Thesis

Technological fun in the workplace:

The Role of Resources and Appraisal on Technostrain and Techno Engagement

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Abstract

With the increased use of (new) technologies on the workfloor and the growing need for further understanding the effects this has on employees, more research is required. The present study focussed on the techno strain and techno engagement experienced by participants as well as the role of autonomy, colleague social support and supervisor social support on these two scales. Technological versions of four already existing questionnaires (UWES, colleague social support, supervisor social support & autonomy) were formed and administered with the tested technostrain questionnaire. More specifically this study endeavoured to determine the relationship between those variables as well as the roles of challenge and hindrance appraisals on those relationships. Based on the cross-sectional research (*N*=101) it was determined that the scales were in fact reliable that all three resources had effects on either technostrain or techno engagement. Moreover the challenge or hindrance appraisal of some resources could moderate the relationship, adding an extra dimension to the data collected. This study provides additional proof for the role of resources, appraisal and technostrain and makes the first step in developing a scale aimed at technological engagement in the workplace specifically.

Keywords: techno engagement; technostrain; autonomy; colleague social support; supervisor social support; cognitive appraisal; challenge appraisal; hindrance appraisal

INTRODUCTION

Technological advancements have been progressing steadily, leading not only to greater ease in life but also to greater demands in information to be processed and expectations which leads to a greater strain (Ulferts, Korunka, Kubicek, 2013). This is in part due to the blending of the spheres of work and life in everyday living as a result of the increased connectedness from technology (Perrons, 2003; Ayyagari, Grover, & Purvis, 2011). The increase in demands due to technology that is expected to reduce stress at work is known as the "the practical paradox of technology" (p.240, Ter Hoeven, van Zoonen, Fonner, 2016). This strain, or imbalance between the resources of a job and its demands can lead to the classic symptoms of burnout (Demerouti, Bakker, Nachreiner & Schaufeli, 2001).

Current research (e.g. Salanova, Llorens & Cifre, 2013) has focussed specifically on the experience of strain arising from technology use and the high speed at which technological change takes place. This is known as *technostrain*. Technostrain refers to the negative psychological experiences comprised of high levels of anxiety, scepticism and inefficacy related to the use of technologies (Salanova, Llorens, & Cifre, 2013). This concept is linked to and partly based on burnout (Salanova, Llorens, & Cifre, 2013) In comparison, burnout comprises of the elements exhaustion, cynicism and professional inefficacy (Maslach, Schaufeli, & Leiter, 2001). In their paper Salanova, Llorens & Cifre established the role job demands and job/personal resources payed in relation to technostrain, however they did not consider the role of subjective appraisal of these elements. For instance, seeing a particular resource (which may normally reduce technostrain) as a hindrance could have as effect that technostrain actually increases. Therefore the effect a challenge/hindrance appraisal has on this relationship merits further research.

Moreover, (organizational) psychological research has generally been more focused on the negative side of psychology as opposed to the positive (i.e. positive organizational behaviour), for example engagement (Bakker, & Schaufeli, 2008). Similarly, relatively little research has been dedicated to the experience of engagement when working with technology. Additionally, while there have been multiple attempts at defining technology engagement, these definitions of engagement are often generic (e.g. O'Brien & Toms, 2008). Other definitions can also be focused on overall IT use engagement as opposed to in a work context (e.g. Sharafi, Hedman & Montgomery, 2006). This is especially interesting when one

takes into account that Salanova, Agut & Peiró (2005) established fourteen years ago that the availability of organizational resources including *technology* led to work engagement in service workers. Therefore this study will look also include the relationship between resources, their appraisal and engagement. However, since there is a technological version of burnout, this study will attempt to adapt the already existing Utrecht Work Engagement Scale (UWES) into a technological format, and then compare the two techno scales.

In sum, the purpose of this study will attempt to adapt UWES into a technological format, the Utrecht Technological Engagement Scale (UTES). This new scale will be tested, as relationship between resources, technostrain and techno engagement, including challenge and hindrance appraisals. This study will thereby add to the literature regarding technostrain, cognitive appraisal and endeavour to make a concrete step towards establishing the value of a separate scale for techno engagement. In order to fulfil the purpose of this study, the following questions will be answered:

1. Can techno engagement be measured reliably and how is it related to technostrain?
2. What is the relationship between technological resources and technological engagement and technostrain?
3. What is the role of cognitive appraisal (i.e. challenges and hindrances) in the relationship between technological resources, techno engagement and technostrain?

Theoretical Background and Hypotheses

Technostrain

As stated, technostress or technostrain has become a recognized issue in recent years (Ayyagari et al., 2011; Salanova, Llorens & Cifre, 2013) subject to research. Ayyagari et al. (2011) showed that within the use of technology there are multiple factors which may lead to technological stress. Specifically they make use of the Person-Environment Fit model (Edwards, 1991) showing a lack of fit between a person and their environment (i.e. unmet job demands or unmet individual needs) can lead to strain. Using this theory and the usability, intrusive and dynamic characteristics gained from literature review they add support to the notion that technostress is valid and can potentially lead lower productivity and turnover. Salanova et al. (2013) looked at the effects of different resources on technostrain on its three factors (anxiety, scepticism and inefficacy), thereby showing that the job resources they tested predict technostrain specifically.

Engagement

Schaufeli, Salanova, González-Romá & Bakker (2002) define work engagement as "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication and absorption" (p.74). Vigour is defined as putting copious amounts of time and energy into one's work ("high levels of energy and mental resilience", p.74). Dedication refers to feeling that the work in meaningful, perhaps serving a purpose or higher goal, including a sense of pride and challenge. Absorption is being fully focussed on the work that you are doing, thereby often not being aware of the passage of time. Schaufeli and others designed the Utrecht Work Engagement Scale (UWES), which measures this phenomenon based on the three dimensions. Engagement is a positive indicator of occupational well-being (Schaufeli, Taris & Van Rhenen, 2008) and it is related to energetic employees who can fully meet the demands of their profession (Schaufeli, Salanova, González-Romá & Bakker, 2002). Engagement appears to be related to positive aspects such as proactive work behaviour (Salanova & Schaufeli, 2008) and organisational commitment (Hakanen, Bakker & Schaufeli, 2006; Saks, 2006). Harter, Schmidt & Hayes' meta-analysis (2002) also showed that engagement is linked to "*meaningful business outcomes"* (p.276).

Techno Engagement

Considering that strain exists in technology as technostrain, it stands to reason that the concept of techno engagement could also exist. While there have been multiple attempts at defining technology engagement, these definitions of engagement are often generic (O'Brien & Toms, 2008) and focused more on overall IT use engagement as opposed to in a work context (Sharafi, Hedman & Montgomery, 2006). This is not to say that such research is not of import, however research focused for example on engagement in video games, online shopping or learning a new language may not be as relevant or applicable in an organisational context. The UWES, on the other hand, is designed for measuring engagement in a work environment. Attempting to adapt the scale into a technological format may therefore prove more useful. Additionally, considering the previously mentioned amount of strain experienced at work as a result from technology, research into which technological resources may increase engagement (thereby reducing strain) at work can be

very valuable indeed. It is for these reasons that this study will adapt the new scale for the techno engagement of employees.

