School of Marketing

Nested Sub-System Model of Technostressors: Impact of Psychological Need Satisfaction, Technostress Inhibitors, Mindfulness and LMX Quality on Burnout and Work Engagement

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Dedicated to

Amma and Appa
for your resilience, courage and strength

Matt
for being a source of joy every single day

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ABSTRACT

The increasing use of Information and Communication Technologies (ICT) at work have given rise to the phenomenon of technostress, which refers to the pressures stemming from intensive use of ICT for work-related purposes. The need to critically examine technostressors, work demands such as techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty, that stem from the intensive use of ICT at work is pressing. However, current research on technostressors mostly focuses on their negative impact in the workplace. In order to address this negative bias, first, the study uses the Job Demands-Resources theory to examine technostressors as a nested sub-system of job demands differentially impacting outcomes of burnout and work engagement. Second, the study investigates psychological need satisfaction as a mediating variable in order to address questions of how technostressors impact outcomes. Third, the study evaluates the extent to which the three resources of technostress inhibitors, self-regulated attention and orientation to experience components of mindfulness and LMX quality moderate the nested sub-system and the mediated relationship between technostressors and outcomes.

A narrative literature review was conducted to develop a conceptual model that was empirically tested with a quantitative study using a cross-sectional survey design. Data was collected from 653 employees from the IT / ITES sector using a self-administered online survey using well established scales, further to which reliability and validity checks were performed. Confirmatory factor analysis established the factor structure of the measurement model. Subsequently, structural equation modeling was conducted to test the hypotheses.

The results of data analysis support the nested sub-system model of technostressors – techno-overload, techno-invasion and techno-complexity positively influenced techno-

insecurity and techno-uncertainty. The distinctive impacts of techno-insecurity and techno-uncertainty as hindrance and challenge demands were also supported - techno-insecurity increased burnout and reduced work engagement, whereas techno-uncertainty increased work engagement. The findings substantiated the role of psychological need satisfaction as a mediator – it fully mediated the relationship between techno-uncertainty and burnout; it partially mediated the relationships between techno-insecurity and burnout and work engagement, as well as techno-uncertainty and work engagement. Partial support was obtained with regard to moderation by mindfulness. The Orientation to Experience component of mindfulness reduced the harmful effect of techno-complexity on techno-insecurity, and also moderated the mediated negative impact of techno-insecurity on work engagement. Contrary to expectation, the results also detected that the Self-Regulated Attention component of mindfulness increased the positive effect of techno-overload on techno-insecurity and the positive effect of techno-insecurity on burnout mediated through psychological need satisfaction.

The theoretical contributions of the study lie in its refinement of the technostress construct and in identifying distinctive impacts of techno-insecurity and techno-uncertainty. It contributes to the job-demands literature by establishing that techno-uncertainty acts like a challenge demand, unlike general job uncertainty which is a hindrance demand. The study further contributes to the mindfulness literature by identifying specific components of mindfulness that may be detrimental in certain situations. Practical implications in the form of organizational practices and HR policies are provided. Lastly some of the limitations of the study such as the use of a cross-sectional method and future research directions are discussed.

Keywords: Technostressors, psychological need satisfaction, burnout, work engagement, mindfulness

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

Information and Communication Technologies (ICTs) occupy an indispensable place in today's work environment. It's role in individuals' working life has been increasing since the 1970s with the start of 'computerization of work' that began with the 'Age of Information and Communication Technology'. This shift in the way people carried out their work occurred due to the invention of new types of chips and micro-processors, new telecommunications equipment, advancements in software and networks enabling services such as remote working, virtual teams and extensive database management systems (Korunka & Vartiainen, 2017). Specifically, the term 'Information and Communications Technologies' has been in use since the 1980s and is defined as "the hardware, software, networks and media for the collection, storage, processing, transmission and presentation of information (voice, data, text, images), as well as related services" (OECD, 2015, p 20). Examples of ICTs include communication technologies such as e-mails, instant messaging, and virtual collaboration tools, technologies that support one's main work function such as project management software and timesheet applications, as well as core technology that enables further technological acceleration such as programming languages.

