TECHNOSTRESS AND WORK WELLNESS

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REMARKS

The reader is reminded of the following:

The references, as well as the editorial style as prescribed by the Publication Manual (*4th edition*) of the American Psychological Association (APA) were followed in this mini-dissertation. This practice is in line with the policy of the Programme in Industrial Psychology at the North-West University.

This mini-dissertation is submitted in the form of one research article.

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SUMMARY

Title: Technostress and Work Wellness.

Key words: Technostress, job insecurity, burnout, work engagement, work wellness

Technology in businesses is advancing at a fast and furious pace, and is leaving a trail of technostress at every level of the organisation. Due to fast-growing technology, computer professionals, as well as computer users face a great demand for continuous learning in order to secure and sustain their jobs. If this and other technological demands are not met, employees can feel inadequate and/or insecure with regard to their jobs, which in turn can leave them "technostressed". Major consequences of technostress have been proved to be job insecurity and burnout, as well as a decrease in work engagement. Computer professionals, as well as computer users (N = 229) in the Vaal Triangle were targeted for this research. A cross-sectional survey design was used to reach the research objectives. Six standardised questionnaires were used in the empirical study, namely the Computer Anxiety Rating Scale (CARS), the Computer Thoughts Survey (CTS), the General Attitudes Towards Computer Scale (GATCS), the Job Insecurity Questionnaire (JIQ), the Maslach Burnout Inventory – General Survey (MBI – GS) and the Utrecht Work Engagement Scale (UWES). The results showed that technostress (computer thoughts) was related to increased levels of exhaustion and cynicism and decreased levels of professional efficacy and work engagement. Positive computer thoughts were found to be inversely related to cognitive and affective job insecurity. Job insecurity partially mediated the relationships between technostress (computer thoughts) and burnout, as well as technostress (computer thoughts) and work engagement. Conclusions were made, limitations of the current research were discussed and recommendations for future research were put forward.

OPSOMMING

Titel: Tegnospanning en Werk Welstand

Sleutelwoorde: Tegnospanning, werksonsekerheid, uitbranding, werksbegeestering, werk welstand

Tegnologie in besighede ontwikkel teen 'n vinnige en skrikwekkende pas, en laat 'n spoor van tegnospanning op elke vlak van die organisasie. As gevolg van die vinnig-groeiende tegnologie, word rekenaarkundiges en gereelde rekenaar gebruikers gekonfronteer met 'n vereiste om aanhoudend te leer om sodoende hulle werk te verseker en te behou. Indien daar nie aan hierdie en ander tegnologiese vereistes voldoen word nie, kan werknemers voel dat hulle nie goed genoeg is nie en/of onseker begin voel oor hulle vaardighede, wat dan kan lei tot tegnospanning. Van die groot gevolge van tegnospanning is bewys om werksonsekerheid en uitbranding, asook 'n daling in werk welstand te wees. Rekenaarkundiges asook gereelde rekenaar gebruikers (N = 229) in die Vaaldriehoek was as teikengroep gebruik vir hierdie navorsing. 'n Dwarssneeopname-ontwerp is gebruik om die doelstellings in hierdie studie te bereik. Ses gestandardiseerde vraelyste is in hierdie empiriese studie gebruik, naamlik die Rekenaar-angsskaal (CARS), die Rekenaar Denke-skaal (CTS), Werksonsekerheidsvraelys (JIQ), die Algemene Houdings Teenoor Rekenaars-skaal (GATCS), Maslach Uitbrandingsvraelys (MBI – GS) en die Utrecht Werksbegeesteringskaal (UWES). Die resultate het 'n verwantskap getoon tussen tegnospanning (rekenaar denke) en verhoogde vlakke van uitputting en sinisisme (uitbranding) asook dalende vlakke van professionele doeltreffendheid en werksbegeestering. Daar is bevind dat positiewe rekenaar gedagtes omgekeerd verband hou met kognitiewe en affektiewe werksonsekerheid. Werksonsekerheid het die verband tussen kognitiewe tegnospanning en uitbranding, sowel as werksbegeestering gedeeltelik gemedieer. Gevolgtrekkings was gemaak, beperkinge van die huidige navorsing was uiteengesit en aanbevelings vir toekomstige navorsing is aan die hand gedoen.

CHAPTER 1

INTRODUCTION

This mini-dissertation relates to technostress, job insecurity, burnout and work engagement of computer professionals, as well as computer users.

In this chapter, the problem statement is discussed, and an outline is provided of the research objectives, research method and chapter division.

1.1 PROBLEM STATEMENT

Not many years ago, technology was a novelty, but today it is an integral part of our daily lives and we cannot seem to function without it. According to Clark and Kalin (1996) it provides organisations with the ability to distribute information much faster than ever before. It also provides the capacity for employees to do more tasks, or to handle several things at once. Information technology promises enhanced performance and productivity, as well as a better quality of life. The success of numerous companies depends on technology (Toppinen & Kalmino, 1996).

As wonderful as technology may seem, Weil and Rosen (1997) reported a negative side to it. It takes time and patience to acquire the knowledge and skills necessary to use these devices properly and at maximum efficiency. According to Toppinen and Kalmino (1996) the challenges and pressures of information technology, affects the well-being of computer users. Due to fast-growing technology, computer professionals as well as other employees, (who work with computers on a daily basis) face a great demand for continuous learning in order to secure and sustain their jobs. A lot of time and energy is needed to stay abreast with the latest and greatest technology (Zielinski, 2004) and if this and other technological demands are not met, employees can feel inadequate and/or insecure with regard to their jobs, which in turn can leave them "technostressed".

The term technostress was coined by the clinical psychologist Craig Brod in 1980 (Zielinski, 2004). He defined it as a modern disease of adaptation caused by the inability to cope with new computer technologies in a healthy manner. Technostress is composed of three separate,

but overlapping dimensions: (a) feelings of anxiety (b) negative attitudes and (c) negative cognitions (Weil & Rosen, 1997). One of the major consequences of technostress has been proved to be job insecurity (Rodgers, 2004).

Mauno and Kinnunen (1999) describe job insecurity as the threat of losing one's job. The threat can be real, as in the case of retrenchments/downsizing or organisational restructuring, or it could be a perceived threat, caused by feelings of uncertainty and inadequacy.

Job insecurity can be conceptualised from three points of view (Mauno & Kinnunen, 1999), i.e. as (a) a global or (b) multidimensional concept, and as (c) a job stressor. The global view of job insecurity has mainly been adopted in the context of organisational change, in which job insecurity is considered the first phase in the process of job loss (Joelson & Wahlquist, 1987). Mauno and Kinnunen (1999) further state that researchers who have adopted the multi-dimensional definition of job insecurity argue that job insecurity, in addition to the threat of actual job loss, refer to the continuity of certain dimensions of the job, such as opportunity for promotion. Regardless of whether job insecurity is operationalised from either a global or a multidimensional point of view, it has generally been considered as a type of job stressor (Barling & Kelloway, 1996). In this research, job insecurity is viewed from a global perspective (i.e. fear of job loss) and as consisting of an affective and cognitive dimension (Borg & Elizur, 1992). Affective job insecurity relates to the fear of job loss, whereas cognitive job insecurity refers to an individual's perception of the likelihood of job loss.

Research conducted by Probst (2002) revealed numerous negative consequences of job insecurity, at individual as well as organisational level, leading to increased organisational withdrawal, increased reported health conditions, increased psychological distress and lowered organisational commitment. De Witte (1999) states that the prolonged exposure to job insecurity can lead to a wearing out of the resources of the individual worker. He adds to the list an increased level of mental, emotional and physical exhaustion, which is referred to as burnout.

Burnout is viewed as a physical syndrome that develops in response to chronic interpersonal stressors on the job (Maslach, et al., 2001). According to literature (Cordes & Dougherty, 1993) Maslach and her colleagues define burnout from their three-component

conceptualisation: as a syndrome of (a) emotional exhaustion, (b) depersonalisation and (c) reduced personal accomplishment. Emotional exhaustion is characterised by a lack of energy and a feeling that one's emotional resources are used up. Depersonalisation is marked by the treatment of clients as objects. Workers may display a detached and emotional callousness, and they may act cynically towards co-workers, clients and the organisation. Reduced (or diminished) personal accomplishment is characterised by a tendency to evaluate oneself negatively. When job insecurity is the result of technostress, job burnout is a problem that originates because of employees who try to reach unrealistic goals in fear of losing their jobs (Gehmeyr, 1993).

In a study done by Toppinen and Kalimo (1996) computer professionals reported more burnout as compared to people with limited or no computer-related experience, although they experienced less technostress, according to Weil and Rosen (1997). They do not like it when a problem arises and do experience stress, but only to a certain extent because they believe an answer will be available and find it a challenge to master. Yet, professionals who are more qualified experience less stress when there is a problem with or on the computer (Weil & Rosen, 1997), but when there is a demand to learn more within a specific time frame and the person's job is on the line, both technostress and job insecurity levels increase, which in turn can lead to burnout. Technostress drastically increases from age 35 onwards. It was ascribed to the fact that learning capacity decreases as age increases (Tu, Wang & Shu, 2005) and that older employees often form rigid ways of thinking and are more used to conventional work settings and procedures (Weil & Rosen, 1997).

In addition to finding a statistically significant positive relationship between job insecurity and burnout, Bosman (2005) found that increased levels of job insecurity was associated with decreased levels of work engagement (as displayed in decreased vigour, dedication and absorption).

Work engagement is defined as a positive, fulfilling, work-related state of mind that is characterised by (a) vigour, (b) dedication and (c) absorption. (Schaufeli, Salanova, Gonzalez-Roma & Bakker, 2002). Vigour is characterised by high levels of energy and mental resilience while working, as well as a willingness to exert effort and to persist even through difficult times. Dedication is characterised as a sense of significance in one's work, feeling enthusiastic, inspired and proud, and by viewing it as a challenge. Absorption is

characterised by being totally and happily immersed in one's work and having difficulty detaching oneself from it. Time passes quickly and one forgets everything else that is around oneself. Csikszentmihalyi (1990) states that work engagement (especially absorption) comes close to a term that is known as "flow". It is an optimal state of experience where focussed attention, a clear mind, unison of body and mind, effortless concentration, complete control, loss of self-consciousness, distortion of time and intrinsic enjoyment are experienced.