Cognitive Appraisal

Determining whether circumstances lead to strain or engagement is based on a few elements. The first relevant theory is that of cognitive appraisal, or the Transactional Model of Stress and Coping (Lazarus and Folkman, 1984; 1987). Cognitive appraisal is when one assesses a situation, which ultimately affects the way in which one perceives a situation as stressful. The primary appraisal focuses on whether or not a situation is benign, threatening or neutral. If the first impression is that the situation is threatening the next appraisal is in order to determine if the individual has enough resources to cope with this threat. If they do, then the situation is seen as a challenge, otherwise it is considered a hindrance (Campbell, Johnson, & Zernicke, 2013). Furthermore Lazarus and Folkman (1984) posit that seeing a situation as a challenge is associated with positive affect. This is supported by Maier, Waldstein & Synowski (2003) who show that there is a positive link between challenge appraisals and task engagement, as well as by Schaufeli & Taris (2014) and Shirom, Nirel, & Vinokur (2010). Schaufeli & Taris (2014) further make the point that resources themselves can be classified as a hindrance if they are *valued* as negative. For instance this can happen in the case where there is lack of a resource. Alternatively, that could be considered a demand in and of itself. The TMSC integrates the appraisal of demands and resources as having an effect on the technostrain and techno engagement.

Job Resources

A job resource is defined by Bakker and Demerouti (p.211, 2008) as a:

> "physical, social, or organisational [aspect] that may: reduce job demands and the associated physiological and psychological costs, be functional in achieving work goals and stimulate personal growth, learning, and development"

They are therefore not only important for reducing the effects of demands in and of itself but also have an inherent use for personal growth and work goals. Moreover they are positively related to work engagement (Bakker & Demerouti, 2007; Schaufeli & Salanova, 2007; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009; Crawford, LePine, & Rich, 2010) and so it would be prudent to look at the effect of techno job resources on techno

engagement.

As potential resources for techno engagement I have selected autonomy, colleague social support and supervisor social support. This is based in part on the research by Salanova, Llorens & Cifre (2013) as they have already identified autonomy and social support as important job resources in a technological environment. Evidence from other models including the Demand Control model (Karasek, 1998; Kim, & Stoner, 2008) or simply research on engagement (Bakker, Hakanen, Demerouti, & Xanthopoulou, 2007; Reeve, Jang, Carrell, Jeon, & Barch, 2004; Taipale, Selander, Anttila, & Nätti, 2011) reiterate the importance of those resources.

Moreover autonomy and social support are important elements of Ryan and Deci's (2000) Self-Determination Theory (SDT). SDT in itself has been linked to engagement in multiple studies (Meyer, & Gagne, 2008; Reeve, 2012). Simply put: employees who have more freedom in their work and support from those around them at work will be more likely to be engaged at work.

Hypotheses

As established previously resources are positively related to engagement. The same holds specifically colleague and supervisor social support (Schaufeli, & Bakker, 2004; Hakanen, Bakker & Schaufeli, 2006; Bakker, & Demerouti, 2007; Schaufeli, & Salanova, 2007) and autonomy (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009; Skaalvik, & Skaalvik, 2014). As such it seems logical that the perception both colleague and supervisor social support will be positively related to techno engagement (*Hypothesis 1a & 1b*). Similarly the perception of autonomy should be positively related to techno engagement (*Hypothesis 1c*):

Hyp 1a: The perception of colleague social support will be positively related to techno engagement.

Hyp 1b: The perception of supervisor social support will be positively related to techno engagement.

Hyp 1c: The perception of autonomy will be positively related to techno engagement.

Previously it was also established that resources help reduce job demands and the negative effects thereof. Specifically: Russell, Altmaier, & Van Velzen (1987) established that social support in and of itself reduces burnout, this is further supported by Baruch-Feldman,

Brondolo, Ben-Dayan, & Schwartz's study (2002), Crawford, LePine, & Rich's meta-analysis (2010) and by Halbesleben's meta-analysis (2006), to name a few. As such it is expected that colleague and supervisor social support will both be negatively related to technostrain (*Hypothesis 2a & 2b):*

Hyp 2a: The perception of colleague social support will be negatively related to technostrain.

Hyp 2b: The perception of supervisor social support will be negatively related to technostrain.

The relationship of autonomy with regard to burnout is nuanced, as Shirom, Nirel, & Vinokur (2006) showed that in interaction with role stress it could in fact predict burnout. However there is plenty of research (Shirom, Nirel, & Vinokur, 2010; Fernet, Austin, Trépanier, & Dussault, 2013) show a direct effect of autonomy reducing burnout and Fischer & Boer (2011) showed that autonomy was required for reducing "negative psychological symptoms" (p.179). Therefore it seems more likely that autonomy will be negatively related to Technostrain by itself (*Hypothesis 2c*), since there is no element of an interaction of role stress:

Hyp 2c: The perception of autonomy will be negatively related to technostrain.

As aforementioned, appraisal means that the individual can perceive resources in terms of challenges and hindrances, which in turn will influence the relationship between the resources and either engagement or burnout. Translating that to this study, that means that the challenge or hindrance appraisal of the resources Colleague Social Support, Supervisor Social Support and Autonomy will affect the relationship between those resources and either Techno Engagement or Technostrain. Since a challenge appraisal in general leads to an increase of engagement, it stands to reason that the proposed positive relationship between Colleague Social Support and Techno Engagement is then moderated by a higher challenge appraisal of said resource to become more positive (*Hypothesis 3a*). The same logic follows for a challenge appraisal of both Supervisor Social Support (*Hypothesis 3b*) and Autonomy (*Hypothesis 3c*):

Hyp 3a: The positive relationship between colleague social support and techno engagement is moderated by a higher challenge appraisal of colleague social support to become more positive.

Hyp 3b: The positive relationship between supervisor social support and techno engagement is moderated by a higher challenge appraisal of supervisor social support to become more positive.

Hyp 3c: The positive relationship between autonomy and techno engagement is moderated by a higher challenge appraisal of autonomy to become more positive.

The same goes for the relationship between the challenge appraisals of the resources to Technostrain. If a challenge appraisal will increase the positive effect of a resource on someone's life, it will also decrease the negative, e.g. burnout, in this case Technostrain. Therefore it is expected that a challenge appraisal of Colleague Social Support will moderate the proposed negative relationship between the same resource and Technostrain to become more negative (*Hypothesis 4a*). Again, this should hold for all of the resources, so the same is expected for the challenge appraisal of Supervisor Social Support (*Hypothesis 4b*) and Autonomy (*Hypothesis 4c*) regarding Technostrain:

Hyp 4a: The negative relationship between colleague social support and technostrain is moderated by a higher challenge appraisal of colleague social support to become more negative.

Hyp 4b: The negative relationship between supervisor social support and is moderated by a higher challenge appraisal of supervisor social support to become more negative.

Hyp 4c: The negative relationship between autonomy and technostrain is moderated by a higher challenge appraisal of autonomy to become more negative.

In terms of the effect of a hindrance appraisal on the relationship between the resources and engagement or burnout, one study (Li, Peeters, & Taris, submitted) already established results. They showed that resources appraised as hindrances weakened the respective relationships to engagement and burnout. As such, it is expected that a hindrance appraisal of Colleague Social Support will moderate the relationship between Techno

Engagement and Colleague to be more negative (read: weaken) (*Hypothesis 5a*). The same is expected for the effects of the hindrance appraisal of both Supervisor Social Support (*Hypothesis 5b*) and Autonomy (*Hypothesis 5c*) on the relationship between the respective resources and Techno Engagement:

Hyp 5a: The positive relationship between colleague social support and techno engagement is moderated by a higher hindrance appraisal of colleague social support to become more negative.

