive challenge, their perceived technostrain will be lessened slightly.

Our third hypothesis, received stronger support and illustrated that HA have a more significant enhancing effect on the relationship between technodemands and technostrain. The interaction effect was significant for all of the variables in the study except for role ambiguity. The interaction was strongest for quantitative demands indicating that when a user appraised working under quantitative demands to be hindering, their perceived stress would be moderately enhanced. This was similar to mental demands but to a lesser extent.

One point in need of addressing, is the way in which the role ambiguity appraisal scale operated. In our correlation analysis, the scale significantly correlated with every pair of appraisal scale except its own. In a similar unexpected fashion, both the challenge and hindrance scale for role ambiguity correlated unexpectedly with the technostrain score. While the relationship between a role ambiguity CA and technostrain was not significant, the relationship between a HA was significantly negatively correlated to technostrain. This would imply that as the ICT user appraises a role ambiguous situation to be a hindrance, their

perceived technostrain would be lower. This was not expected and, when taken in conjunction with the main and interaction effects for both these appraisal scales being not significant, could suggest a construct error in the scale. The items in the role ambiguity technodemand scale were worded in reverse, describing a situation where the user, “knows exactly what is expected” of them. This operationalisation may be efficacious when asking the participant to relate the statement to their current position. However, when operationalised into the appraisal scale, we continued in the same vein and described an objectively unambiguous work situation. It could be argued that this type of work situation: where one knows exactly what is expected of them, knows exactly what their tasks are for what they are responsible, is an inherently unchallenging situation. This could explain discrepancies in the results and perhaps would have proven more effective as a scale had we chosen to describe an ambiguous work situation instead.

In relation to the reliability and replicability of this study, we feel this study performs well. The research design drew from a number of well-researched and well-endorsed scales. With regards to participant error, the length of the survey may be a point of contention. The length of the survey was promoted as nine minutes, however most completed responses were in excess of twelve minutes. This point was mentioned by a number of participants after taking the questionnaire who also had issues with the phrasing of the role ambiguity appraisal scales. These are two issues that could be addressed in future research. Similarly, the participants from within the companies contacted may have experienced a degree of participant bias. The survey was distributed by their superiors and told that the study was related to their experience with technostrain and their superiors would be provided with a report upon completion. Participants from this sample may have answered in a self-aggrandising way to appear more favourable in the eyes of their superiors.

With regards to the validity of the study, we believe this paper demonstrated high construct validity. The phenomenon of technostress has been well documented and categorised

through the work of Salanova and colleagues (2007; 2013). The phenomenon of technodemands affecting technostrain has been a highly studied area and incorporating stress appraisals into the relationship was a logical assumption to make. The study of the challenge-hindrance framework has inferred a moderating role of stress appraisals (Hobfall, 1989) and the operationalisation of these appraisals closely adhered to the work of Searle and Auton's (2014) review of measuring challenge and hindrance appraisals. In terms of external validity, this study was conducted using quite a heterogenous sample. There was a wide range of ages and industries who participated in the study. However, there is a possibility for varying results if this study design were to be applied to one industry. For example, for a sample of IT workers, it is reasonable to assume that they would be less likely to view working with technology to be a hindrance, given that they have chosen working with technology as their career. Conversely, taking a sample of gardeners, participants may be more likely to report working technology as a hindrance. For this reason, we advise future researchers to be conscious of industry when sampling.

**Limitations and Future Research**

As we only examined three of the task level technodemands as detailed by Salanova et al. (2013), future research could use a similar research design and investigate the remaining three technodemands: ergonomic qualitative overload (the extent to which the user is in an awkward position positions when using technology); routine (the extent to which tasks are repetitive, boring and monotonous); and the continuous pace of technology (the extent to which the users perceive there to be more tasks required than time permits). It would be interesting to investigate whether stress appraisals moderate these technodemands' relationship to technostrain. It can be argued that being in awkward positions while using technology would consistently be appraised as a hindrance. However, routine and the continuous pace of

technology would be prime technodemands to study. Similarly, future research could add to the body of technostress literature by examining social, organisational and extra-organisational demands through the challenge-hindrance framework.