Work engagement provides a complex and thorough perspective on an individual's relationship with work, focusing on the work itself (Maslach, et al., 2001). Based on Maslach and Leiter's view, Rothmann (2003) describes work engagement as being characterised by energy, involvement and efficacy, which are considered to be the direct opposites of the three burnout dimensions, namely exhaustion, cynicism and lack of professional efficacy, respectively. Schaufeli, et al. (2002) consider burnout and engagement to be opposite, yet related concepts that should be measured independently with different instruments.

Work wellness, in this research, is conceptualised as consisting of job insecurity, burnout, and work engagement. From the above literature review, it is perceived that technostress may lead to job insecurity, which in turn may lead to increased levels of burnout and decreased levels of work engagement. Research has however also shown a direct path from technostress to burnout and work engagement, hence only a partially mediating effect of job insecurity is expected on the relationship between job insecurity and burnout, and job insecurity and work engagement.

On the basis of the above-mentioned problem statement, the following research questions can be formulated:

- How are technostress, job insecurity, burnout and work engagement, and the relationship between these constructs conceptualised in literature?
- What are the relationships between technostress, job insecurity, burnout and work engagement of computer professionals, as well as computer users?
- Does job insecurity partially mediate the relationship between technostress, burnout and work engagement of computer professionals, as well as computer users?

- Do technostress levels differ according to demographic characteristics such as age, qualification and industry of computer professionals, as well as computer users?

This study will contribute to Industrial Psychology as a science in the following ways:

- Knowledge will exist regarding the relationship between technostress, job insecurity, burnout and work engagement.
- Knowledge will exist so as to whether technostress levels vary according to demographic aspects such as age, qualification and industry.

1.2 RESEARCH OBJECTIVES

1.2.1 General objectives

With reference to the above formulation of the problem, the general objective of this research is to determine the relationship between technostress, job insecurity, burnout and work engagement of computer professionals, as well as computer users.

1.2.2 Specific objectives

The specific objectives are:

- To conceptualise technostress, job insecurity, burnout and work engagement and the relationship between these constructs in literature;
- To determine the relationship between technostress, job insecurity, burnout and work engagement of computer professionals, as well as computer users;
- To determine whether job insecurity partially mediates the relationship between technostress, burnout and work engagement of computer professionals, as well as computer users.
- To determine whether technostress levels differ according to demographic characteristics such as age, qualification and industry of computer professionals, as well as computer users.

1.3 RESEARCH METHOD

The research method for this article, which is submitted for the purpose of this mini-dissertation, consists of a literature review and an empirical study.

1.3.1 Literature review

In the literature review, the focus is on previous research that has been done on technostress, job insecurity, burnout, and work engagement. The following databases will be consulted:

- Psychlit
- Internet
- Reportorium of South African Journals
- Library Catalogues

1.3.2 Empirical study

a. Research design

A cross-sectional survey design will be used to reach the research objectives. Use will also be made of a correlation design (Huysamen, 1993). This design can be used to assess interrelationships among variables at one point in time, without any planned intervention. This design is ideally suited to the descriptive and predictive functions associated with correctional research, and is also less time consuming (Shaughnessy & Zechmeister, 1997).

b. Participants

Computer professionals in the Information Technology industry and frequent computer users from various companies in the Vaal Triangle will be used as respondents for this study. A sample of 230 respondents will be targeted.

c. Measuring battery

Six standardised measuring instruments will be used in this empirical study:

- The Computer Anxiety Rating Scale (CAR) (Form C) (Weil, Sears & Rosen, 1998)
- The Computer Thoughts Survey (CT) (Form C) (Weil, Sears & Rosen, 1998)

- The General Attitudes towards Computer Scale (GATC) (Form C) (Weil, Sears & Rosen, 1998)
- The Job Insecurity Questionnaire (JIQ) (De Witte, 2000)
- The Maslach Burnout Inventory – General Survey (MBI-GS) (Maslach, Leiter & Jackson, 1996)
- The Utrecht Work Engagement Scale (UWES) (Schaufeli, et al., 2002)

The *Computer Anxiety Rating Scale (CARS) (Form C)* (Weil, Sears & Rosen, 1998) will be used as a measure for computer anxiety. 20 items (statements) were created to reflect a variety of features of technological anxiety, including anxiety about machines themselves, their role in society, computer programming, computer use, consumer uses of technology, problems with computers and technology and technology in the media. An example of a statement is: "Getting 'error messages' from a computer". Each statement is rated on a five-point scale indicating how anxious or nervous the item expressed in the statement makes the person feel, with 1 being "not at all", 2 "a little", 3 "a fair amount", 4 "much" and 5 "very much".

The *General Attitudes towards Computer Scale (GATC)* (Form C) (Weil, Sears & Rosen, 1998) will be used to measure the employees' attitudes toward technology. This 20-item questionnaire is arranged along a five-point Likert format with 1 being "strongly agree", 2 "agree", 3 "neutral", 4 "disagree" and 5 "strongly disagree". An example of one of the statements is: "Computers can ruin interpersonal relationships".

The *Computer Thoughts Survey (CTS) (Form C)* (Weil, Sears & Rosen, 1998) will be used to measure the employees' cognitions and feelings about their abilities with regard to technology. Each of the 20 items (statements) in this questionnaire was rated on a five-point scale, reflecting how often the person had each specific thought when working with technology or when thinking about working with technology. An example of a statement is: "What if I hit the wrong button?". The scale ranges from 1, being "Not at all" to 5 being "Very much".

The *Job Insecurity Questionnaire (JIQ)* (De Witte, 2000) will be used as a measure of job insecurity. The 11 items summarise both the cognitive and affective dimensions of job

insecurity and are arranged along a 5-point scale, with 1 being "strongly agree" and 5 representing strong disagreement. An example of a cognitive statement is: "I think I might be dismissed in the near future" and an affective statement: "It makes me anxious that I might become unemployed". The items of the JIQ, measuring global job insecurity are reported to have a Cronbach alpha coefficient of 0,92 and both scales (cognitive and affective) have been shown to be highly reliable, with the six items measuring cognitive job insecurity, displaying a Cronbach alpha coefficient of 0,90; and items of the affective job insecurity having a Cronbach alpha coefficient of 0,85 (De Witte, 2000). According to De Witte (2000) the content of these two scales do not overlap, but nevertheless have a high underlying correlation ($r=0,76$; $p<0,0001$). Laba (2004) obtained an alpha coefficient of 0,92 for the total JIQ. Bosman (2005) obtained an alpha coefficient of 0,72 for the affective job insecurity scale and 0,70 for the cognitive subscale.

The *Maslach Burnout Inventory – General Survey (MBI-GS)* (Maslach, Leiter & Jackson, 1996) will be used as a measure of burnout. This 16-item questionnaire is arranged along a seven-point frequency rating scale, varying from 0 being "never" to 6 being "daily". This measure of job burnout has three scales, namely exhaustion (5 items), cynicism (5 items), and professional efficacy (6 items). For exhaustion, an example of a statement is: "I feel emotionally drained because of my work", cynicism: "I have become less interested in my work since I started this job" and professional efficacy: "I can effectively solve the problems that arise in my work". The three subscales provide a three-dimensional perspective on burnout. High scores on exhaustion and cynicism and a low score on the professional efficacy dimension are indicative of job burnout. According to Schaufeli, Bakker, Hoogduin, Schaap and Kladler (2001) internal consistencies are usually well above the 0,70 Cronbach alpha level with the exception of the depersonalisation scale in some samples. Schaufeli, Leiter, Maslach and Jackson (1996) found Cronbach alpha coefficients varying between 0,87 and 0,89 for exhaustion; 0,73 and 0,84 for cynicism; and 0,76 and 0,84 for professional efficacy and test-retest reliabilities were 0,65 for exhaustion, 0,60 for cynicism and 0,67 for professional efficacy. Storm (2002) obtained a Cronbach alpha coefficient of 0,88 for the exhaustion component, 0,79 for the cynicism component and 0,78 for the professional efficacy component.

The *Utrecht Work Engagement Scale (UWES)* (Schaufeli, et al., 2002) will be utilised as a measure of work engagement. This 17-item questionnaire is arranged along a 7-point

frequency scale, ranging from 0 "never" to 6 being "daily". This measure of work engagement has three scales, namely vigour (6 items), dedication (5 items) and absorption (6 items). The statement examples for each subscale are as follows: for vigour "I am bursting with energy at work", dedication "I find my work full of meaning and purpose" and absorption "Time flies when I am working". High levels of vigour, dedication and absorption point to an individual who experiences a high level of work engagement. Regarding internal consistency, Cronbach alpha coefficients have been determined between 0,86 and 0,91 (Schaufeli et al., 2002).

d. Statistical analyses

The statistical analyses will be carried out with the SPSS programme (SPSS Inc, 2003). Confirmatory factor analyses and Cronbach's alpha coefficients will be determined to assess the validity and reliability of the various measuring instruments. A simple principal component analysis will be conducted on the constructs, which form part of the measurement model. The eigenvalues and scree plot will then be studied in order to determine the number of factors involved. Means, standard deviations, skewness and kurtosis will be determined to describe the data. Pearson product-moment correlation coefficients were used to specify the relationships between variables. The level of statistical significance is set at $p < 0,01$. Steyn (2002) criticises the sole uses of statistical significance testing and recommends that effect sizes be established to determine the importance of a statistically significant relationship. While the reporting of effect sizes is encouraged by the American Psychological Association (APA) in their Publication Manual (APA, 1994), most of these measures are seldom found in published reports (Kirk, 1996; Steyn, 2002). Therefore, effect sizes will be computed to assess the practical significance of relationships in this study. A cut-off point of 0,30, which represents a medium effect (Cohen, 1988; Steyn, 2002), is set for the practical significance of correlation coefficients. A multiple-regression analysis will be done to determine whether technostress holds predictive value with regard to job insecurity, burnout and work engagement, as well as to determine whether job insecurity partially mediates the relationships between job insecurity and burnout, and job insecurity and work engagement.

e. Research Procedure

A letter explaining the purpose of the research will be attached to the questionnaire. A consent form will also be attached in order to gain the researched person's permission to be

tested. The questionnaires will be handed out to computer professionals and other computer users during their lunch hour. The specific dates and times will be arranged for.