Hyp 5b: The positive relationship between supervisor social support and techno engagement is moderated by a higher hindrance appraisal of supervisor social support to become more negative.

Hyp 5c: The positive relationship between autonomy and techno engagement is moderated by a higher hindrance appraisal of autonomy to become more negative.

Finally, as stated before the relationship between burnout and resources potentially was found to be weakened by a hindrance appraisal of said resources. Therefore it is expected that the hindrance appraisal of Colleague Social Support will moderate the negative relationship between Colleague Social Support and Technostrain to become more positive (*Hypothesis 6a*). Likewise the hindrance appraisals of Supervisor Social Support (*Hypothesis 6b*) and Autonomy (*Hypothesis 6c*) will moderate the negative relationship between the respective resources and Technostrain to become more positive:

Hyp 6a: The negative relationship between colleague social support and technostrain is moderated by a higher hindrance appraisal of supervisor social support to become more positive.

Hyp 6b: The negative relationship between supervisor social support and technostrain is moderated by a higher hindrance appraisal of supervisor social support to become more positive.

Hyp 6c: The negative relationship between autonomy and technostrain is moderated by a higher hindrance appraisal of autonomy to become more positive.

METHOD

Procedure

Data was collected with an online questionnaire in Qualtrics. In conducting this study and reporting its results we followed the guidance of Porter, Outlaw, Gale, and Cho (2018). The study had a cross-sectional design. All the participants (*n*=128) were gathered using word of mouth and the snowball technique. After clicking on the link participants were led to a page with the informed consent explaining the purpose of the study. They were also informed that they may choose to leave the study at any time and that all results will remain anonymous. Once the participants agreed to the study they were allowed to continue on to the next question. The study lasted approximately nine minutes. Participants participated on a voluntary basis and were not reminded afterwards.

Participants

All the participants (*n*=128) were gathered using word of mouth and the snowball technique. Out of the 128 participants, twenty-five had started but failed to complete the questionnaire and were therefore excluded from analysis. Additionally, participants were excluded if they indicated not to be working or did not use ICT or technology at work, leaving 101 participants.

Participants were reasonably evenly divided in terms of gender, with 48 men (47.5%) and 51 women (50.5%). Only two participants chose not to share their gender or chose the option 'other'. In terms of highest attained education all forms were present, though only two participants had vocational training and the grand majority (89,1%, *n*=90) had a University of Applied Sciences education or higher.

The ages of the participants ranged from 20 to 67, with a mean age of 32.38 (*SD* = 13.60), though 69.9% (*n* = 72) were in their twenties. They had an average of 7.65 (*SD*=10,79) years working experience in their respective fields and on average they worked 5.75 (*SD* = 2.25) hours per day with ICT.

Participants worked in different sectors including Education, Culture & Science (*n* = 26, 11,9%), Health & Welfare (*n* =23, 22,8%), ICT (*n* = 12, 11,9%) and Technology, Production & Construction (*n* = 12, 11,9%). Other sectors were also included to a lesser degree, with Tourism, Recreation & Catering Industry being most underrepresented (*n* = 1, 1,0%). See figure 1 for an overview.

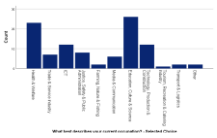

Figure 1: Distribution of participants based on Work Sector

Measurements

There are ten main variables to be measured in the present study: technological engagement, technological strain, three technological job resources (autonomy, colleague social support & supervisor social support) and cognitive appraisal of the three technological job resources. Each of these variables have previously established forms of measurement but were adapted to the topic of the present study. Each questionnaire was administered in English in order to maximise the pool of potential participants. Prior to reading the questions, the participants were given a definition of ICT as defined by the researchers.

Technological Engagement. For measuring technological engagement the items of the UWES-9 were adapted to a technological context. For example, the item 'At my work, I feel bursting with energy' became 'While working with ICT, I feel bursting with energy'. Items 1, 2 and 5 measure vigour; items 3, 4 and 7 measure dedication; whereas items 6, 8 and 9 measure absorption. Participants could answer with a Likert scale ranging from 0 (Never) to 6 (Always) (see Appendix 3). A reliability analysis showed that Cronbach's alpha with a high reliability score, α = .934. All of the items were worthy of retention, as none of the items being removed would yield an improved alpha. When viewed per dimension, Cronbach's alpha remained decent at α = .841 (vigour), α = .881 (dedication), α = .852 (absorption). Only the alpha for vigour could be improved by removing item 5 to α = .893. However, this seems inadvisable as only two items would remain for vigour.

Technostrain. Technostrain was measured with the RED Questionnaire – Technostress by Salanova, Llorens & Cifre (2013) with 16 items. Items 1-4 measure scepticism, items 5-8 fatigue, items 9-12 anxiety and 13-16 ineffectiveness. Participants could answer with a Likert scale ranging from 1 (Completely disagree) to 7 (Completely agree) (see Appendix 4). A reliability analysis showed that Cronbach's alpha with a good reliability, α = .891. All of the items were worthy of retention, as none of the items being removed would yield an improved alpha. When viewed per dimension, Cronbach's alpha remained decent at α = .834 (scepticism), α = .825 (fatigue), α = .833 (anxiety), α = .831 (ineffectiveness). Viewed separately only the second item of anxiety may merit exclusion (item 11) in order to raise the value of alpha to α = .857. However, this would reduce the total number of items to three for anxiety.

Autonomy. Autonomy was measured using Jackson, Wall, Martin, & Davids' (1993) established questionnaire with 10 items. Items 1-4 measure timing control and items 5-10 measure method control. Participants could answer with a Likert scale ranging from 1 (Never) to 5 (Often) (see Appendix 7). The items were adapted to the context of this study. For example 'Can you plan your own work?' was adapted into 'Can you plan your own work when working with ICT?' A reliability analysis showed a Cronbach's alpha of high reliability, α = .915. All of the items were worthy of retention, as none of the items being removed would yield an improved alpha. When viewed per dimension, Cronbach's alpha remained decent at α = .838 (timing control), α = .865 (method control). Only item 6 would negligibly increase alpha to α = .866, therefore all items remain worthy of retention.

Social support. Colleague and supervisor social support were based on Peeters, Buunk, & Schaufeli's research (1995), focussing on emotional support, appraisal support, instrumental support & informative support, one item for each dimension. Item 1 measures emotional support, item 2 appraisal support and so forth. In total there were 8 items, 4 for the colleague variant and 4 for the supervisor variant. These items were also adapted, for example for colleague support: from 'If needed, my colleagues help me with a certain task' to 'If needed, my colleagues help me with a certain ICT task'. For supervisor support the same items were used but the word 'colleague' was replaced with 'supervisor'. Participants could answer with a Likert scale ranging from 1 (Never) to 5 (Often) (Appendix 5 & 6).

A reliability analysis was carried out on the adapted colleague social support scale.

Cronbach's alpha showed a decent reliability, α = .802. Most of the items were worthy of retention, excepting item no. 2 "My colleagues show that they appreciate the way I work with ICT". Removal of this item would increase alpha to α = .839 and is therefore worth considering. However, this would reduce the total number of items to three.