This paper has shown that not all technodemands are created equal and future research could move away from the previous method of a priori categorisation. The TSMC provided a very useful framework through which technodemands can be studied particularly where an enhancing or buffering effect may be present for certain technodemands. As shown in the present paper, the magnitude of the moderation effect varies from demand to demand which may suggest that certain demands are more susceptible to be altered by a challenge or hindrance appraisal whereas others are less affected. This may have practical implications in job design and employee training programmes where employees could be matched to tasks that they appraise as challenging or receive training in areas they appraise as hindering.

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# Appendix A

## Finalised Questionnaire Used in Study

Thank you participating in this study!

Current research states that all ICT-related work demands are created equal: what stresses out one employee will also stress another. This research is interested in your experiences about working with technologies and how this might (or might not) influences your stress levels. This research is conducted as part of a Master's thesis in Social, Health and Organisational Psychology at Utrecht University, Netherlands.

The present survey should take approximately 10 minutes to complete.

Your participation in this study is voluntary. You may choose to withdraw from participating at any time. Your responses will be treated with complete confidentiality.

If you have any questions about the research, please contact me, the researcher, Cian Rath-Cullimore at c.j.rath-cullimore@students.uu.nl

By clicking "Agree" you confirm that you have read the above information and you voluntarily agree to participate.

Q1. How old are you?

Q2. What is your gender?

Q3. What is your highest level of educational attainment?

Q4. Which best describes your current occupation?

Q5. How long have you been in this industry?

Q6. How many hours do you work with technology or ICT per day?

Q7. Please enter company code if applicable.

**Technological Demands Items**

Listed below are a series of statements regarding the use of technology in the workplace. In the context of this study, the use of technology at the work place refers to the use of computers ( any device that processes information) and Information and Communication Technology (e.g. the Internet, instant messaging services)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Never | A couple of times a year | Once a month | A couple of times a month | Once a week | A couple of times a week | Every day |

Quantitative Demands

Q1. Working with technology requires me to work very fast

Q2. When working with technology, I have too much to do

Q3. Working with technology requires me to work extra hard to finish some tasks.

Q4. When working with technology, I have sufficient time to get my work done (Reversed)

Q5. In working with technology, my tasks have a time limit

Mental Demands

Q1. My work with technology requires me to concentrate deeply

Q2. My work with technology requires a lot of precision

Q3. My work with technology is mentally demanding

Q4. My work with technology requires continual mental effort while doing it

Role Ambiguity

Q1. I know exactly what is expected of me when working with technology

Q2. I know exactly for what I am responsible and which areas are not my responsibility

Q3. It is clear to me exactly what my tasks are when working with technology

**Stress Appraisal Items**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |

Quantitative Demands Appraisal

Imagine the following situation.

Mary says, “When working with technology, my job requires me to work very fast. I often have too much work to do and must work extra hard to finish some tasks. I must work quickly as some of my tasks have a time limit”

In general, I believe that having a job like Mary…

Q1. will help me to learn a lot

Q2. will make the experience educational

Q3. will show me I can do something new

Q4. will keep me focused on doing well

Q5. will hinder any achievements I might have

Q6. will restrict my capabilities

Q7. will limit how well I can do

Q8. will prevent me from mastering difficult aspects of the work

Mental Demands Appraisal Items

Imagine the following situation.

Derrick says, “When working with technology, my job requires me to work with precision and concentrate deeply. My work is mentally demanding and requires continual mental effort.”

In general, I believe that having a job like Derrick…

Q1. will help me to learn a lot

Q2. will make the experience educational

Q3. will show me I can do something new

Q4. will keep me focused on doing well

Q5. will hinder any achievements I might have

Q6. will restrict my capabilities

Q7. will limit how well I can do

Q8. will prevent me from mastering difficult aspects of the work

Role Ambiguity Appraisal Items

Imagine the following situation.