1.4 CHAPTER DIVISION

Chapter 1: Introduction, problem statement and objectives.

Chapter 2: Article: *Technostress and work wellness.*

Chapter 3: Conclusions, limitations and recommendations.

1.5 CHAPTER SUMMARY

Chapter 1 provided a discussion of the problem statement and research objectives. An explanation was provided of the measuring instruments and research method, followed by a brief overview of the chapters to follow.

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CHAPTER 2

RESEACRH ARTICLE

TECHNOSTRESS AND WORK WELLNESS

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ABSTRACT

The objective of this study was to investigate the relationship between technostress, job insecurity, burnout and work engagement of computer professionals, as well as computer users (N = 229) in the Vaal Triangle. A cross-sectional survey design was used. The Computer Anxiety Rating Scale, General Attitudes Toward Computers Scale, Computer Thoughts Survey, Job Insecurity Questionnaire, Maslach Burnout Inventory – General Survey and Utrecht Work Engagement Scale were used as measuring instruments. The results showed that technostress (computer thoughts) was related to increased levels of exhaustion and cynicism and decreased levels of professional efficacy and work engagement. Positive computer thoughts were found to be inversely related to cognitive and affective job insecurity. Job insecurity partially mediated the relationships between technostress (computer thoughts) and burnout, as well as technostress (computer thoughts) and work engagement.

OPSOMMING

Die doelstellings van hierdie studie was om die verband tussen tegnospanning, werksonsekerheid, uitbranding en werksbegeestering van rekenaar kundiges en gereelde rekenaar gebruikers (N = 229) in die Vaaldriehoek te ondersoek. 'n Dwarssneeopname-ontwerp is gebruik. Die Rekenaar-angsskaal, Algemene houding teenoor rekenaars-skaal, Rekenaar denke-skaal, Werksonsekerheidsvraelys, Maslach Uitbrandingsvraelys en die Utrecht Werksbegeesteringskaal is as meetinstrumente gebruik. Die resultate het 'n verwantskap getoon tussen tegnospanning (rekenaar denke) en verhoogde vlakke van uitputting en sinisisme (uitbranding) asook afnemende vlakke van professionele doeltreffendheid en werksbegeestering. Daar is bevind dat positiewe rekenaar gedagtes omgekeerd verband hou met kognitiewe en affektiewe werkonsekerheid. Werksonsekerheid het die verband tussen kognitiewe tegnospanning en uitbranding, sowel as werksbegeestering gedeeltelik gemedieer.

The technological advances achieved in the past few decades have brought about a revolution in the business world, affecting nearly all aspects of the working life (Sowell, 1995). People can reach each other throughout the world in a matter of seconds. Employees no longer need to physically interact with their clients and co-workers; instead they can communicate effectively at home, at a distant office, across the world, and even in their car or on an airplane. Years ago it was a novelty, but today technology plays an integral part in human lives, and people cannot seem to function without it (Weil & Rosen, 1997).

Technology has the capacity to enhance lives, but according to Hess (2004) it can also instil fear in the hearts of people who are normally cool-headed and quick to respond competently to traditional work. Although computers were devised to make the work life easier and to provide entertainment, Weil and Rosen (1997) state that many people are terrified of the very technology on which they have become so dependent.

According to Harper (2000) technology has become a serious issue for both users and Information Technology professionals due to the potential effect on its users. Technology may do wonders *for* people, but it is also doing something *to* people, says Weil and Rosen (1997). Robert Lee, a social psychologist at IBM (one of the world's leading computer companies) conducted a study and found that the public had two independent beliefs: computers are useful tools of mankind; and computers will eventually control society and take over the world (Weil & Rosen, 1997). Tu, Wang and Shu (2005) add that people feel that computers are dehumanising society, invading privacy, and taking away much-needed jobs.

In 1946 the first digital computer was invented and in 1969 the first electronic link was established between widely-dispersed university computer networks and that is how the Internet was born. In 1975 the first personal computer (PC) saw the light and in 1985 computerised appliances and entertainment centres began appearing in homes. In 1990 laptops, cellular phones, the Internet, CD-ROMs, video conferencing and more electronic advancements appeared (Weil & Rosen, 1997). It was during this time that people started to react negatively towards technology (Hess, 2004). The fear of computers was quickly given a name: "computerphobia" (Weil & Rosen, 1997). Timothy Jay first coined the term in 1981, but little was known about what caused it, who suffered from it, and what could be done to

overcome it. As other products became commonplace, the term computerphobia evolved into what is now known as technostress (Hess, 2004).

The term technostress was coined in 1984 by Dr. Craig Brod, a clinical psychologist. He defined it as a modern disease of adaptation caused by the inability to cope with new computer technologies (Kupersmith, 1992). Weil and Rosen (1997) do not see technostress as a disease, however. These researchers describe technostress as any negative impact on attitudes, thoughts, behaviours, or body physiology that is caused either directly or indirectly by technology and more specifically computers.

Computer-related technostress has been found to affect Chinese and American employee productivity, often costing companies in terms of lost productivity and employee turnover (Tu, Wang & Shu, 2005; Weil & Rosen, 1997). A study in China reported that technostress increased drastically from age 35 onwards. It was ascribed to the fact that learning capacity decreases as age increases (Tu, Wang & Shu, 2005) and that older employees often form rigid ways of thinking and are more used to conventional work settings and procedures (Weil & Rosen, 1997). However, the rapidly-changing technology demands that older employees continuously learn new skills, even though they have more mental resistance than younger colleagues (Tu, Wang & Shu, 2005).

According to Weil and Rosen (1997), the mass and rapid pace of modern technology tend to alienate people from one another, increase daily stress levels, and leave many feeling dependent, inadequate and incompetent. Feelings of frustration, disappointment and uncertainty are experienced, even among people who are the so-called experts of computer technology. Weil and Rosen (1997) divided people into three groups regarding their reaction towards technology: eager adopters; hesitants and resisters. Eager adopters love technology and usually experience a lot of flow while working with it. In all the studies of Weil and Rosen (1997) they came out as the minority group. The hesitants, which make up the majority group, use technology but hesitate to experiment with it and must be convinced that they need to buy it. The resisters avoid technology and in Weil and Rosen's (1997) research they were slightly less representative than the majority group.

According to Kupersmith (1992), the primary symptom of those who are ambivalent, reluctant, or fearful of computers, is anxiety. This anxiety is expressed in many ways:

irritability, headaches, nightmares, resistance to learning about the computer, or outright rejection of the technology.

Technostress (also known as technophobia and computer anxiety) manifests itself in two distinct but related ways: the struggle to accept computer technology; and the more specialised form of over-identification with computer technology (Tu, Wang & Shu, 2005).

Technostress may be environmental in origin: poor ergonomics at computer workstations, for example, may leave staff feeling drained. Employees may also struggle to cope with the skills demanded by new technology (Kupersmith, 1992). According to Harper (2000) there are three central components or causes of technostress. These include role and information overload, mainly describing that the demands of the job feel too great or complicated for one person to handle; role insufficiency or performance anxiety where there is a lack of training or experience to accomplish the job; and role conflict where the employee mainly experiences that the computer has taken over the job and he/she is not sure what to do.

Technostress is prevalent at all levels and for most there is no way to escape from it (Weil & Rosen, 1997). Harper (2000) recorded physical forms of technostress, which include eyestrain, headaches and back pain. He states that the heavy use of computers, in particular, may also result in muscular dysfunctions and strain injuries such as carpal tunnel syndrome with symptoms including pain, tingling and numbness in the hands, wrists and arms.

Psychological forms of technostress – which may have physical consequences – are rather more complex in nature and may be more difficult to identify and treat. These include job insecurity and job burnout (Harper, 2000). Work wellness, in this research, is conceptualised as consisting of job insecurity, burnout, and work engagement.

Job insecurity can be described as the threat of losing one's job. The threat can be real, as in the case of retrenchments/downsizing or organisational restructuring, or it could be a perceived threat, caused by feelings of uncertainty and inadequacy (Mauno & Kinnunen, 1999). Sverke, et al. (2004) describe job insecurity as a perceptual phenomenon, which reflects the employee's fear of involuntary job loss, representing the individual's perception of the employment situation as more insecure than desired.

According to Van Vuuren (1990), job insecurity is a subjective experience or perception, as each employee may perceive the same situation differently. It implies uncertainty regarding the future and doubts the continuation of the job as such. From a versatile perspective, job insecurity is viewed as encompassing aspects such as the perceived threat to various job features, as well as the individual's ability to counteract these threats (De Witte, 1999).

Job insecurity can be conceptualised from three points of view (Mauno & Kinnunen, 1999), i.e. as (a) a global or (b) multi-dimensional concept, and as (c) a job stressor. The global view of job insecurity has mainly been adopted in the context of organisational change, in which job insecurity is considered the first phase in the process of job loss (Joelson & Wahlquist, 1987). Mauno and Kinnunen (1999) further state that researchers who have adopted the multi-dimensional definition of job insecurity argue that job insecurity refers furthermore to the continuity of certain dimensions of the job, such as opportunity for promotion or the possibility of being laid off. Regardless of whether job insecurity is operationalised from either a global or a multi-dimensional point of view, it has generally been considered as a type of job stressor (Barling & Kelloway, 1996). In this research, job insecurity is viewed from a global perspective (i.e. fear of job loss because of technological changes that lead to change in the workplace) and as consisting of an affective and cognitive dimension (Borg & Elizur, 1992). Affective job insecurity relates to the fear of job loss, whereas cognitive job insecurity refers to an individual's perception of the likelihood of job loss.

According to Harper (2000), job insecurity may be compounded by jealousy among co-workers when levels of technological competency differ. Over a prolonged period, this may lead to loss of motivation and team spirit. More specifically, it may also lead to an erosion of trust among staff, as more "technologically aware" employees become reluctant to share their skills and knowledge, in the paranoid belief that by so doing they are making themselves more indispensable than technical novices. Research conducted by Probst (2002) revealed numerous, negative consequences of job insecurity, at individual as well as organisational level, such as increased organisational withdrawal, increased reported health conditions, increased psychological distress and lowered organisational commitment.