1.1 BACKGROUND OF THE STUDY

ICTs are changing the way in which businesses create value, the where and how people work as well as the modes of communication and interaction between employees (Cascio & Montealegre, 2016). Technology is increasingly transforming the core functions of an organization such as human resource management systems, performance management, learning and development, and recruitment (Bersin, 2017). The use of ICTs in the workplace has been associated with favourable outcomes: for

instance, adopters of ERP systems had better business performance and productivity than non-adopters (Hitt et al., 2002) and information technologies had created increases in productivity and consumer value (Hitt & Brynjolfsson, 1996). Higher levels of ICT adoption have resulted in greater economic impacts such as business model innovations and rising patent applications (Baller et al., 2016). Organizations have gained from the flexibility and instant information transmission provided by ICTs (O'Driscoll et al., 2010). ICT adoption increased knowledge flows in organizations through reduced communication costs (Forman & Zeebroeck, 2012) and greater employee involvement (Bayo-Moriones et al., 2017). They contributed to a firm's innovation capacities by enabling New Product Development (Kawakami et al., 2015) and service innovations (Ryu & Lee, 2018). Use of certain technologies, such as the Internet promoted greater cooperation among employees, satisfaction with work and willingness to expend extra effort on the job (Martin & Omrani, 2015).

ICTs provide opportunities for greater productivity and efficiency; however, these gains rely on individual employee attitudes toward ICT use at work (Tabrizi et al., 2019). The workforce transitions made necessary by this technological progress pose a massive human resource challenge to organizations (J. Brown et al., 2018; Bughin et al., 2017), because advances in technical skills form only one side of the transition. Unique human capabilities, not replicable by machines are equally if not more important for employees of the future (J. Brown et al., 2018; Rainie & Anderson, 2017). Technology intensive work will require a set of skills different from what employees possess today. With advances in ICT, opportunities for highly skilled employees who can convert these ICT advancements into functional products and services have increased (Bresnahan & Yin, 2017). But this progress has also fuelled technological acceleration increasing the quantity and speed of information. This subsequently

accelerates individuals' pace of life, requiring them to step-up the number of responses per unit time and multitasking (Korunka & Vartiainen, 2017)

The constantly evolving nature of ICTs create unpredictability and uncertainty for its users, and this can cause confusion, frustration, intimidation and unhappiness among them (Weil & Rosen, 1997). The rate at which technological changes take place creates the illusion that more work can be completed in less time, a phenomenon called 'ephemeralization' (Evenstad, 2018). This compels employees to stay updated all the time leading to learning pressures (O'Driscoll et al., 2010) and perceptions of job insecurity (Nam, 2019). Repeated interruptions caused by ICT (text messages, e-mails, calendar reminders) invade one's time-role-space boundaries creating perceptions of information and communication overload (Karr-Wisniewski & Lu, 2010; Yin et al., 2018). While the connectivity provided by ICTs enable individuals to complete work assignments from wherever they are, it also blurs work-home boundaries (Berkowsky, 2013; Boswell & Olson-Buchanan, 2007; Fenner & Renn, 2010) causing emotional exhaustion (Xie et al., 2018) and strain (Ayyagari et al., 2011). Information processing demands posed by technology also reduces well-being of remote and mobile workers (Tarafdar, 2018). As a consequence of incorporating technology into work environments, the term 'technostress' was first coined by Brod (1984) and was defined as a problem of adaptation, or difficulty to keep up with new computer technologies. It was described as comprising both physical symptoms such as headaches and strain, as well as emotional symptoms such as 'computer anxiety' characterized by 'fear or reluctance towards computer usage'. With increasing research, technostress came to be defined as "one's discomposure, fear, tenseness and anxiety when one is learning and using computer technology directly or indirectly, that ultimately ends in psychological and emotional repulsion and prevents one from further learning or using computer

technology" (Wang et al., 2008, p 3004). Later definitions of technostress include the cognitive component and refer to technostress as the inability to cope with the pressures of organizational computer usage, resulting in negative cognitions towards ICT (Agogo & Hess, 2018; Ayyagari et al., 2011; Ragu-Nathan et al., 2008). ICT use conditions that create technostress have been termed as technostress creators or technostressors and include techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty.

1.2 MOTIVATION FOR THE STUDY

The reasons underlying this study, leading to the objectives of this work are discussed below:

1.2.1 Technostress

Early approaches to technostress conceptualized it as always leading to negative results. This is confirmed by an examination of the outcomes already studied with technostressors as listed in Table 1.1.