Shannon says, “When working with technology, I know exactly what is expected of me in my position and it is clear to me exactly what my tasks are and for what I am responsible. I often have to adapt my approach to tasks”

In general, I believe that having a job like Shannon…

Q1. will help me to learn a lot

Q2. will make the experience educational

Q3. will show me I can do something new

Q4. will keep me focused on doing well

Q5. will hinder any achievements I might have

Q6. will restrict my capabilities

Q7. will limit how well I can do

Q8. will prevent me from mastering difficult aspects of the work

**Technostrain Items**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Strongly Disagree | Disagree | Somewhat Disagree | Neither Agree nor Disagree | Somewhat Agree | Agree | Strongly Agree |

Scepticism

Q1. With the passage of time, technology interests me less and less

Q2. I feel less involved with the use of ICT

Q3. I am more cynical about the contribution of technologies in my work

Q4. I doubt the meaning of working with these technologies

Fatigue

Q1. I find it difficult to relax after a day of using technology

Q2. When I finish working with technology, I feel exhausted

Q3. I am so tired from working with technology that I cannot do anything else

Q4. It is difficult to concentrate after working with technologies

Anxiety

Q1. I feel tense and anxious when working with technologies

Q2. I doubt myself when using technologies for fear of making mistakes

Q3. It scares me to think that I can destroy a lot of information due to improper use

Q4. Working with technology makes me feel uncomfortable, irritable and impatient

Inefficacy

Q1. I feel I am inefficient when using technology

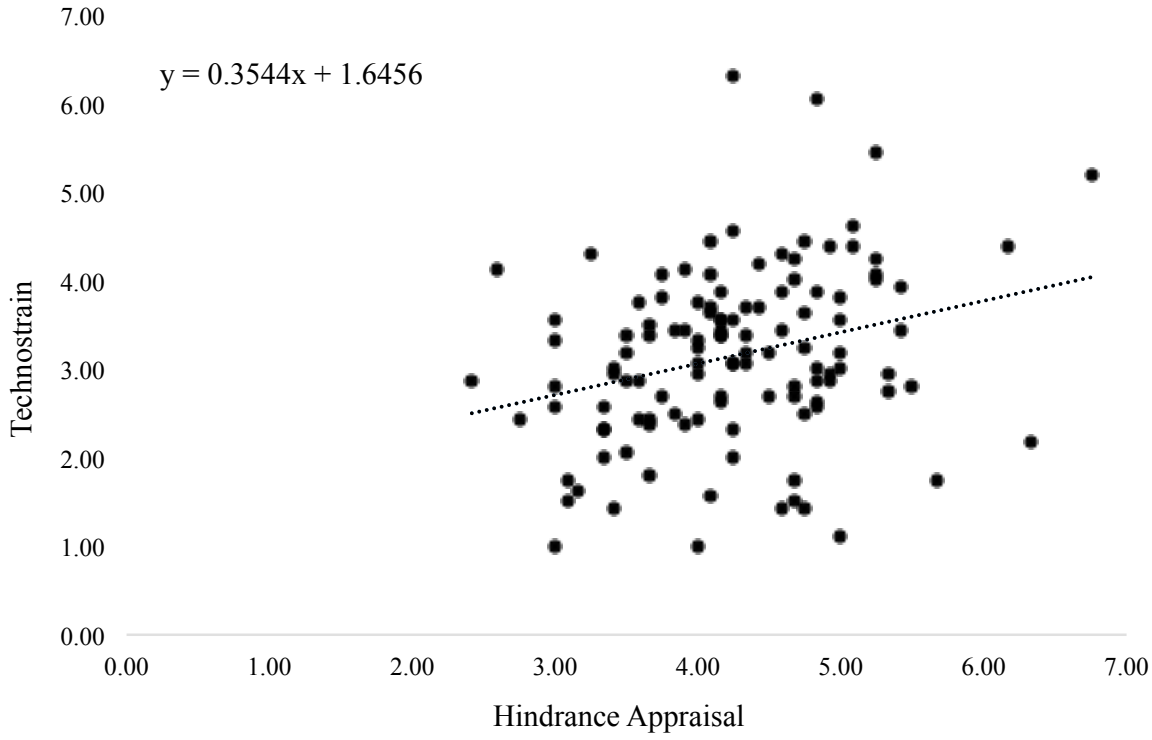
Q2. I find it difficult to work with ICT