Employees in China reported that if they cannot keep up with the fast-changing technologies, they would be likely to lose their jobs (Tu, Wang & Shu, 2005). The effort-reward model, as

discussed by Bakker, Killmer, Siergriest and Schaufeli (2000), provides a theoretical approach toward explaining the adverse health effects produced by a lack of reciprocity at work. According to this model, a lack of reciprocity between costs and gains defines a state of emotional distress with a particular proclivity to automatic arousal and associated strain reactions. Bakker *et al.* (2000) note that this holds especially true if poor rewards are experienced in terms of poor job stability, forced occupational change, downward mobility, or lack of promotion prospects (low occupational control). From this point of view perceived job insecurity can thus be expected to produce a lack of reciprocity leading to emotional distress, such as job burnout and a reduction in work engagement. De Witte (1999) adds that the prolonged exposure to job insecurity can lead to a wearing out of the resources of the individual worker. He adds to the list an increased level of mental, emotional and physical exhaustion, which is referred to as burnout.

In 1974 Herbert Freudenberger (an American psychoanalyst) was the first to attach psychological meaning to the term burnout (Vanheule, 2001). Based upon his own experience and upon clinical practice, he considered burnout as a chronic condition caused by exhaustion, resulting from over-commitment. He defined job burnout as a state of fatigue or frustration brought about by devotion to cause, way of life, or relationship that failed to produce the expected reward. According to Freudenberger (Visconti, 2004), an excess of stress causes job burnout. To him it is the result of a gradual process and can be considered as the pathological continuation of job stress. The end result is a lack of enthusiasm, or a lack of drive and finally giving up or resignation.

The individuals Freudenberger considered to be prone to job burnout are "personal strivers and achievers", who don't admit their limitations, and who tend to set impossible tasks for themselves (Vanheule, 2001). Denial in order to be able to persist in current habits is a major characteristic of the problem. It is expressed in rigidity, inflexibility and over-involvement in the job. The underlying desire seems to be for a person to prove himself/herself in relation to others. Burnout is a problem born out of good intentions, because it happens when people try to reach unrealistic goals and end up depleting their energy and losing touch with themselves and others. The irony of job burnout is that it happens to the same person who previously was enthusiastic and brimming over with energy and new ideas about a new job or situation.

According to Maslach, Schaufeli and Leiter (2001), burnout is a prolonged response to chronic emotional and interpersonal stressors on the job, and is defined by three dimensions of exhaustion, cynicism, and inefficacy. Maslach and her colleagues define job burnout from their three-component conceptualisation: as a syndrome of (a) emotional exhaustion, (b) depersonalisation and (c) reduced personal accomplishment (Cordes & Dougherty, 1993). Emotional exhaustion is characterised by a lack of energy and a feeling that one's emotional resources are used up. Depersonalisation is marked by the treatment of clients as objects. Workers may display a detached and an emotional callousness, and they may act cynical towards co-workers, clients and the organisation. Reduced (or diminished) personal accomplishment is characterised by a tendency to evaluate oneself negatively. When technostress is the result of job insecurity, job burnout is a problem that originates because of employees who try to reach unrealistic goals in fear of losing their jobs (Gehmeyr, 1993). In a study done by Toppinen and Kalimo (1996) computer professionals reported more job burnout as compared to people with limited or no computer-related experience.

Hatfield and Gray (2004) adapted Freudenberger and Maslach's definition of job burnout and define it as a debilitating psychological condition brought about by *unrelieved* work stress, resulting in depleted energy and emotional exhaustion, lower resistance to illness, increased depersonalisation in interpersonal relationships, increased dissatisfaction and pessimism, as well as increased absenteeism and work inefficiency. Neils (2003) lists the signs of burnout as chronic fatigue, anger outbursts, self-criticism, a sense of being besieged, frequent headaches, gastrointestinal disturbances, sudden weight loss or gain, sleeplessness, depression, shortness of breath, feelings of helplessness, cynicism, negativity and irritability.

In an attempt to find a statistically significant positive relationship between job insecurity and burnout, it was found that increased levels of job insecurity are associated with decreased levels of work engagement (as displayed in decreased vigour, dedication and absorption) (Bosman, 2005).

Work engagement is defined as an energetic state in which the employee is dedicated to excellent performance at work and is confident of his or her effectiveness (Schutte, Toppinen, Kalimo & Schaufeli, (2000). According to Schaufeli, Salanova, Gonzalez-Roma, and Bakker (2002) work engagement is defined as a positive, fulfilling, work-related state of mind that is characterised by (a) vigour, (b) dedication and (c) absorption. Vigour is characterised by

high levels of energy and mental resilience while working, as well as a willingness to exert effort and to persist even through difficult times. Dedication is characterised as being a sense of significance in one's work, feeling enthusiastic, inspired and proud, and by viewing it as a challenge. Absorption is characterised by being totally and happily immersed in one's work and having difficulties detaching oneself from it. Time passes quickly and one forgets everything else that is around. Csikszentmihalyi (1990) states that engagement (especially absorption) is comparable to a term known as "flow", which is an optimal state of experience where focussed attention, a clear mind, unison of body and mind, effortless concentration, complete control, loss of self-consciousness, distortion of time and intrinsic enjoyment are experienced.

A variable may be considered a mediator to the extent to which it carries the influence of a given independent variable to a given dependent variable (Preacher & Leonardelli, 2005). In other words mediation implies that an independent variable causes a mediator, which causes a dependent variable (See Figure 1).

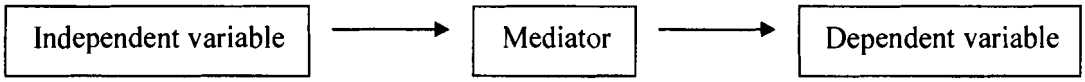

Figure 1. Mediating effect

According to Harper (2000) technostress can lead to burnout. Weil and Rosen (1997) proved that there is also a relationship between technostress and engagement. Yet technostress can lead to job insecurity (Harper, 2000) and there is also a relationship between job insecurity and burnout (Bakker, et al., 2000) as well as between job insecurity and engagement (Bosman, 2005). Therefore it is expected that job insecurity will partially mediate the relationship between technostress and burnout, as well as between technostress and work engagement (See Figure 2).

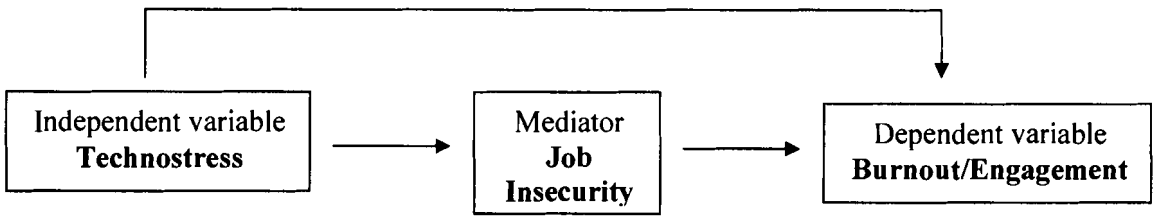

Figure 2. Partially mediating effect

The following hypotheses are proposed:

H1: Technostress is associated with increased levels of burnout and holds predictive value with regard to burnout.

H2: Technostress is associated with decreased levels of work engagement and holds predictive value with regard to work engagement.

H3: Job insecurity partially mediates the relationship between technostress and burnout.

H4: Job insecurity partially mediates the relationship between technostress and work engagement.

H5: Technostress levels differ according to demographic characteristics such as age, qualification and industry.

METHOD

Research approach

A cross-sectional survey design was used in this research. Information collected is used to describe the population at that time. This design is ideally suited to the descriptive and predictive functions associated with correctional research, and is also less time consuming (Shaughnessy & Zechmeister, 1997).

Participants

A sample of 230 computer professionals in the Information Technology industry as well as frequent computer users from various companies in the Vaal Triangle were targeted in this research. A response rate of 229 participants was obtained. The biographical characteristics of the study population are detailed in Table 1.

Table 1

Characteristics of the Participants (N = 229)

Item	Category	Frequency	Percentage
Cultural group	Black (1)	46	20,1
	White (2)	173	75,5
	Other (3)	10	4,4
	Missing Values	0	0
	Total	229	100
Gender	Male (1)	86	37,6
	Female (2)	143	62,4
	Missing Values	0	0
	Total	229	100
Age	18 – 24 years (1)	29	12,7
	25 – 34 years (2)	56	24,5
	35 – 44 years (3)	49	21,4
	45 – 54 years (4)	34	14,8
	55 – 60 years (5)	4	1,7
	Total	172	75,1
	Missing values	57	24,9
	Total	229	100
Qualification	Matric (1)	96	41,9
	Diploma (2)	72	31,4
	Degree (3)	34	14,8
	Post-graduate Degree (4)	27	11,8
	Missing Values	0	0
	Total	229	100
Computer-user at work	Yes (1)	229	100
	No (2)	0	0
	Missing Values	0	0
	Total	100	100
IT industry	Yes (1)	50	21,8
	No (2)	179	78,2

	Missing Values	0	0
	Total	229	100
Tenure	1 – 5 years (1)	90	39,3
	6 – 10 years (2)	48	21,0
	11 - 15 years (3)	21	9,2
	16 – 20 years (4)	31	19,9
	21 – 25 years (5)	19	13,5
	26 – 30 years (6)	7	8,3
	Total	216	94,3
	Missing values	13	5,7
	Total	229	100

The sample consisted mainly of white (75,5%) participants, the majority being female (62,4%). All of the participants use computers at work (100%), but only a minority of them work in the IT industry (21,8%). The highest level of education for the majority of participants is matric (41,9%), although a large number have obtained a diploma (31,4%) as well. Most participants range in the age groups 25 – 34 (24,5%) and 35 – 44 (21,4%) and have been working between 1 – 5 years in their current position (39,3).

Measuring Instruments

The *Computer Anxiety Rating Scale (CARS) (Form C)* (Weil, Sears & Rosen, 1998) is used as a measure for computer anxiety. 20 items (statements) were created to reflect a variety of features of technological anxiety, including anxiety about machines themselves, their role in society, computer programming, computer use, consumer uses of technology, problems with computers and technology and technology in the media. An example of a statement is: "Getting 'error messages' from a computer". Each statement is rated on a five-point scale indicating how anxious or nervous the item expressed in the statement makes the person feel, with 1 being "not at all", 2 "a little", 3 "a fair amount", 4 "much" and 5 "very much".