A reliability analysis was also carried out on the supervisor social support scale. Notably this scale had a higher Cronbach's alpha of α = .866 than its 'colleague' counterpart. Similarly to the previous scale the removal of the second items, in this case "My supervisor shows that he/she appreciates the way I work with ICT". Removal of this item would increase alpha to α = .894 and is therefore worth considering. However, this would also reduce the total number of items to three.

Cognitive Appraisal. Cognitive appraisal was assessed based on a self-developed method for measuring appraisal. Thereby a description of a situation is given based on one of the three job resources measured earlier. Per situation described, there were multiple questions assessing potential challenge and hindrance forms of appraisal, as based on Searle & Auton's scale (2015) and as adapted by P. Li, Taris and Peeters (submitted). Challenge and hindrance appraisals were measured with two separate four-item scales. For this thesis, each situation was described as working in an environment with (new) technology while also having the presence of one of the three aforementioned technological job resources. For example regarding colleague social support the researchers said: "Imagine the following situation: Dave says: '*While working with ICT, my colleagues pay attention to my feelings and problems. They not only appreciate the way I do my work with ICT, but they help me with certain tasks if required and also advise me on how to deal with certain issues when I work with ICT*.'" Following that participants were asked: "In general, I believe that having a job like Dave…" followed by the eight items measuring appraisal of challenge (e.g. "will help me learn a lot") and hindrance (e.g. "will restrict my capabilities"). Similarly, short stories were written for supervisor social support and autonomy. Per item participants were again asked to answer on Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree) (Appendix 8).

Statistical Analyses

First, assumptions regarding outliers, normality, linearity, multicollinearity, homoscedasticity and skewness were checked, bearing in mind the fact that most of the data was collected in a Likert-scale format. Next, Pearson correlation analyses was administered which looked at the correlations between the technological job resources, technological engagement, technological strain and the cognitive appraisal, thereby also comparing correlations between challenge and hindrance appraisals. This method of correlation analysis was chosen contrary to conventional wisdom advising the use of Spearman's rank correlation for Likert-scales as it has been proven to provide virtually identical results. In fact, in their research regarding the reliability analyses of likert-scales Norman (2010) states: "*The Pearson correlation (…) is extremely robust with respect to violation of assumptions*" (p.630). Furthermore, a paired t-test was administered to check that the means differed significantly between challenge and hindrance appraisals. A factor analysis was also performed to determine if the technostrain and techno engagement questionnaires could be considered to measure separate constructs. Finally regression analyses with interaction effects (Preacher, Rucker, & Hayes, 2007) were applied to test the moderation of cognitive appraisal on the relationship between technological job resources and technological engagement and technostrain. These consisted of hierarchical multiple regression analyses with centred variables. First, for each of the analyses the control variables tenure and hours with ICT were filled in. Second, techno engagement and technostrain had separate analyses comparing them with the job resources in order to determine which may be the greater predictors and to what extent. The three job resources were filled in based on their correlations to each of the two dependent variables. Third, techno engagement and technostrain were compared to the individual job resources and their challenge or hindrance (separate analysis for each) appraisals as well as the interaction between the resource and its respective appraisal. The interaction variables were computed by multiplying the resource and appraisal in SPSS. Variables were centred prior to analysis to ease interpretation.

RESULTS

Overall, the means in table 1 show that on average the participants experience techno engagement often (M = 4.02, SD = 1.27) whereas they are decidedly neutral on how much technostrain they experience (M = 2.90, SD = 0.92). Furthermore, regarding the job resources participants on average indicate only to experience each of the three 'sometimes'. Autonomy was experienced the most (M = 3.86, SD = .75) followed closely by colleague social support (M = 3.34, SD = 0.90) and supervisor social support (M = 3.02, SD = 1.12). When looking at the difference between challenge and hindrance appraisals it is safe to conclude that overall each of the resources separately is perceived more as a challenge than as a hindrance. This can be seen in the paired-sample t-test for colleague social support ($M_{challenge}$ = 5.31, SD = 0.96; $M_{hindrance}$ = 2.70, SD = 1.06; $T(100)$= 14.39, $p < .001$), supervisor social support ($M_{challenge}$ = 5.42, SD = 0.92; $M_{hindrance}$ = 2.51, SD = .97; $T(100)$= 17.85, $p < .001$) and autonomy ($M_{challenge}$ = 5.09, SD = 1,12; $M_{hindrance}$ = 2.81, SD = 1.29; $T(100)$= 10.90, $p < .001$). Sadly the factor analysis did not reveal a clear distinction in factors of the technostrain and techno engagement questionnaires. When eventually performing a two-factor factor analysis almost every item in both factors coded above the cut-off of .3.

Correlation Analyses. The results of the correlation analyses including Mean and Standard Deviation can be found in Table 1. The first three variables correlated only significantly with a few other variables: level of education had a slight positive relationship with both autonomy (.23, $p < .05$) and challenge appraisals of colleague support (.20, $p < 0.05$), as well a slight negative relationship with hindrance appraisals of supervisor support (-.24, $p < 0.05$). Notably tenure had very significant negative relationships with both colleague support (-.42, $p < .01$) and supervisor support (-.31, $p < .01$), suggesting a decrease in support from both potential parties as one's tenure increases. Finally hours working with ICT per day had a slight positive relationship with techno engagement (.22, $p < .05$).

Technological engagement correlated with many of the other variables (excluding only autonomy and the hindrance appraisals of both supervisor support and autonomy), negatively correlated at -.26, $p < .05$ for hindrance appraisals of colleague support and positively correlated ranging from .22, $p < .05$ for hours working with ICT per day to .40, $p < .01$ for colleague support. Aside from the aforementioned, technostrain is only further

significantly correlated with autonomy at -.28, $p < .01$ and therefore not significantly related to either challenge or hindrance appraisals, nor to any of the job resources. Of particular note is that techno engagement is correlated with technostrain at -.44, $p < .01$.

Both colleague support and supervisor support correlated similarly to other variables compared to each other, with the exception of challenge appraisals of autonomy, which only correlated slightly positively with supervisor support. They also correlated high in relation to each other at .69, $p < .01$, suggesting that those who experience higher support from colleagues are rather likely to experience support from supervisors. Potentially this could indicate the existence of a supportive work culture. Finally, all the challenge and hindrance appraisals correlate significantly with each other.

Hypotheses Testing

Relationship between job resources and Techno Engagement. It was hypothesised that the job resources colleague social support, supervisor social support and autonomy would be positively associated with techno engagement (Hypothesis 1a, 1b and 1c). According to the correlation analyses, both sources of social support were indeed significantly related to techno engagement, providing support for hypotheses 1a and 1b. Autonomy was not related to technostrain so hypothesis 1c was not supported. Next, the job resources were put in the hierarchical analysis via the enter method in that order based on their correlations with Techno Engagement. Table 2 shows that techno engagement was indeed positively related to colleague social support ($\beta = .33$, $p < .05$). This suggests that colleague social support is not only positively related but also predicts techno engagement. On the other hand, both supervisor social support ($\beta = .11$, $p = .40$) and autonomy ($\beta = .17$, $p = .06$) were not significantly related.