Table 1. 1 Outcomes studied with technostressors and support received

Outcome	Result	Reference
Loneliness	Positive – supported	Taser et al. (2022)
Job satisfaction, End-user performance, End-user satisfaction	Negative - supported	Ioannou et al. (2022)
Engagement, Well-being	Negative - supported	Wu et al. (2022)
Academic Productivity	Negative - supported	Upadhyaya & Vrinda (2021)
Distress Eustress	Positive – supported Negative - supported	Califf et al. (2020)
Customer Satisfaction, Customer Delight	Negative – supported	Christ-Brendemühl & Schaarschmidt (2020)
Work-family conflict, Job distress, Work exhaustion	Positive - supported	Gaudioso et al. (2017)
Performance	Negative - supported	Brooks & Califf (2017)

Table 1.1 (**contd.**)

Outcome	Result	Reference
Strain	Positive - supported	Pirkkalainen et al. (2017)
Work-life conflict	Positive – supported	Oh & Park (2016)
Sales performance, Technology enabled innovation	Negative – supported	Tarafdar et al. (2015)
Organizational commitment Job satisfaction Negative affectivity Technology enabled performance	Negative - supported Negative – supported Positive - supported Negative - supported	Jena (2015)
Work exhaustion	Positive – supported	Fieseler et al. (2014)
End-user satisfaction	Negative - supported	Fuglseth & Sorebo (2014)
End-user satisfaction, End-user performance	Negative – supported	Tarafdar et al. (2010)
Job satisfaction	Negative – supported	Ragu-Nathan et al. (2008)
Role stress Productivity	Positive – supported Negative - supported	Tarafdar et al. (2007)

From Table 1.1, it can be seen that all the impacts studied have been negative. But the very nature of connectivity, instant access to information, and hardware- software upgrades associated with technostress can also stimulate individuals to use them for positive gains such as greater virtual collaboration, work flexibility, and innovation (Cascio & Montealegre, 2016). Since ICT has both benefits and drawbacks, users' differential perceptions of ICT as empowering or constraining can create either opportunities for enhanced work or obstacles leading to technostress, respectively (Coovert & Thompson, 2014). Only recently, developments in the technostress literature have taken account of this double-edged nature of ICT and differentiate techno-distress from techno-eustress (Tarafdar et al., 2019). Techno-eustress is defined as "the positive stress that individuals face in their use of ICT" wherein they assess ICT characteristics as "challenges" and therefore are motivated to engage and cope with them (Tarafdar et al., 2019, p 14). These challenges can also be perceived as opportunities for skill development, thereby improving performance, satisfaction and

other favourable outcomes.

Although this double-edged nature of using ICT for work has been acknowledged (Stich et al., 2015), the extant literature does not address the following issues. Firstly, there aren't theoretically grounded accounts of which technostressors differentially create opportunities for growth and efficiency and which ones impede work and well-being (Tarafdar et al., 2015, 2019). Therefore, this work examines each technostressor individually in order to better understand their specific contributions to positive and negative work-related outcomes. Particularly, this work examines burnout as a negative work-related outcome, and work engagement as a positive work-related outcome. Secondly, explanations of psychological mechanisms that underlie the impact of technostressors on outcomes are lacking (Day et al., 2010; Tarafdar et al., 2019). Towards this, the role of psychological need satisfaction as a mediator is examined. Finally, little is known about the organizational, individual and leadership level mechanisms that can be used to mitigate the effect of technostressors on outcomes (Cascio & Montealegre, 2016; Pirkkalainen & Salo, 2016). In remedying this, the role of technostress inhibitors as organizational resources, dispositional mindfulness as an individual resource, and Leader-Member Exchange (LMX) Quality as a leadership resource is investigated. The above-mentioned variables and the rationale for their use are further elaborated in the subsequent paragraphs.

1.2.2 Burnout

Burnout is a well-documented outcome of pressure and stress at the workplace (Schaufeli et al., 2009). Early studies of burnout defined it as a result of interpersonal stressors, particular to service professions such as nursing, teaching and social work (Cordes & Dougherty, 1993). Later empirical research confirmed that burnout was not specific to only a limited number of service professions, but could be experienced in

other occupations such as in jobs involving computer technology, within the military, and among clerical and managerial workers (Maslach et al., 2001). Burnout is defined as a "prolonged response to chronic emotional and interpersonal stressors on the job, and is defined by the three dimensions of exhaustion, cynicism, and inefficacy" (Maslach et al., 2001, p 397). Some studies report associations between ICT use in the workplace and increased burnout (Berg-Beckhoff et al., 2017; R. Brown et al., 2014; Salanova et al., 2000). But most of these measure only one or two aspects of ICT for work, such as interruptions caused by e-mails and instant messaging (Galluch et al., 2015; Reinke et al., 2016), or increasing accessibility to work during non-work time (Derks & Bakker, 2014). Technostress was also implicated in burnout in one study (Srivastava et al., 2015). However, the independent specific effects of the distinct types of technostressors namely techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty on burnout remain unexamined, which this work aims to resolve.