The *General Attitudes towards Computer Scale (GATC) (Form C)* (Weil, Sears & Rosen, 1998) is used to measure the employees' attitudes toward technology. This 20-item questionnaire is arranged along a five-point Likert format with 1 being "strongly agree", 2

"agree", 3 "neutral", 4 "disagree" and 5 "strongly disagree". An example of an item from this scale is: "Computers can ruin interpersonal relationships".

The *Computer Thoughts Survey (CTS) (Form C)* (Weil, Sears & Rosen, 1998) is used to measure the employees' cognitions and feelings about their abilities with regard to technology. Each of the 20 items (statements) in this questionnaire was rated on a five-point scale, reflecting how often the person had each specific thought when working with technology or when thinking about working with technology. An example of a statement is: "What if I hit the wrong button?". The scale ranges from 1, being "Not at all" to 5 being "Very much".

The *Job insecurity Questionnaire (JIQ)* (De Witte, 2000) is used as a measure of job insecurity. The 11 items summarise both the cognitive and affective dimensions of job insecurity and are arranged along a 5-point scale, with one being "strongly agree" and 5 representing strong disagreement. An example of a cognitive statement is: "I think I might be dismissed in the near future" and an affective statement: "It makes me anxious that I might become unemployed". The items of the JIQ, measuring global job insecurity are reported to have a Cronbach alpha coefficient of 0,92 and both scales (cognitive and affective) have been shown to be highly reliable, with the six items measuring cognitive job insecurity, displaying a Cronbach alpha coefficient of 0,90; and items of the affective job insecurity having a Cronbach alpha coefficient of 0,85 (De Witte, 2000). According to De Witte (2000) the contents of these two scales do not overlap, but nevertheless have a high underlying correlation ($r=0,76$; $p<0,0001$). Laba (2004) obtained an alpha coefficient of 0,92 for the JIQ. Bosman (2005) obtained an alpha coefficient of 0,72 for the affective job insecurity scale and 0,70 for the cognitive subscale.

The *Maslach Burnout Inventory – General Survey (MBI-GS)* (Maslach, Leiter & Jackson, 1996) is used as a measure of burnout. This 16-item questionnaire is arranged along a 7-point frequency rating scale, varying from 0 being "never" to 6 being "daily". This measure of job burnout has three scales, namely exhaustion (5 items), cynicism (5 items), and professional efficacy (6 items). For exhaustion an example of a statement is: "I feel emotionally drained because of my work", cynicism: "I have become less interested in my work since I started this job" and professional efficacy: "I can effectively solve the problems that arise in my work". The three subscales provide a three-dimensional perspective on

burnout. High scores on exhaustion and cynicism and a low score on the professional efficacy dimension are indicative of job burnout. According to Schaufeli, Bakker, Hoogduin, Schaap and Kladler (2001) internal consistencies are usually well above the 0,70 Cronbach alpha level, with the exception of the depersonalisation scale in some samples. Schaufeli, Leiter, Maslach and Jackson (1996) found Cronbach alpha coefficients varying between 0,87 and 0,89 for exhaustion; 0,73 and 0,84 for cynicism; and 0,76 and 0,84 for professional efficacy and test-retest reliabilities were 0,65 for exhaustion, 0,60 for cynicism and 0,67 for professional efficacy. Storm (2002) obtained a Cronbach alpha coefficient of 0,88 for the exhaustion component, 0,79 for the cynicism component and 0,78 for the professional efficacy component.

The *Utrecht Work Engagement Scale (UWES)* (Schaufeli, Salanova, Gonzales-Roma & Bakker, 2002) is used as a measure of work engagement. This 17-item questionnaire is arranged along a 7-point frequency scale, ranging from 0 "never" to 6 being "daily". This measure of work engagement has three scales, namely vigour (6 items) dedication (5 items), and absorption (6 items). The statement examples for each subscale are as follows: for vigour "I am bursting with energy at work", dedication "I find my work full of meaning and purpose" and absorption "Time flies when I am working". High levels of vigour, dedication and absorption point to an individual who experiences a high level of work engagement. Regarding internal consistency, Cronbach alpha coefficients have been determined between 0,86 and 0,91 (Schaufeli et al., 2002).

Analyses of data

The statistical analysis was carried out with the SPSS programme (SPSS Inc, 2003). Descriptive statistics were used to analyse the data. Confirmatory factor analyses and Cronbach's alpha coefficients were determined to assess the validity and reliability of the various measuring instruments. A simple principal component analysis was conducted on the constructs, which forms part of the measurement model. The eigenvalues and scree plot were then studied in order to determine the number of factors involved. Means, standard deviations, skewness and kurtosis were determined to describe the data. Pearson product-moment correlation coefficients were used to specify the relationships between variables. Multiple regression analyses were conducted to determine whether technostress holds predictive value with regard to job insecurity, burnout and work engagement, as well as to determine whether job insecurity partially mediates the

relationships between technostress and burnout, as well as between technostress and work engagement. The significance of differences in technostress levels between demographic groups was established by means of MANOVA.

RESULTS

Interpretation

Descriptive statistics, Cronbach alpha coefficients and the inter-item correlation coefficients of the CARS, GATCS, JIQ, MBI-GS and UWES of computer professionals, as well as computer users (N=229) are reported in Table 2.

Table 2

Descriptive statistics of the CARS, GATCS, JIQ, MBI-GS and UWES

Test and subscales	*Mean*	*SD*	Skewness	Kurtosis	Inter-item *r*	Cronbach alpha α
Computer anxiety	1,98	0,74	0,76	-0,30	0,37	0,92
Attitudes towards computers	3,30	0,35	1,20	7,04	0,05	0,50
Thoughts about computers	3,60	0,46	-0,46	-0,35	0,16	0,80
Cognitive job insecurity	2,30	0,79	0,34	-0.17	0,50	0,86
Affective job insecurity	2,62	0,86	0,24	-0,22	0,53	0,85
Job insecurity: Total	2,45	0,76	0,30	-0,27	0,47	0,91
Burnout: Exhaustion	2,50	1,50	0,29	-0,70	0,50	0,84
Burnout: Cynicism	2,51	1,16	0,25	0,01	0,43	0,79
Burnout: Professional Efficacy	4,44	1,17	-0,55	0,88	0,37	0,74
Burnout: Total	3,21	0,75	-0,20	0,82	0,13	0,70
Engagement: Total	4,16	1,20	-0,87	0,85	0,49	0,94

A simple principal components analysis was done to verify the construct validity of the components of the total Technostress Questionnaires. Three factors emerged, which together explained 32,94% of the total variance, with commonalities ranging between 0,53 – 0,78. As indicated by Table 2, acceptable Cronbach alpha coefficients were obtained for the Computer

Anxiety Rating subscale (CARS) and for the Computer Thoughts (CTS). The Cronbach alpha coefficient obtained for the subscale General Attitudes Toward Computers subscale (GATCS)was found to fall well below the 0,70 cut-off point. For this reason, this subscale was not included in any subsequent analyses. The mean inter-item correlation coefficient (r) of the CARS and CTS subscales was found to be acceptable, but the mean inter-item correlation coefficient of the subscale GATCS was found to be slightly low. All scores appear to be normally distributed, with the exception of the CATCS, which presented with a kurtosis well above 1, but with an acceptable level of skewness.

A factor analysis was done to verify the construct validity of the components of the JIQ. Two factors emerged, which together explained 63,30% of the total variance, with commonalities ranging between 0,43 – 0,75. As indicated by Table 2, acceptable Cronbach alpha coefficients were obtained from the total JIQ, as well as its subscales. The mean inter-item correlation coefficient (r) of total JIQ, as well as its subscales were found to be acceptable, although the mean inter-item correlation coefficient of affective job insecurity was found to be slightly high, although still acceptable. All scores appear to be normally distributed.

A factor analysis was done to verify the construct validity of the components of the MBI-GS. Three factors emerged, which together explained 59,73% of the total variance, with commonalities ranging between 0,26 – 0,74. As indicated by Table 2, acceptable Cronbach alpha coefficients were obtained from the total MBI-GS, as well as its subscales. The mean inter-item correlation coefficient (r) of the MBI-GS subscales was found to be acceptable, although the mean inter-item correlation coefficient of the total MBI-GS was found to be slightly low, yet still acceptable.

A factor analysis was done to verify the construct validity of the components of the UWES. One factor emerged, which explained 53,38% of the total variance, with commonalities ranging between the total UWES. The mean inter-item correlation coefficient (r) of total UWES was found to be acceptable. Scores on the UWES appear to be normally distributed.

Next the relationship between technostress, job insecurity, burnout, and work engagement is reported.

Table 3

Correlations

	1	2	3	4	5	6	7	8	9
1. Computer Anxiety	-								
2. Computer Thoughts	-0,22*	-							
3. Job Insecurity: Total	0,02	-0,40*†	-						
4. Cognitive Job Insecurity	0,07	-0,41*†	0,93*††	-					
5. Affective Job Insecurity	-0,03	-0,34*†	0,92*††	0,71*††	-				
6. Burnout: Exhaustion	-0,03	-0,32*†	0,42*†	0,34*†	0,45*†	-			
7. Burnout: Cynicism	-0,04	-0,29*	0,36*†	0,30*†	0,38*†	0,60*††	-		
8. Burnout: Professional Efficacy	-0,08	0,50*††	-0,36*†	-0,37*†	-0,28*	-0,28*†	-0,22*	-	
9. Engagement: Total	-0,17*	0,51*††	-0,42*†	-0,40*†	-0,38*†	-0,50*††	-0,36*†	0,53*††	-

* Statistically significant $p \leq 0,01$

† Correlations is practically significant $r \geq 0,30$ (medium effect)

†† Correlations is practically significant $r \geq 0,50$ (large effect)

For interpretation purposes, it must be noted that higher scores on the technostress subscales indicate lower levels of technostress and *vice versa*. As indicated by Table 3, a practically-significant negative correlation of medium effect was obtained between computer thoughts and job insecurity (total job insecurity, as well as the cognitive and affective subscales). This suggests that more positive computer thoughts are associated with lower levels of cognitive and affective job insecurity and more negative computer thoughts are associated with higher levels of affective and cognitive job insecurity. These findings support the opinions of Harper (2000), as well as Weil and Rosen (1997) who note that a psychological form of technostress may include job insecurity.