Table 1

Means, Standard Deviations, and Correlations among the Study Variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Education	1.00													
2. Duration in industry	.02	1.00												
3. Hours with ICT (day)	.04	-.09	1.00											
4. Techno Engagement	-.04	-.04	.22*	1.00										
5. Technostrain	-.16	-.13	.03	-.44**	1.00									
6. Colleague Sup.	-.05	-.42**	.08	.40**	-.09	1.00								
7. Supervisor Sup.	.04	-.31**	.02	.34**	-.16	.69**	1.00							
8. Autonomy	.23*	.25	-.04	.16	-.28**	-.03	.01	1.00						
9. Colleague Sup. CA	.20*	-.02	.10	.34**	-.17	.41**	.44**	.1	1.00					
10. Colleague Sup. HA	-.19	-.19	-.10	-.26*	.17	-.29**	-.31**	-.23*	-.62**	1.00				
11. Supervisor Sup. CA	.14	.03	-.03	.30**	.09	.37**	.34**	.13	.67**	-.43**	1.00			
12. Supervisor Sup. HA	-.24*	-.18	-.07	-.17	.17	-.20*	-.24*	-.23*	-.44**	.71**	-.51**	1.00		
13. Autonomy CA	.06	.19	.05	.25*	-.16	.19	.21*	.14	.36**	-.26*	.31**	-.20*	1.00	
14. Autonomy HA	-.11	-.19	-.08	-.16	.19	-.08	-.18	-.12	-.29**	.41**	-.24*	.54**	-.51**	1.00
M	5.10	7.65	5.75	4.02	2.90	3.34	3.02	3.86	5.31	2.70	5.42	2.51	5.09	2.81
SD	1.28	10.79	2.25	1.27	0.92	0.90	1.12	0.75	0.96	1.06	0.92	0.97	1.12	1.29

***.** Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2

Hierarchical Multiple Regressions for Techno Engagement, Technostrain, Techno Job Resources

Predictors	Techno Engagement		Technostrain	
	Beta	R-square	Beta	R-square
Colleague Social Support	.36**	.20***	.04	.12
Supervisor Social Support	.12	.20	-.17	.12
Autonomy	.15	.21	-.25*	.08**

* Correlation is significant at the 0.05 level

** Correlation is significant at the 0.01 level

*** Correlation is significant at the 0.001 level

Relationship between job resources and technostrain. Regarding the relationship of the job resources to Technostrain it was hypothesised that the job resources colleague social support, supervisor social support and autonomy would be negatively associated with technostrain (Hypothesis 2a, 2b and 2c). According to the correlation analyses, only autonomy was indeed significantly related to technostrain, providing support for hypotheses 2c. The sources of social support were not related to technostrain so hypothesis 2a and 2b were not supported. Next, in a hierarchical analysis the resources were in a reverse order compared to techno engagement, based on their correlations to technostrain. Table 2 shows that only autonomy is significantly negatively related to technostrain ($\beta = -.28$, $p < .01$) with supervisor social support trailing behind ($\beta = -.16$, $p = .22$) and colleague social support even being slightly positively related, though far from significant ($\beta = .02$, $p = .92$). Therefore autonomy may also predict decreased technostrain.

The following hypotheses focus on the interaction effects and possible moderations of challenge and/or hindrance appraisals on the relationship between the respective job resources on either techno engagement or technostrain.

Hypothesis 3a, 3b and 3c focus on the moderation effect of a *challenge* appraisal of each of the job resources on Techno Engagement. A challenge appraisal of colleague social support predicts techno engagement as expected ($\beta = .21$, $p < .05$). Follow-up simple slopes test showed that the positive effects of colleague social support were stronger when challenge appraisals were high ($b = .72$, $t = 3.98$, $p < .001$) than when the challenge

appraisals were low (*b* = .18, *t* = 1.07, *p* = .29). See Figure 1 for the plotted simple slope analysis.

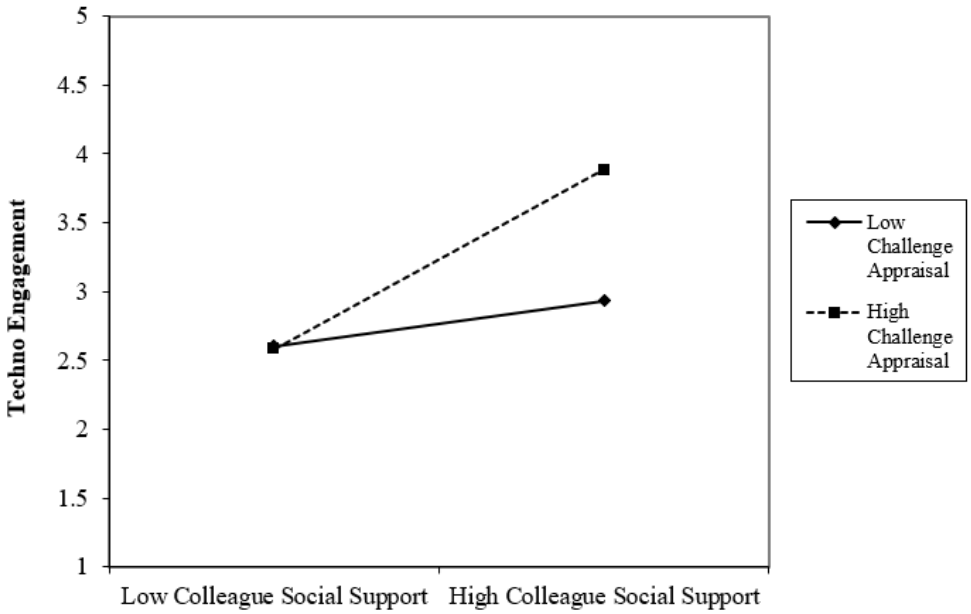

Figure 1 The interaction between Colleague Social Support and Challenge Appraisal on Techno Engagement

Neither the interaction effect of supervisor challenge appraisal nor the interaction of autonomy challenge appraisal significantly influence techno engagement (See Table 3). Therefore the perception of supervisor social support as a challenge does not moderate the relationship between techno engagement and supervisor social support. Neither does the perception of autonomy as a challenge moderate the relationship between techno engagement and autonomy. Therefore Hypothesis 3a is supported while 3b and 3c cannot be confirmed.

Hypothesis 4a, 4b and 4c focus on the moderation effect of a *challenge* appraisal of each of the job resources on technostrain. None of the interactions were significant (See Table 3). This means that while Hypothesis 4c is rejected, 4a and 4b cannot be confirmed.

Hypothesis 5a, 5b and 5c focus on the relationship of a *hindrance* appraisal of each of the job resources on techno engagement. Similar to the challenge appraisals with regard to technostrain none of the interactions were significant (See Table 3). Notably (while insignificant) the interactions of colleague social support and autonomy do not have a

weaker positive effect but in fact have a negative effect. In effect this means that Hypothesis 5a is rejected, yet 5b and 5c cannot be confirmed.

Hypothesis 6a, 6b and 6c focus on the relationship of a *hindrance* appraisal of each of the job resources on technostrain. As when related to techno engagement none of the interactions were significant (See Table 3). In this case all three of the job resources interaction have a stronger (albeit insignificant) positive effect. Since none of the values are significant, only hypothesis 6c can be confirmed.

Finally, the results show that the control variable of hours working with ICT always predicts Techno Engagement, in each analysis. The degree to which the variable predicts Techno Engagement ranges from $\beta = .18$ ($p < .05$) in the challenge appraisal analysis of Colleague Social Support to $\beta = .24$ ($p < .05$) in the challenge appraisal analysis of supervisor social support.