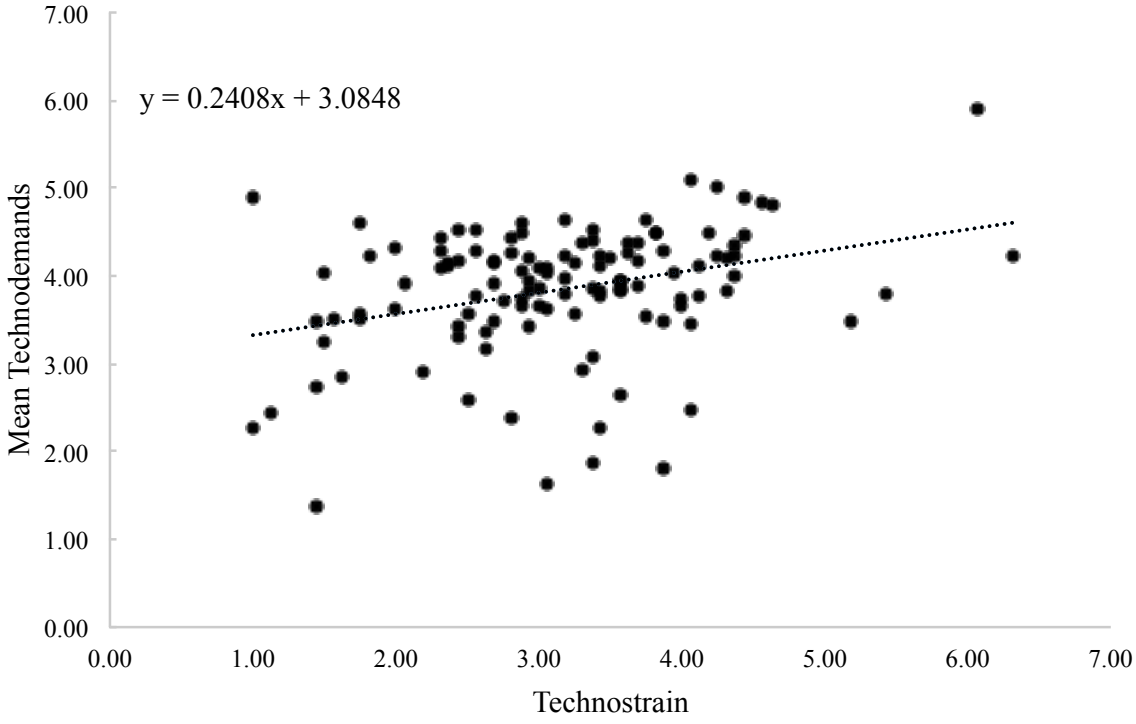
Q3. People say I'm inefficient when using technology