1.2.3 Work Engagement

Work engagement as a topic of interest in organizational behaviour started at the turn of the twentieth century with the increasing importance of psychological elements in human capital management, as well as the emerging field of positive psychology. Work engagement refers to an employee's relationship with their work and is defined as "a positive, fulfilling, work related state of mind that is characterized by vigour, dedication, and absorption" (Schaufeli et al., 2002, p 74), and is relatively stable across long time periods (Schaufeli et al., 2002). Characteristics of the job and the work environment influence work engagement (Bakker & Demerouti, 2017; Mauno et al., 2010). Mixed evidence exists with regard to the influence of work-related ICT use on work engagement. Use of mobile technology for works (Fujimoto et al., 2016), and

technology acceptance (Molino et al., 2020) increased work engagement, but technology enabled parallel communications via emails and text messages reduced employees' work engagement (Orhan et al., 2021). Some of the reasons for these conflicting findings may be that these studies used widely varying conceptualizations of work-related ICT use (e.g., technology use, technology acceptance and technology-mediated-interruptions). This work proposes to overcome this limitation by using a conceptually well-established understanding of technostressors, and by studying their specific impacts across five types of pressures they could create, namely overload, invasion, complexity, insecurity and uncertainty.

If technostressors have the potential to create either positive or negative impacts, the next question that arises is what are the mechanisms that explain favourable outcomes for some and unfavourable outcomes for others. In other words, what is that variable that can explain why technostressors may be motivating for some and demotivating for others? The organizational behaviour literature posits psychological need satisfaction as a mechanism that explains intrinsic motivation under challenging work conditions (Gagne & Deci, 2005).

1.2.4 Psychological Need Satisfaction

Psychological needs are fundamental universal nutrients that are necessary for optimal human functioning. The extent to which these psychological needs are satisfied within one's work environment is referred to as work-related psychological need satisfaction (Van den Broeck et al., 2010). Early research on need satisfaction put forth the two needs of autonomy and competence, whose satisfaction predicted greater internal motivation at work (Deci & Ryan, 1985). Autonomy denotes experiencing choice in initiating and conducting one's work, and competence denotes achieving desirable outcomes in the pursuit of optimally challenging work (Deci et al., 2001). Later, the

third need of relatedness was introduced since it was found that social connectedness and feelings of belongingness to a group motivated employees towards goal accomplishment (Gagné & Deci, 2005). Together, these three needs determine employees' well-being at work. Studies relate both trait level variation in needs between persons and daily fluctuations of needs within the same person to variations in overall well-being (Reis et al., 2000). All three needs are equally important in that, satisfaction of one need but not another, will not result in internalized motivation, performance or well-being. The extensive use of ICTs at work produces conditions that either impede or promote need satisfaction. For instance, the ability to stay connected to work even while outside the office and immediate response expectations made possible through ICT hinder connectedness and autonomy needs respectively. Similarly, the pressing requirement to constantly upskill oneself in the face of latest technology upgrades can cast doubt on one's competence, preventing this need's satisfaction. While studies have examined the overall impact of technostressors on outcome variables, the mechanism through which ICT can create favourable vs. unfavourable outcomes remain unexamined (Tarafdar et al., 2019). Towards this, the present study tests psychological need satisfaction as an explanatory variable for the impact of technostressors on outcomes.

Further, the technostress literature does not elaborate on the factors that can boost or buffer the effects of technostress producing conditions (Cascio & Montealegre, 2016; Pirkkalainen & Salo, 2016). In order to resolve this, the present work proposes to examine three types of resources (at the organizational, individual and leadership level) in relation to technostressors. Technostress Inhibitors, Mindfulness, and Leader-Member Exchange Quality as organizational, individual and leadership resources respectively are proposed.