Table 3

Hierarchical Multiple Regression for Techno Engagement, Technostrain, Techno Job Resources, Challenge Appraisals & Hindrance Appraisals

	Model 1		Model 2		Model 3	
Predictors	Techno Engagement	Technostrain	Techno Engagement	Technostrain	Techno Engagement	Technostrain
	Beta *CA/HA*	Beta *CA/HA*	Beta *CA/HA*	Beta *CA/HA*	Beta *CA/HA*	Beta *CA/HA*
Tenure	-.02	-.12	.14	*-.17/-.15*	*.11/.13*	*-.16/-.15*
Hours with ICT	.22*	.02	.19*	.04	*.18*/.19**	.04
Colleague Social Support			*.38**/.42****	*-.11/-.13*	*.32**/.39***	*-.09/-.12*
Challenge Appraisals			.17	-.13	.13	-.13
Hindrance Appraisals			-.09	.11	-.11	.11
Colleague × CA					.21*	-.09
Colleague × HA					-.10	.03
R-Square	.05	.02	*.24***/.23****	.05	*.28*/.24*	*.06/.05*
Tenure	-.02	-.12	*.06/.07*	*-.19/-.16*	*.05/.08*	*-.18/-.15*
Hours with ICT	.22*	.02	*.23*/.22**	*.02/.03*	*.24*/.21**	*.00/.02*
Supervisor Social Support			*.28**/.34***	*-.21/-.18*	*.27*/.34***	*-.20/-.18*
Challenge Appraisals			.21*	-.01	.22*	-.02
Hindrance Appraisals			-.06	.10	-.06	.11
Supervisor × CA					.08	-.08
Supervisor × HA					.07	.13
R-Square	.05	.02	*.21***/.17***	*.06/.07*	*.21/.18*	*.06/.08*
Tenure	-.02	-.12	*-.11/-.09*	*-.04/.03*	*-.11/.10*	*-.03/-.02*
Hours with ICT	.22*	.02	.21*	.03	*.23*/.22**	*.02/.03*
Autonomy			*.17/.18*	-.25*	.15	*-.25*/-.24**

(Table continues overleaf)

Challenge Appraisals			.24*	-.13	.24*	-.13
Hindrance Appraisals			-.13	.15	-.12	.14
Autonomy × CA					.15	-.07
Autonomy × HA					-.14	.09
R-Square CA	.05	.02	*.14**/.10*	.10*	*.16/.12*	.10

Note: CA = Challenge Appraisal, HA = Hindrance Appraisal, Values in *Italics* differed per CA or HA analysis

*. Correlation is significant at the 0.05 level

**. Correlation is significant at the 0.01 level

***. Correlation is significant at the 0.001 level

DISCUSSION

The goals of this study included establishing if there is such a thing as techno engagement by means of comparison with another already established scale and a selection of job resources. Furthermore this study looked at the interaction effect of appraisals to establish the possible presence of a moderation effect between resources and techno engagement or technostrain. Overall, this study gave some promising preliminary results on what is starting to emerge as a new field of study in this modern and technology-oriented world. There were three main questions and 18 hypotheses. In total, five hypotheses were confirmed, two were rejected and eleven could not be conclusively rejected or confirmed.

The first question was: *Can techno engagement be measured reliably and how is it related to technostrain?*

The reliability analysis confirmed that the reliability is high for techno engagement (and technostrain), suggesting that the modification of the UWES-9 does not detrimentally affect the reliability of the scale. It is important to remember that due to the cross-sectional design of the study there was no opportunity to test for test-retest reliability. Both further testing for reliability and validity is merited. There was also a strongly significant negative correlation with between the two variables, though the correlation itself was not strong, but moderate. This shows that the two scales may be used more often in tandem when assessing how the individual experiences their working with technology as the two scales measure related but not mutually exclusive concepts. In other research, Schaufeli, Martinez, Pinto, Salanova, & Bakker (2002) performed a cross-national study comparing burnout and engagement where they also established a moderate negative correlation between the two scales. Similar results were also found in Schaufeli, Salanova, González-Romá, & Bakker's

work (2002). However, the factor analysis performed in this study did not give such clear results. While the techno engagement items did code negatively on the first factor compared to the technostrain items, all the items did still primarily code on the first factor together, as opposed to two separate factors. In sum, the evidence does not point to a clear picture regarding whether or not the techno engagement scale and technostrain questionnaire can be used in the same capacity as engagement and burnout.

The second question this study looked at was: *What is the relationship between technological resources and technological engagement and technostrain?*

As expected, the perception of both sources of social support (i.e. colleague and supervisor) were both significantly positively correlated to techno engagement (*Hypothesis 1a & 1b* is confirmed), whereas (the perception of) autonomy was only significantly negatively correlated to technostrain (*Hypothesis 2c* is confirmed). While this did show that each of the resources were relevant and an important part of this study, it was unexpected that each resource was only specifically relevant to one of the two scales. This is especially true when considering the results of the hierarchical multiple regression. From that it can be concluded that colleague social support most importantly plays a role in the prediction of techno engagement – further evidence of the importance of this variable in improving techno engagement. Similarly, autonomy was proven to predict a decrease in technostrain, thereby strengthening the argument to implement it in technostrain reduction techniques. The role of autonomy in relation to technostress is supported by Atanasoff & Venable's literature review (2017), who looked at technostress and its implications for the adult workforce based on many different studies. In it are different practical recommendations

and evaluations of different theories and scales related to technostress. The current study adds to this collection of evidence of the role of autonomy.

The final research question in this study was: *What is the role of cognitive appraisal (i.e. challenges and hindrances) in the relationship between technological resources, techno engagement and technostrain?*

To start, the challenge appraisals were positively correlated to each other, as were the different hindrance appraisals. Furthermore, all the challenge appraisals were correlated negatively to all the hindrance appraisals. All of which is to be expected. However, what is interesting is that the three resources themselves are not all significantly correlated to each other. In fact, autonomy is not even close to significantly correlated with supervisor and colleague social support.

Only a few of the conclusions that arose from this extensive part of the analysis were expected. First, that a high challenge appraisal of colleague social support moderates the positive relationship between colleague social support and techno engagement (*Hypothesis 3a* is confirmed). Ergo, if one is more likely to see the support gained from colleagues as contributing to their learning and improving their work then the effect of that support on techno engagement is even more positive than it would be otherwise. A hindrance appraisal of colleague social support, on the other hand, does not significantly influence techno engagement (*Hypothesis 5a* is rejected). This means that while colleague social support predicts techno engagement, seeing colleague social support as a detrimental to learning and work does not moderate or affect that relationship.

Surprisingly, the study did not find evidence for either a hindrance or a challenge appraisal of supervisor social support influencing the relationship between supervisor social

support and technostrain or techno engagement. This means that there is only a direct relationship between two variables, namely that supervisor social support directly predicts techno engagement.

Aside from that, the other expected finding is that seeing autonomy as a hindrance leads to the relationship between autonomy and technostrain becoming less negative (*Hypothesis 6c* is confirmed). This means that if one perceives autonomy as a hindrance it becomes less likely to predict a decrease in technostrain. In the case of this study, it even slightly (though insignificantly) predicts an increase in technostrain. However, the study did not find evidence for the expectation that a challenge appraisal of autonomy influences the relationship between autonomy and technostrain significantly (*Hypothesis 4c* is rejected). Therefore, although autonomy predicts technostrain, seeing autonomy as a challenge does not moderate that relationship.