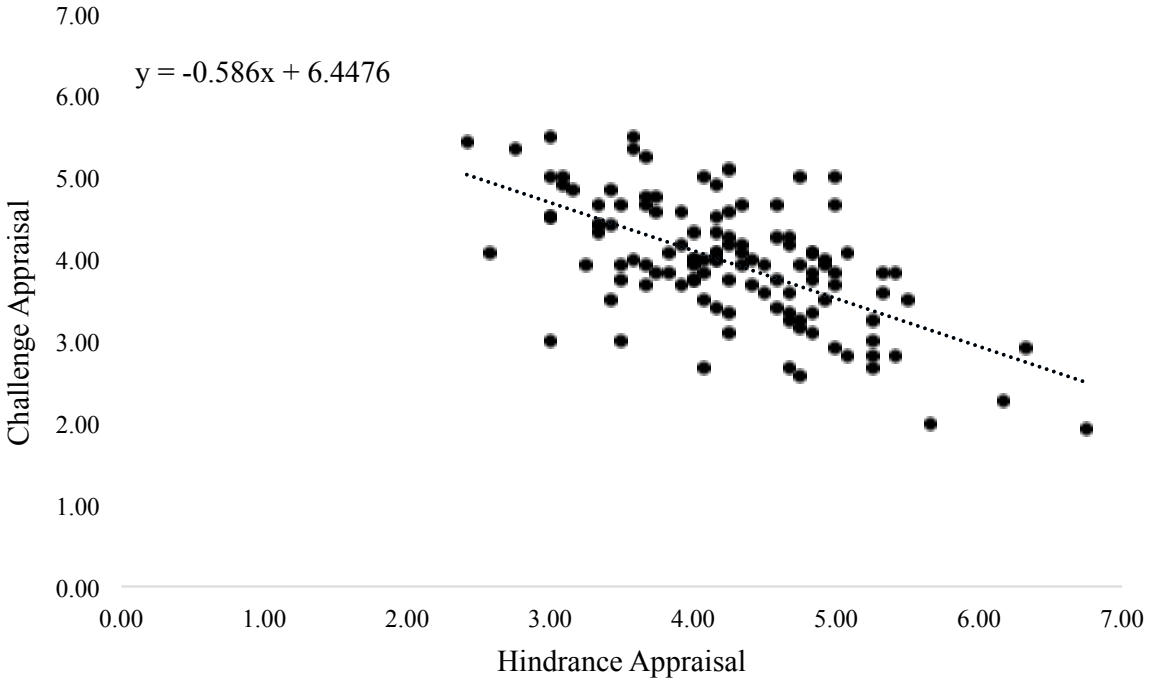
Q4. I am unsure I am finishing tasks well when using technology