A practically significant negative correlation of medium effect was found between computer thoughts and exhaustion and cynicism (marginally below the medium effect cut-off point) subscales of the MBI-GS, implying that positive computer thoughts are associated with lower levels of exhaustion and cynicism and negative computer thoughts are associated with higher levels of exhaustion and cynicism. Furthermore, a practically significant correlation of large effect was found between computer thoughts and professional efficacy, suggesting that higher levels of positive computer thoughts are associated with higher levels of professional efficacy and that negative computer thoughts are associated with lower levels of professional efficacy.

No correlations were found between computer anxiety and job insecurity, burnout or work engagement.

Next, a series of multiple regression analyses were performed to test whether technostress (as measured by the Computer Thoughts Survey) predicted burnout and work engagement and to test whether job insecurity partially mediates the relationship between technostress and the dependent variables. Baron and Kenny (1986) recommend three steps in order to test for mediation. According to these authors, beta coefficients of different regression equations must be compared. Firstly, the mediator should be predicted by the independent variable. Secondly, the dependent variable should be predicted by the independent variable and the mediator and lastly, the dependent variable should be regressed on the independent variable, controlling for the mediator. If all steps prove significant, perfect mediation holds when, controlling for the mediator, the independent variable does not predict the dependent variable.

The possible partially mediating role of job insecurity in the relationship between technostress and burnout (exhaustion) was tested (Refer to Table 4). Firstly, regression analysis with job insecurity as dependent variable and technostress as independent variable (not shown in Table 4) showed statistically significant F-values ($F = 44{,}32$, $p < 0{,}0001$). These results lend support to the first criterion set by Baron and Kenny (1986). Secondly, a regression analysis with technostress as independent variable and burnout (exhaustion) as dependent variable resulted in a statistically significant F-value ($F = 25{,}73$, $p < 0{,}0001$). Regression analysis with burnout (exhaustion) as dependent variable and job insecurity as predictor, also showed statistically significant results ($F = 48{,}71$, $p < 0{,}0001$). These results provide support for the second criterion of Baron and Kenny (1986) and lastly, in order to test adherence to the third criterion, burnout (exhaustion) was regressed on technostress, controlling for the influence of job insecurity, the results of which are provided in Table 4.

Table 4

Regression Analysis – Technostress and Job Insecurity: Burnout (Exhaustion).

ANALYSIS OF VARIANCE					
Model 1: Technostress					
R: 0,32	Source of variation		*df*	Sum of	Mean
R^2: 0,10				squares	Square
Adjusted R^2: 0,10	Regression		1	51,60	51,59
Standard Error: 1,42	Residual		227	455,26	2,00
	$F = 25,73$ $p = 0,000$				
Model 2: Technostress and job insecurity					
R: 0,45	Source of variation		*df*	Sum of	Mean
R^2: 0,20				squares	Square
Adjusted R^2: 0,20	Regression		2	103,03	51,52
Standard Error: 1,34	Residual		226	403,82	1,79
	$F = 28,83$ $p = 0,000$				
	VARIABLES IN THE EQUATION				
INDEPENDENT VARIABLES	B	SEB	Beta	*t*	*p*
Technostress	-1,03	0,20	-0,32	-5,07	0,000*
Technostress	-0,57	0,21	-0,18	-2,75	0,007*
Job insecurity	0,68	0,13	0,35	5,37	0,000*

* Statistically significant difference: $p < 0,05$

From Table 4 it is evident that the regression coefficient of technostress remains statistically significant upon inclusion of job insecurity and the standardised regression coefficient (beta) of technostress increased when controlling for job insecurity. Based upon Baron and Kenny's (1986) third criterion, which states that perfect mediation would be applicable when the independent variable does not predict the dependent variable when controlling for the mediator, perfect mediation does not apply in this case. However, given the increase in the standardised regression coefficient (beta) of techno-stress upon the inclusion of job insecurity, it appear as though proof does exist for a partially mediating effect of job insecurity on the relationship between technostress and burnout (exhaustion). Technostress predicted 10% of the variance in burnout (exhaustion), which increased to 20% when combined with job insecurity. Employees, who experience technostress, tend to experience higher levels of burnout (exhaustion), but they also experience higher levels of job insecurity, which further contributes to an increase in burnout (exhaustion).

Next, the possible mediating role of job insecurity in the relationship between techno-stress and burnout (cynicism) was tested (Refer to Table 5). Firstly, regression analysis with job insecurity as dependent variable and techno-stress as independent variable (not shown in Table 5) showed statistically significant F-values ($F = 44,32$, $p < 0,0001$). These results lend support to the first criterion set by Baron and Kenny (1986). Secondly, a regression analysis with techno-stress as independent variable and burnout (cynicism) as dependent variable resulted in a statistically significant F-value ($F = 20,51$, $p < 0,0001$). Regression analysis with burnout (cynicism) as dependent variable and job insecurity as predictor, also showed statistically significant results ($F = 34,43$, $p < 0,0001$). These results provide support for the second criterion of Baron and Kenny (1986) and lastly, in order to test adherence to the third criterion, burnout (cynicism) was regressed on techno-stress, controlling for the influence of job insecurity, the results of which are provided in Table 5.

Table 5

Regression Analysis – Technostress and Job Insecurity: Burnout (Cynicism).

ANALYSIS OF VARIANCE					
Model 1: Techno-stress					
R: 0,29	Source of variation		*df*	Sum of	Mean
R^2: 0,08				squares	Square
Adjusted R^2: 0,08	Regression		1	25,26	25,26
Standard Error: 1,12	Residual		227	279,60	1,23
	$F = 20,51$ $p = 0,000$				
Model 2: Techno-stress and job insecurity					
R: 0,39	Source of variation		*df*	Sum of	Mean
R^2: 0,16				squares	Square
Adjusted R^2: 0,15	Regression		2	47,41	23,70
Standard Error: 1,07	Residual		226	257,45	1,14
	$F = 20,81$ $p = 0,000$				
	VARIABLES IN THE EQUATION				
INDEPENDENT VARIABLES	B	SEB	Beta	*t*	*P*
Technostress	-0,72	0,16	-0,29	-4,53	0,000*
Technostress	-0,42	0,17	-0,17	-2,53	0,012*
Job insecurity	0,45	0,10	0,30	4,41	0,000*

* Statistically significant difference: $p < 0,05$

It is evident from Table 5 that the regression coefficient of technostress remains statistically significant upon inclusion of job insecurity and the standardised regression coefficient (beta) of technostress increased when controlling for job insecurity. Perfect mediation does not apply in this case, based upon Baron and Kenny's (1986) third criterion, which states that perfect mediation would be applicable when the independent variable does not predict the dependent variable when controlling for the mediator. However, given the decrease in the standardised regression coefficient (beta) of technostress upon the inclusion of job insecurity, it appear as though proof does exist for a partially mediating effect of job insecurity on the relationship between technostress and burnout (cynicism). Technostress predicted 8% of the variance in burnout (cynicism), which increased to 15% when combined with job insecurity. Employees, who experience technostress, tend to experience higher levels of burnout (cynicism), but they also experience higher levels of job insecurity, which also contribute to an increase in burnout (cynicism).

Next the possible mediating role of job insecurity in the relationship between technostress and burnout (Professional efficacy) was tested (Refer to Table 6). Firstly, regression analyses with job insecurity as dependent variable and techno-stress as independent variable (not shown in Table 6) showed statistically significant F-values ($F = 44{,}32$, $p < 0{,}0001$). These results lend support to the first criterion set by Baron and Kenny (1986). Secondly, a regression analysis with techno-stress as independent variable and burnout (professional efficacy) as dependent variable resulted in a statistically significant F-value ($F = 74{,}90$, $p < 0{,}0001$). Regression analyses with burnout (professional efficacy) as dependent variable and job insecurity as predictor, also showed statistically significant results ($F = 32{,}86$, $p < 0{,}0001$). These results provide support for the second criterion of Baron and Kenny (1986) and lastly, in order to test adherence to the third criterion, burnout (professional efficacy) was regressed on technostress, controlling for the influence of job insecurity, the results of which are provided in Table 6.

Table 6

*Regression Analysis – Technostress and Job Insecurity: Burnout (*Professional *Efficacy).*

ANALYSIS OF VARIANCE					
Model 1: Techno-stress					
R: 0,50	Source of variation		*df*	Sum of squares	Mean Square
R^2: 0,25					
Adjusted R^2: 0,25	Regression		1	77,54	77,54
Standard Error: 1,02	Residual		227	243,98	1,04
	$F = 74,90$ $p = 0,000$				
Model 2: Techno-stress and job insecurity					
R: 0,53	Source of variation		*df*	Sum of squares	Mean Square
R^2: 0,28					
Adjusted R^2: 0,27	Regression		2	86,43	43,22
Standard Error: 1,00	Residual		226	226,09	1,00
	$F = 43,20$ $p = 0,000$				
	VARIABLES IN THE EQUATION				
INDEPENDENT VARIABLES	B	SEB	Beta	*t*	*p*
Technostress	1,26	0,15	0,50	8,66	0,000*
Technostress	1,07	0,16	0,42	6,85	0,000*
Job insecurity	-0,29	0,10	-0,18	-2,98	0,003*

* Statistically significant difference: $p < 0,05$

From Table 6 it is evident that although the regression coefficient of technostress remains statistically significant upon inclusion of job insecurity, the standardised regression coefficient (beta) of techno-stress decreased when controlling for job insecurity. Perfect mediation does not apply in this case, because according to Baron and Kenny's (1986) third criterion, perfect mediation would be applicable when the independent variable does not predict the dependent variable when controlling for the mediator. However, given the reduction in the standardised regression coefficient (beta) of technostress upon the inclusion of job insecurity, it appear as though proof does exist for a partially mediating effect of job insecurity on the relationship between technostress and burnout (professional efficacy). Technostress predicted 25% of the variance in burnout (professional efficacy), which increased to 27% when combined with job insecurity. Employees, who experience technostress, tend to experience higher levels of burnout (professional efficacy), but they also experience higher levels of job insecurity, which also contributes to an increase in burnout (professional efficacy).