Possibly this is the same for all the challenge and hindrance appraisals of the other resources, but since the remaining results of both the resources themselves and their respective appraisals are not significant no valid inferences can be made, save those made previously. Overall, it would seem that the cognitive appraisal of resources plays a valuable role in moderating the relationship between resources and technostrain/techno engagement. This is an element that must be kept in mind, especially in the field of Psychology, where individual difference is all the difference that is required.

Theoretical Implications

This study has several theoretical implications. First, it contributes to the job resources literature (e.g. the JDR-model, Demerouti et al., 2001; the DC-model, Karasek, 1998), technological strain literature (e.g. Salanova et al., 2013) and the Cognitive Appraisal

literature (e.g. TMSC, Lazarus, & Folkman, 1984; 1987) by researching the role of resources and the effect of their appraisals on technostrain. Furthermore it helped broaden the scope of research by bringing together the technological world with the already established UWES (Schaufeli et al., 2002). Previous research on technostress mostly focused on the effects of technostress on other factors (Ragu-Nathan, Tarafdar, Ragu-Nathan, & Tu, 2008; Atanasoff, & Venable, 2017) and technological or demands/resource causes of technostress (Ayyagari et al., 2011; Salanova et al., 2013). This study went a step further to look at the individual differences within resource appraisal and the effect on that same relationship and demonstrated that the perception of resources can moderate that relationship. Furthermore this study made an interesting advance into potentially creating a scale which can be used in tandem with technostrain, similar to engagement and burnout. While it could not be concluded definitively whether or not this is the case in this study, the results that argue for the inclusion merit additional research.

However, it is also a well-established fact that demands play a significant role in the work process, hence the names of the JDR- and DC-models. Additionally there is the established relevance of both demands and resources in concurrence with burnout and engagement (Demerouti et al., 2001; Schaufeli, & Bakker, 2004; Schaufeli, Bakker, & Van Rhenen, 2009). Considering that this study has now established the relevance of resources with regard to technostrain and techno engagement, it stands to reason that researching the (appraisal of) technological demands should be the next step.

Limitations and Recommendations

Regrettably there are also a few caveats, these limitations will now be discussed and additional future recommendations will be given based on those. First of all, a few minor

adjustments/limitations: the sample size and giving an answering option for ‘n.a.’. While adequate, a sample of 101 participants is not ideal. While as many as possible is always the aim, preferably there would be at least double those respondents in order to make more accurate generalisations and to strengthen the data gathered. For future research an improvement would include performing power analyses to estimate the needed sample size. Furthermore, in retrospect one simple element that the questionnaire was missing was the option for participants select ‘n.a.’ or ‘not applicable’ on select items. Specifically regarding the items focussed on supervisor and colleague social support this would have been a useful addition. The result now is that some participants either did not finish the questionnaire because it was not applicable or they simply filled it in incorrectly. For example, if someone works independently (therefore without colleagues or a supervisor) they may fill in ‘never’ for all the respective items. It is then impossible to know whether or not their data need be excluded or if they simply have unsupportive colleagues/supervisors. In all likelihood this was a small percentage of participants in the current study but it remains a valid concern.

The next limitations are linked with the nature of the study and the subject. As stated, this study deals with an unexplored topic and while the premise is based on research, the exploratory nature and broad scope come with downsides. First of all, it was decided that almost anyone could participate in this research, as long as they work and use some form of ICT in their work. This in itself can present a limitation as people have varying degrees and experiences of working with ICT, especially as ‘ICT’ is such a broad concept. Participants ranged from people who only used Word occasionally to full-time IT employees or data analysts who have a much greater and deeper exposure to various forms of IT, this can lead to a collection of results which paints an unclear picture. Verbal feedback from

participants included ‘What does my supervisor have to do with how I use Word?’ and ‘I’m in IT, how would I *not* have any autonomy to decide how I work with ICT?’. This study has laid the groundwork for the existence and reliability of techno engagement; in future research it is advisable to pick a more specific target group or topic in order to fully explore the depths of this concept without the potential of muddying results. Furthermore, all the scales used in the research - except the scale for technostrain - were adapted, albeit minimally. The adapted scales had not previously been tested for reliability and validity, therefore the implementation of these scales carries their own risk. Additionally this study had a cross-sectional design, so while regression may provide insight into the types of relationships, longitudinal inferences are not possible.

Another element which comes into play with cross-sectional studies is the risk of method variance. Method variance is a debated phenomenon where cross-sectional studies using (often) self-report measures of data gathering inherently gather higher correlated data compared to other forms of research (Lindell, & Whitney, 2001; Spector, 2006). Partially this can be due to such effects as social desirability in self-report methods. This is also possible for this study as it can be considered socially desirable to state that one’s colleagues or supervisor are socially supportive for instance. Other reasons include “transient mood states, response styles, acquiescence, illusory correlations, (…) similarity of semantic content, and proximity to the criterion variable” (Lindell, & Whitney, 2001, p.117). Regardless, there are some who say that simply doing a cross-sectional study with self-report questionnaires risk the presence of method variance (Lindell, & Whitney, 2001; Spector, 2006). Future research should therefore ideally avoid a cross-sectional design, or otherwise add a variable into their questionnaire which was previously determined to be

theoretically unrelated (Lindell, & Whitney, 2001). This is known as the MV-marker variable. Theoretically the correlation of the MV-marker variable to the other dependent and independent variables should be very low and/or not significant. If that is not the case then it is an indication of method variance.

Finally there are the limitations associated with the measuring of appraisal. This was done by writing vignettes describing situations where particular resources were abundantly present. An issue with this approach is that while certain resources can be helpful to job performance and learning, an *excess* of a resource may be detrimental. This premise holds with both social support resources (Deelstra et al., 2003) and autonomy (Wielenga-Meijer, Taris, Wigboldus, & Kompier, 2011). This can be explained by person-environment fit theory (Edwards, 1991), which states that if the resources of a person's environment do not match (fit) the person's standard, they will experience a misfit. This leads to a decrease in well-being and outcomes (van Vianen, 2018). Therefore participants may have perceived a situation as more of a hindrance than a challenge simply due to the excessive wording, skewing the results as a result. For example autonomy is generally seen as a desirable trait, however some people prefer to have some autonomy along with a guiding hand from their supervisor (e.g. supervisor social support). This point at the issue of curve linearity. In the introduction Shirom, Nirel, & Vinokur's study (2006) was mentioned which showed that Autonomy in interaction with role stress could in fact predict burnout. This interaction is an example of what a new employee could experience.

Practical Implications

Additionally the study also has practical implications. First of all the effect of colleague social support, supervisor social support and autonomy on technostrain and techno engagement

points to the development of prevention techniques of technostrain and techniques of furthering or improving techno engagement. Where others (e.g. Fieseler, Grubenmann, Meckel, & Müller, 2014) looked at the role of the supervisor in reducing technostress, this study complements that by adding the element of autonomy, suggesting that it is not simply the supervisor's task to reduce technostress but that letting employees have more control and say over their job will help. However, this only holds when autonomy is not seen as a hindrance, e.g. excessively present. Moreover, while not directly linked to technostrain, social support from both supervisors and colleagues will increase techno engagement, which at the very least is negatively correlated to technostrain, thereby meriting a mention as an alternative strategy for improving technological work life. This effect also holds in other alternative forms of engagement, for instance in education (Garcia-Reid, Reid, & Peterson, 2005; Wang, & Eccles, 2012). This study influence is especially true when colleague social support is seen as an element that contributes to learning and positive work outcomes.