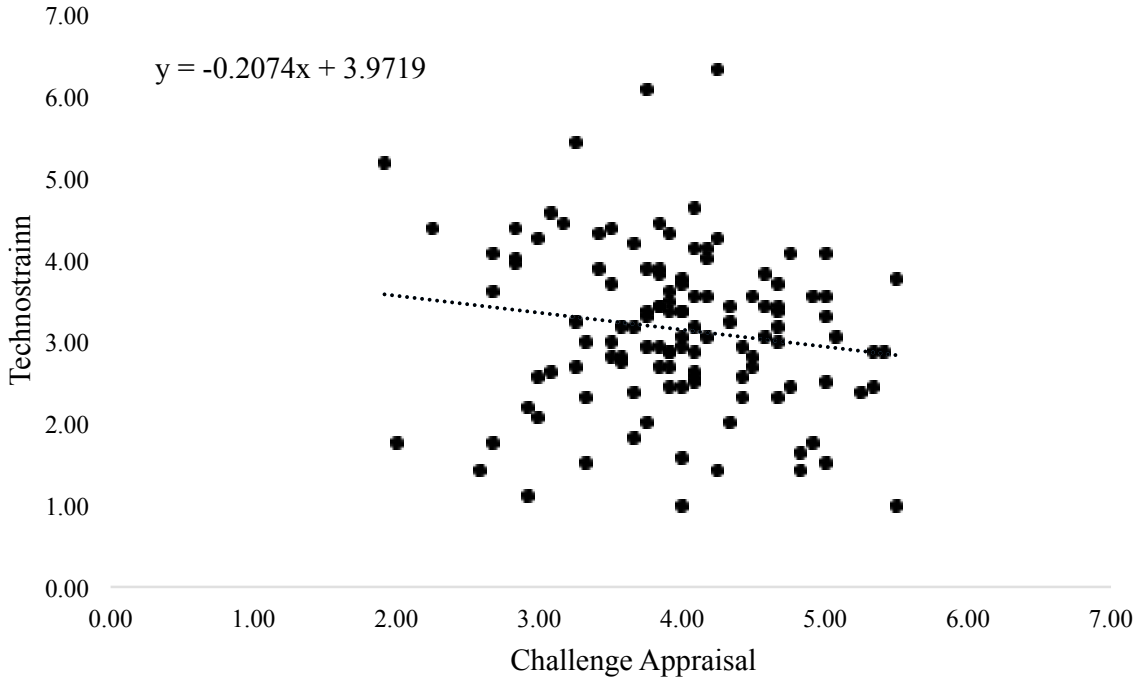
# Appendix B

## Supplementary Correlation Scatter Plots




y = -0.586x + 6.4476
Challenge Appraisal
Hindrance Appraisal
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00


y = -0.2074x + 3.9719
Technostrainn
Challenge Appraisal
0.00
1.00
2.00
3.00
4.00
5.00
6.00
7.00

# Appendix C

## Extended RED Questionnaire

### RED Questionnaire – Technostress ©
(Llorens, Salanova y Ventura, 2011)

Listed below are a series of statements are about the use of technology. Please read each statement carefully and how often you feel it by crossing the number (from 0 to 6) that best describes how frequently you feel that way.

| Never | Almost never | Rarely | Sometimes | Often | Very often | Always |
|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |

1. Over time, the technologies interest me less and less
2. Every time I feel less involved in the use of ICT
3. I'm more cynical of whether the technologies contribute to something in my work
4. I doubt the significance of working with these technologies
5. I find it hard to relax after a day of work using them
6. When I finished working with ICT, I feel exhausted
7. I'm so tired when I finish working with them that I cannot do anything else
8. It is difficult to concentrate after working with technologies
9. I feel tense and anxious to work with technologies
10. It scares me to think I can destroy a lot of information from improper use of them
11. I hesitate to use technologies for fear of making mistakes
12. Working with them makes me feel uncomfortable, irritable and impatient
13. In my opinion, I am using technologies in an inefficient way
14. It is difficult to work with technologies of information and communication
15. People say I'm using technologies in an inefficient way
16. I am unsure to finish properly my tasks when I am using technology
17. I think I use too much technology in my life
18. I constantly use technologies, even outside my working hours
19. I spend more time on technologies that will be with friends, family, practice hobbies, etc.
20. I find myself constantly thinking about technologies (e.g., checking email, finding information on the Internet, etc.) even outside working hours
21. I have anxiety if I have no access to technology (Internet, email, mobile, etc.)
22. An inner drive forces me to use them anywhere and anytime

| |
|---|
| Skepticism (items 1-4) |
| Fatigue (items 5-8) |
| Anxiety (items 9-12) |
| Ineffectiveness (items 13-16) |
| Working excessively (items 17-22) |
| Working compulsively |

# Appendix D

## Authorisation for Use of RED Questionnaire

*WANT Prevención Psicosocial y Organizaciones Saludables*
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UNIVERSITAT JAUME I
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Prevención Psicosocial
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Castellón, 10th April 2019

DR. MARISA SALANOVA SORIA, Full Professor of the Department of Developmental, Educational and Social Psychology and Methodology, and Director of the WANT Research Group at Jaume I University (Castellón, Spain)

CERTIFIED THAT

I authorize Cian Rath-Cullimore, student of Masters in Work and Organisational Psychology at Utrecht University (Nederland), to use the Technostress scale in his master's thesis. The recipient of this authorization agrees to properly cite the academic work in which the scales were originally published.

- ✓ Llorens, S., Salanova, M., & Ventura, M. (2011). *Tecnoestrés*. Madrid: Síntesis.

Sincerely,

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