Lastly, the possible mediating role of job insecurity in the relationship between technostress and work engagement was tested (Refer to Table 7). Firstly, regression analyses with job insecurity as dependent variable and technostress as independent variable (not shown in Table 7) showed statistically significant F-values ($F = 44,32$, $p < 0,0001$). These results lend support to the first criterion set by Baron and Kenny (1986). Secondly, a regression analysis with technostress as independent variable and work engagement as dependent variable resulted in a statistically significant F-value ($F = 79,45$, $p < 0,0001$). Regression analyses with work engagement as dependent variable and job insecurity as predictor, also showed statistically significant results ($F = 48,77$, $p < 0,0001$). These results provide support for the second criterion of Baron and Kenny (1986) and lastly, in order to test adherence to the third criterion, work engagement was regressed on technostress, controlling for the influence of job insecurity, the results of which are provided in Table 7.

Table 7

Regression Analysis – Technostress and Job Insecurity: Work Engagement.

ANALYSIS OF VARIANCE					
Model 1: Technostress					
R: 0,51	Source of variation	*df*	Sum of squares	Mean Square	
R^2: 0,26					
Adjusted R^2: 0,26	Regression	1	85,99	85,99	
Standard Error: 1,04	Residual	227	245,67	1,08	
	$F = 79,45$ $p = 0,000$				
Model 2: Technostress and job insecurity					
Technostress	Source of variation	*df*	Sum of squares	Mean Square	
Job insecurity					
R: 0,56	Regression	2	104,26	52,13	
R^2: 0,31	Residual	226	227,39	1,01	
Adjusted R^2: 0,31	$F = 51,81$ $p = 0,000$				
Standard Error: 1,00					
	VARIABLES IN THE EQUATION				
INDEPENDENT VARIABLES	B	SEB	Beta	*t*	*p*
Technostress	1,33	0,15	0,51	8,91	0,000*
Technostress	1,06	0,16	0,41	6,73	0,000*
Job insecurity	-0,41	0,10	-0,26	-4,26	0,000*

* Statistically significant difference: $p < 0,05$

From Table 7 it is evident that although the regression coefficient of technostress remains statistically significant upon inclusion of job insecurity, the standardised regression coefficient (beta) of technostress decreased when controlling for job insecurity. Baron and Kenny's (1986) third criterion to test for mediation, states that perfect mediation would be applicable when the independent variable does not predict the dependent variable when controlling for the mediator. Therefore perfect mediation does not apply in this case. However, given the reduction in the standardised regression coefficient (beta) of technostress upon the inclusion of job insecurity, it does appear as though proof does exist for a partially mediating effect of job insecurity on the relationship between technostress and work engagement. Technostress predicted 26% of the variance in work engagement, which increased to 31% when combined with job insecurity. Employees, who experience technostress, tend to experience lower levels of work engagement, but they also experience higher levels of job insecurity, which further contributes to a reduction in work engagement. The differences in technostress levels (thoughts scale) of participants of different ages, with different qualifications and from different industries are reported in Table 8.

Table 8
Differences in Technostress Levels (Thoughts Scale) according to Age, Qualification and Industry (IT or not)

Variable	Value	*F*	*Df*	Error *df*	*p*	Partial eta squared η
Age	0,93	1,49	8	332,0	0,160	0,04
Qualification	0,97	1,17	6	448,0	0,321	0,02
Industry	0,99	0,38	2	226,0	0,687	0,00

* Statistically significant difference: $p < 0,05$

Table 8 shows that there were no significant effects of age, qualification or industry on the dependent variable, technostress (thoughts).

DISCUSSION

The aim of this study was to determine the relationship between technostress, job insecurity, burnout, and work engagement of computer professionals, as well as computer users. It was

furthermore the aim to determine whether job insecurity partially mediates the relationship technostress and burnout, as well as the relationship between technostress and work engagement. Lastly, it was aimed to determine whether technostress levels differ according to demographic characteristics such as age, qualification and industry.

Confirmatory factor analyses confirmed the three-factor structure of the technostress questionnaire. This corresponds with the findings of Weil and Rosen (1997). Acceptable Cronbach's alpha coefficients were obtained for the computer anxiety and computer thoughts surveys, although the computer attitudes survey delivered a poor level of internal consistency. For this reason, the attitudes survey was not included in any subsequent analyses. Factor analysis confirmed the two-factor structure of the JIQ, which corresponds with De Witte's (2000) findings. Cronbach alpha coefficients confirmed the reliability of the JIQ, which corresponds with the findings of various other researchers (Bosman, 2005; De Witte, 2000; Selepe, 2004). Factor analysis confirmed the three-factor structure of the MBI-GS constructs and acceptable Cronbach's alpha coefficients were obtained for all dimensions. These findings correspond with the research of Maslach, et al. (2001). Regarding the UWES, confirmatory factor analysis resulted in one factor . This corresponds with the findings of Bosman (2005), who also found that the UWES resulted in a one-factor structure, as opposed to a three-factor structure. Storm and Rothmann (2003) also found that a re-specified one-factor model fitted their data best.

The analysis of Pearson's correlations in this study indicated that higher levels of positive computer thoughts were found to be associated with lower levels of cognitive and affective job insecurity and vice versa. This corresponds with the findings of Tu, Wang and Shu (2005). Positive computer thoughts were found to be associated with lower levels of exhaustion and cynicism (burnout) and negative computer thoughts were found to be associated with higher levels of exhaustion and cynicism. It corresponds with Weil and Rosen's (1997) findings. Higher levels of positive computer thoughts are associated with higher levels of professional efficacy and lower levels of positive computer thoughts are associated with lower levels of professional efficacy. Higher levels of cognitive and affective job insecurity were found to be associated with increased levels of exhaustion and cynicism, and decreased levels of professional efficacy and work engagement. This corresponds with the findings of Bosman (2005).

Based on the relationships found in previous research between technostress and burnout (Weil & Rosen, 1997), technostress and work engagement and technostress and job insecurity (Harper, 2000) as well as the relationships between job insecurity and burnout (Bakker, et al., 2000), and job insecurity and work engagement (Bosman, 2005) it was expected that job insecurity will partially mediate the relationship between technostress and burnout as well as between technostress and work engagement. After a series of multiple regression analyses were performed empirical support was obtained for a partially mediating effect of job insecurity on the relationship between technostress and burnout (exhaustion, cynicism and professional efficacy). A partially mediating effect of job insecurity on the relationship between technostress and work engagement was also confirmed. Based on these findings, hypothesis 1, which states that technostress is associated with increased levels of burnout, and holds predictive value with regard to burnout can be accepted. Hypothesis 2, which states that technostress is associated with decreased levels of work engagement, and holds predictive value with regard to work engagement, can also be accepted. Hypotheses 3 and 4, which state that job insecurity plays a partially mediating role in the relationships between job insecurity and burnout, and job insecurity and work engagement, is also accepted.

Based on the findings of this study, it can be concluded that within this study population, employees, who experienced technostress, tended to experience higher levels of burnout (exhaustion, cynicism, and decreased professional efficacy), but they also experienced higher levels of job insecurity (as a result of technostress), which contributed to a further increase in burnout. Employees, who experienced technostress, tended to experience lower levels of work engagement, but they also experienced higher levels of job insecurity (as a result of technostress), which further contributed to a reduction in work engagement.

Contrary to expectation there were no significant effects of age, qualification or industry on technostress (thoughts). Yet in literature it states that technostress drastically increases from age 35 onwards (Tu, Wang & Shu, 2005) and that professionals who are more qualified experience less technostress (Weil & Rosen, 1997). In a study done by Weil and Rosen (1997) computer professionals reported less technostress than computer users. Accordingly hypothesis 5 is rejected.

LIMITATIONS AND RECOMMENDATIONS

The sample size was a limitation, specifically the distribution of gender, and cultural groups. There was also a misrepresentation in terms of industry (IT professionals versus computer users), suggesting that the finding that no statistically significant differences exist in technostress levels according to industry, might not be entirely valid. Stratified random sampling might ensure sufficient representation of the different groups. A further limitation of this study was its reliance on self-report measures. According to Schaufeli, Enzmann and Girault in Bosman (2005), the exclusive use of self-report measures in validation studies increases the likelihood that at least part of the shared variance between measures can be attributed to method variance. Regarding research design, future studies should focus on longitudinal designs where causal inferences can be made. Lastly, the technostress questionnaires were developed in America and have not been validated for use in South Africa, which may be related to the problematic nature of the attitudes questionnaires. Therefore, validation of the technostress questionnaires for South African circumstances is required.

In order to minimise technostress, Weil and Rosen (1997) suggest that focus should be rendered toward the employees in the company. It is important that employees do not feel their job security is threatened or negatively judged because of their feelings, concerns and beliefs about technology. The resisters and those who are hesitant to use technology should be given the opportunity to voice their concerns and share their feelings. They must be told that their feelings are not unusual, that they are not alone and that overcoming their discomfort is a prelude to learning any new technology. If a need has been established for new technology, it should be ensured that adequate time is invested to thoroughly investigate all options. Rogers (2004) add that management should think clearly before implementing new technologies in the organisation. Often, newer technology will not make the company any more productive, because existing technology can do the job just as well. Once the need for new technology is determined, time should be taken to establish training needs in order to implement a proper training programme.

Bosman (2005) notes that career counselling is a useful mechanism for assisting job insecure employees. Klandermans and Van Vuuren (1999) believe that social support plays a major

role when it comes to job insecurity. De Witte (in press) agrees and adds that the employee's capability to cope with organisational changes also appears important. Sverke and Hellgren (2002) states that an employee is likely to cope better when he/she has a firm foundation of people support.

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CHAPTER 3

CONCLUSIONS, LIMITATIONS AND RECCOMENDATIONS

In this chapter conclusions regarding the literature study and the results of the empirical research are made. Shortcomings of the research are discussed, and recommendations for the organisation and future research are suggested.

3.1 CONCLUSIONS

Conclusions regarding the specific theoretical objectives and the results of the empirical research are made.

3.1.1 Conclusions regarding the specific theoretical objectives

In line with the first specific objective stated in Chapter 1, technostress, job insecurity, burnout and work engagement and the relationship between these constructs were conceptualised from literature.