CONCLUSION

In conclusion, this study was a tentative first step into a previously under-explored area of research within the field of Organisational Psychology. A limited sample size reduced the statistical strength of the analyses, nevertheless a number of results came to light that showed promise. Not only is the newly adapted Utrecht Techno Engagement Scale (UTES) a reliable measure, it is predicted as expected by colleague social support and supervisor social support and research shows it can be used in concurrence with the already-established questionnaire for measuring technostrain. That knowledge, along with the fact that autonomy can help to reduce the technostrain are useful aids for determining interventions to help workers who are dealing with (new) technologies. Sometimes it seems

like every day a new technological innovation comes to light that could completely change your life. If that is so, having the resources to be engaged in your new life could be very valuable indeed.

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Appendices

1. Informed Consent

Dear participant,

Thank you for participating in this study!

The current research focuses on your experience in working with ICT technologies . It aims to uncover how employees appraise support and autonomy in working with ICT.
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 and anonymity.

If you have any questions about the research, please contact me, the researcher, Jamie Hutchins at j.s.c.hutchins@uu.nl

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

2. Demographics

1. **How old are you?**

2. **What is your gender?**

- Male
- Female
- Other
- Prefer not to say

3. **What is your highest level of educational attainment?**

- Primary education
- Secondary education
- Vocational
- University of Applied Sciences
- University Bachelor Degree
- University Master Degree
- Postmaster Degree

4. **What best describes your current occupation?**

- Health & Welfare
- Trade & Service Industry
- ICT
- Justice, Safety & Public Administration
- Farming, Nature & Fishing
- Media & Communication
- Education, Culture & Science
- Technology, Production & Construction
- Tourism, Recreation & Catering Industry
- Transport & Logistics
- Other, namely

5. **How long have you been in this industry?**

   (Please use decimals, e.g.: 3 months is 0.25 years, 1 year and a half is 1.5)

6. **How many hours on average do you work with technology or ICT per day?**

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)

(Please use decimal)

3. Engagement

Work & Well-being Survey (UWES) ©

The following 9 statements are about how you feel when working with ICT. Please read each statement carefully and decide if you ever feel this way about your job. If you have never had this feeling, select the "0" (zero) in the space after the statement. If you have had this feeling, indicate how often you feel it by crossing the number (from 1 to 6) that **best describes** how frequently you feel that way.

	Almost never	Rarely	Sometimes	Often	Very often	Always
0	1	2	3	4	5	6
Never	A few times a year or less	Once a month or less	A few times a month	Once a week	A few times a week	Every day

1. While working with ICT, I feel bursting with energy
2. While using ICT at my job, I feel strong and vigorous
3. I am enthusiastic about ICT in my job
4. ICT in my job inspires me
5. When I get up in the morning, I feel like going to work with ICT
6. I feel happy when I am working intensely with ICT
7. I am proud of the work that I do with ICT
8. I am immersed in my work when I use ICT
9. I get carried away when I'm working with ICT

4. Technostress

The following 16 statements refer to how you feel when working with ICT. Please read each statement carefully and decide to what extent you feel this way about your job. Indicate on the scale from 1 to 7 to what extent you (dis)agree with the relevant statements.

Completely disagree	Disagree	Slightly disagree	Neutral	Slightly agree	Agree	Completely agree
1	2	3	4	5	6	7

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

5. Colleague Social Support

The following 4 statements are about how much support you feel you receive from your colleagues while working with ICT.

Please read each statement carefully and decide how often you experience each situation.

Never	Seldom	Sometimes	Regularly	Often
1	2	3	4	5

1. My colleagues pay attention to my feelings and problems with ICT work (*)
2. My colleagues show that they appreciate the way I work with ICT (*)
3. If needed, my colleagues help me with a certain ICT task (*)
4. If needed, my colleagues give me advice on how to handle things when I work with ICT (*)

6. Supervisor Social Support

The following 4 statements are about how much support you feel you receive from your supervisor while working with ICT.

Please read each statement carefully and decide how often you experience each situation.

Never	Seldom	Sometimes	Regularly	Often
1	2	3	4	5

1. My supervisor pays attention to my feelings and problems with ICT work (*)
2. My supervisor shows that they appreciate the way I work with ICT (*)
3. If needed, my supervisor helps me with a certain ICT task (*)
4. If needed, my supervisor gives me advice on how to handle things when I work with ICT (*)

7. Autonomy

The following 10 statements are about how much autonomy you feel you have when working with ICT. Please read each statement carefully and decide how often you experience each situation.

Never	Seldom	Sometimes	Regularly	Often
1	2	3	4	5

Autonomy (Jackson)

1. Can you decide yourself on the order in which you do things when you work with ICT?
2. Can you decide yourself when to start a piece of work when you work with ICT?
3. Can you decide yourself when to finish a piece of work when you work with ICT?
4. Can you set your own pace of work when you work with ICT?
5. Can you control how much you produce when you work with ICT?
6. Can you vary how you do your work when you work with ICT?
7. Can you plan your own work when you work with ICT?
8. Can you control the quality of what you produce when you work with ICT?
9. Can you decide how to go about getting your job done when you work with ICT?
10. Can you choose the methods to use in carrying out your work when you work with ICT?

8. Appraisal

1	2	3	4	5	6	7
Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree

Appraisal of Social Support Colleagues.

Imagine the following situation

Dave says: “While working with ICT, my colleagues pay attention to my feelings and problems. They not only appreciate the way I do my work with ICT, but they help me with certain tasks if required and also advise me on how to deal with certain issues when I work with ICT.”

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

1. will help me learn a lot
2. will make the experience educational
3. will show me I can do something new
4. will keep me focused on doing well
5. will hinder any achievements I might have
6. will restrict my capabilities
7. will limit how well I can do
8. will prevent me from mastering difficult aspects of the work

Appraisal of Social Support Supervisor.

Imagine the following situation.

Tess says: “While working with ICT, my supervisor pays attention to my feelings and problems. My supervisor not only appreciates the way I do my work with ICT, but also helps me with certain tasks if required and advises me on how to deal with certain issues when I work with ICT.”

In general, I believe that having a job like Tess..

1. will help me learn a lot
2. will make the experience educational
3. will show me I can do something new
4. will keep me focused on doing well
5. will hinder any achievements I might have
6. will restrict my capabilities
7. will limit how well I can do
8. will prevent me from mastering difficult aspects of the work

Appraisal of Autonomy.

Imagine the following situation.

Neal says: “While working with ICT, I have the freedom to decide when to start, when to finish and in what order to do a piece of work. I am allowed to plan my own work, vary how to do my work and control the quality of what I produce.”

In general, I believe that having a job like Neal..

1. will help me learn a lot
2. will make the experience educational
3. will show me I can do something new
4. will keep me focused on doing well
5. will hinder any achievements I might have
6. will restrict my capabilities
7. will limit how well I can do
8. will prevent me from mastering difficult aspects of the work