Technostress was conceptualised from literature as any negative impact on attitudes, thoughts, behaviours, or body physiology that is caused either directly or indirectly by technology and more specifically computers. It is composed of three separate, but overlapping dimensions: (a) feelings of anxiety (b) negative cognitions and (c) negative attitudes. Technostress manifests itself in two distinct but related ways: the struggle to accept computer technology; and the more specialised form of over-identification with computer technology. Technostress is prevalent at all levels and for most there is no way to escape from it. For the individual, there are physical as well as psychological consequences. The primary symptom of those who are ambivalent, reluctant, or fearful of computers, is anxiety, which can be expressed as irritability, headaches, nightmares, resistance to learning about the computer, or outright rejection of the technology. Job insecurity and burnout are found to be the most common psychological consequences. Computer-related technostress has been found to affect employee productivity, often costing companies in terms of lost productivity and employee turnover.

Job insecurity was conceptualised from literature, as a perceived or a real threat of losing one's job. In this research, job insecurity was viewed from a global perspective, where job insecurity has mainly been adopted in the context of organisational change, and as consisting of an affective and cognitive dimension. Job insecurity proved to produce a lack of reciprocity leading to emotional distress, such as burnout and a reduction in work engagement. The employee experiences anxiety and even depression while the organisational consequences are increased absenteeism and turnover.

Burnout was conceptualised as a psychological syndrome, being caused by exhaustion, resulting from over-commitment. An excess of stress was also proved to cause burnout. It's conceptualised as a syndrome of (a) emotional exhaustion, (b) depersonalisation and (c) reduced personal accomplishment. Signs of burnout were listed as chronic fatigue, anger outbursts, self-criticism, a sense of being besieged, frequent headaches, gastrointestinal disturbances, sudden weight loss or gain, sleeplessness, depression, shortness of breath, feelings of helplessness, cynicism, negativity and irritability.

Work engagement was conceptualised as a positive, energetic state of work-related orientation, characterised by (a) vigour, (b) dedication and (c) absorption. Vigour was conceptualised as being related to high energy levels, mental resilience, willingness to exert effort and persistence. Dedication was conceptualised as being related to enthusiasm, inspiration, pride, challenge and a sense of significance. Absorption was defined as referring to a state where time flies and where the individual finds it difficult for him or her to detach from work. Burnout and work engagement were conceptualised as opposite, yet independent constructs.

From a literature review, it was perceived that technostress might lead to job insecurity, which in turn might lead to increased levels of burnout and decreased levels of work engagement. Previous research, however, also showed a direct path from technostress to burnout and work engagement, hence only a partially-mediating effect of job insecurity was expected on the relationship between job insecurity and burnout, and job insecurity and work engagement.

3.1.2 Conclusions regarding the specific empirical objectives

Construct validity, as well as internal consistency was confirmed for all measuring instruments and subscales, with the exception of the attitudes (technostress) scale.

The second empirical objective was to determine the relationship between technostress, job insecurity, burnout, and work engagement of computer professionals, as well as computer users. Pearson Correlations indicated that employees, who experience technostress, tended to experience higher levels of job insecurity as well as burnout (exhaustion cynicism and professional efficacy). Results furthermore indicate that increased levels of affective and cognitive job insecurity were associated with increased levels of exhaustion and cynicism and decreased levels of professional efficacy and work engagement.

The third empirical objective was to determine whether job insecurity partially mediates the relationships between technostress and burnout, as well as technostress and work engagement of computer professionals, as well as computer users. Multiple-regression analyses indicated that proof does exist for a partially-mediating effect of job insecurity on the relationship between technostress and burnout (as represented by exhaustion, cynicism and reduced professional efficacy), as well as the relationship between job insecurity and work engagement.

The fourth empirical objective was to determine whether technostress levels differ according to age, qualification and industry, given that literature indicated that differences in technostress levels based on the demographic characteristics have been established. Results, however, indicated the contrary, as no such differences were found.

3.2 LIMITATIONS OF THE RESEARCH

- The sample size, specifically the distribution of gender, culture and industry representatives. The group of participants working in an IT-industry, black participants and males were under-represented in this study.
- The reliance on self-report measures. Some participants may have doubted the confidentiality of their responses, which may have influenced some of the results.

- The technostress questionnaires have not been normed for use in South Africa, which may have affected results.
- A cross-sectional survey design was used, which holds limitations in terms of the interpretation of causality.

3.3 RECOMMENDATIONS

Recommendations are made with regard to organisations, as well as with regard to future research.

3.3.1 Recommendations for the organisation

Technology in businesses is advancing at a fast and furious pace, and is leaving a trail of technostress at every level of the organisation (Weil, Sears & Rosen, 1998). Results indicated that technostress held predictive value with regard to job insecurity, burnout and work engagement.

Weil and Rosen (1997) believe that technostress could be prevented by starting with and focusing on the people in the organisation. Before implementing new technologies in the organisation, management should ask themselves whether new technology will add value to the company (Rodgers, 2004). Often, newer technology will not make the company any more productive, because existing technology can do the job just as well. Therefore it is necessary to ask whether it is really needed and that question should be posed to the right people within the organisation (Weil & Rosen, 1997). If a need has been established for new technology, it should be ensured that adequate time is invested to thoroughly investigate all options. According to Weil and Rosen (1997) it makes sense to consider technology that will grow with the organisation's needs. Once the need for change is determined, time should be taken to educate the employees about the rationale for the change. The resisters and those who are hesitant need assistance in removing their preconceived technological discomfort. They should be given the opportunity to voice their concerns and share their feelings. It is imperative that employees not feel their job security is threatened or negatively judged because of their feelings, concerns and beliefs about technology. They must be told that their feelings are not unusual, that they are not alone and that overcoming their discomfort is a

prelude to learning any new technology. Training needs should be established. This will go a long way toward decreasing the inherent technostress of technological change and toward increasing both worker morale and feelings of acceptance (Weil & Rosen, 1997; Besser, 2004). While training employees, develop personal motivation by showing them how the specific technology can work for them, e.g. the Internet.

When an employee is trained well it will also reduce the fear of technology. Weil and Rosen (1997) distilled 14 key strategies that can be used in any training programme:

- Limit session time in order to prevent information overload.
- Use single concepts. The earliest ones must be practical and immediately useful.
- Avoid jargon; new terms must be introduced with explanations in plain language.
- Use humour, it helps to reduce stress.
- Using hands-on training is an essential component for success. This builds early success, motivation and confidence.
- Match hardware. Teaching on the same equipment that is to be used, fosters transfer of learning more effectively.
- Show a variety of help tools (the manual, on-line help desk, and other people). Employees should learn that it is okay to ask for help.
- Use a variety of learning styles. Some people learn best through a visual presentation, others through auditory channels, and still others through tactile (touch) lessons.
- Prepare for problems. Technology is bound to give problems when least expected.
- Do not assume any prior knowledge.
- Model actions because people learn best through modelling. Have someone demonstrate first, and then have the trainee perform the task.
- Assist, do not do. If a problem arises, the trainer should tell the trainee what to do and then let him do it. Pressing keys for someone is not teaching them at all.
- Summarise information often to solidify learning.
- Start early. "Pressure cooker" or "need-to-know-by-yesterday" strategies are not only unsuccessful, but also lead to strong resentment and technostress.

Whether job insecurity is a consequence of technostress or not, Sverke, et al, (2001) states that job insecurity is problematic because it implies unpredictability and uncontrollability

(Sverke, et al, 2001). The results suggested that higher levels of technostress lead to increased burnout and decreased work engagement, but that it also leads to job insecurity, which in turn contributes to a decrease in burnout and an increase in work engagement. For this reason, it is important to for the organisations involved to reduce job insecurity levels as well. According to de Witte (in press) the negative consequences of job insecurity could be avoided or at least mitigated by reducing that unpredictability and uncontrollability. He proposes at least three ways in which this can be achieved: Through communication, by participating in decision-making and by increasing organisational justice. Insecurity is stimulated by a lack of communication about future events (De Witte, in press; Schaufeli, 2004). In De Witte (in press), Schweiger and DeNisi suggest that explicit and open communication regarding e.g. organisational change is effective in reducing insecurity. Weil and Rosen (1997) believe it to be true. Secondly, De Witte (in press) states that job insecurity can be reduced through participation in the decisions to be made about the organisations' future, e.g. unemployment. By participating, employees increase their control over the situation. Lastly, De Witte (in press) claims that procedural justice improves the predictability of the organisational change processes and their outcomes.

Klandermans and Van Vuuren (1999) believe that social support plays a major role when it comes to job insecurity. De Witte (in press) agrees and adds that the employee's capability to cope with organisational changes also appears important. Sverke and Hellgren (2002) states that an employee is likely to cope better when he/she has a firm foundation of people support.

Bosman (2005) notes that career counselling is a useful mechanism for assisting job insecure employees. Appelbaum and Donia (2000) emphasise the importance of communication in fostering trust and empowerment. Fostering trust of the employees enable them to concentrate on their work and to continue being productive, with the assurance that management is also concerned regarding their well-being (Bosman, 2005).

3.3.2 Recommendations for future research

Although the three-factor structure of the technostress battery was confirmed, the attitude survey proved to be somewhat problematic, particularly with regard to its level of internal consistency. The technostress battery was normed in America and may not be appropriate for use in South Africa in its current form. Research is required into the psychometric properties

of this instrument and some adaptation of items may be required. Limited research has been conducted on technostress in a South African context. This is an important job stressor with numerous documented negative consequences; hence more research is required in this regard. Research should also be conducted in a variety of occupational settings, so as to enable the development of norms against which groups can be compared.

Practical significance should be determined in addition to statistical significance and adequate statistical techniques (e.g. structural equation modelling) should be used. It is recommended that a more powerful sampling method be used and that longitudinal designs be employed, so as to enable casual inferences. Making use of stratified random sampling rather than a cross-sectional design will eliminate inequalities as found in this study. Similar research could be undertaken, but making use of larger and more representative samples.
Job insecurity was measured from a global perspective in this research. Future studies could make use of a multi-dimensional measure of job insecurity, which considers additional facets of job insecurity, for example feelings powerlessness and importance of job features.

3.4 CHAPTER SUMMARY

In this chapter conclusions regarding the theoretical and empirical objectives were made. The limitations of the research were pointed out and recommendations were made for the organisation in which the study was conducted, as well as for future research. All theoretical and empirical objectives formulated for this research, have been attained.

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