1.2.5 Technostress Inhibitors

There is some evidence that the presence of technostress inhibitors - organizational mechanisms meant to buffer the intensity of technostress inducing conditions can ameliorate some of the negative impacts of technostress (Tarafdar, Pullins, et al., 2015; Tu et al., 2008). However, this evidence appears mixed with some research supporting its mitigating role, while others report no significant effect (Hung et al., 2015; Ragu-Nathan et al., 2008). Given these ambiguous findings, this work aims to reassess the moderating impact of this important organizational resource.

1.2.6 Leader-Member Exchange Quality

In addition to employees' perceptions of organizational support, the nature of relationship with their immediate supervisor is crucial for their well-being and performance in an ICT intensive work environment (Settoon et al., 1996). This is reflected in the employees' perceived leader-member exchange (LMX) quality, which refers to the quality of the dyadic relationship between the leader and their subordinate. High quality relationships, also known as mature relationships are characterized by trust, collaboration and functional interdependence (Cogliser et al., 2009; Graen, 1976). In a high-quality exchange relationship, leaders and subordinates establish clear role and boundary expectations that reduce technostress (Sonnentag & Pundt, 2016).

The extent to which employees feel pressured by the use of technology at work depends on their immediate supervisors' expectations. For example, an 'always-on' culture promotes expectations of constant availability from supervisors leading to negative consequences such as work home imbalances and strain (Derks et al., 2015). Further, such availability expectations from the supervisor can intensify feelings of job- insecurity if other colleagues endorse these connectedness norms. The nature of

relationship with one's supervisors, i.e., the LMX quality, determines how employees manage these availability expectations and consequently perceived stress from ICT intensive work environments (Smith, 2019). In the absence of studies that explore how LMX quality might impact technostressors, this work examines its moderating role in relation to technostressors.

Finally, characteristics of individual users that can serve a protective function and increase the likelihood of work-related ICT use being perceived as challenges have not gained attention (Cascio & Montealegre, 2016; O'Driscoll et al., 2010; Tarafdar et al., 2019). In this regard, this study proposes the examination of mindfulness, an individual characteristic that has been highly associated with gains in the workplace as a personal resource.

1.2.7 Mindfulness

Mindfulness is a positive psychology construct that has made inroads into positive organizational scholarship (Sutcliffe et al., 2016). The literature in this discipline differentiates dispositional from cultivated mindfulness. Dispositional mindfulness is "a basic human quality, characterized by the tendency to attend to and accept present moment experience" (Rau and Williams, 2016, p 32), whereas cultivated mindfulness refers to training and practice of the attention and awareness components of mindfulness (Shapiro et al., 2008). Individuals with high dispositional mindfulness are resilient to external pressures, less likely to engage in negative thinking and avoidant coping, and exhibit greater emotional stability and well-being (Tomlinson et al., 2018).

Since the introduction of mindfulness in the technostress mitigation paradigm is nascent, it would not be fruitful to examine mindfulness interventions without first establishing the protective effects of dispositional mindfulness. In other words, if

individuals with already high levels of dispositional mindfulness are not protected from negative effects of ICT at work, it may not be fruitful to examine interventions in this context. Therefore, this study explores the role of dispositional mindfulness as an answer to the question of which individual factors increase perceptions of technostressors as challenges and as growth opportunities.

Based on the reasoning presented in this section, the aims and objectives of the present work are encapsulated in the following section.

1.3 AIMS AND OBJECTIVES

This study aims to resolve the identified research gaps through the following objectives:

1. To examine the inter-relationships between the five technostressors, namely techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty.
2. To demonstrate the differential impact of the technostressors on outcome variables of burnout and work engagement.
3. To analyze the role of psychological need satisfaction as a mediator in the relationship between technostressors and outcome variables.
4. To study the moderating impact of technostress inhibitors in the relationship between technostressors and outcome variables.
5. To evaluate the moderating impact of mindfulness in the relationship between technostressors and outcome variables.
6. To assess the moderating impact of LMX quality in the relationship between technostressors and outcome variables.

1.4 SCOPE AND CONTEXT OF THE WORK

The fundamental aims of this study are to understand what kinds of impacts technostressors can have on employees in the workplace, how these impacts occur, and what can be done to mitigate adverse consequences. Given the intent of this work is to develop a holistic framework for technostressors, their outcomes, and attenuating resources, a quantitative method was employed in this work. This work is also set within the context of Indian Information Technology (IT)/ Information Technology Enabled Services (ITES) sector. While technology intensive work permeates across all industry sectors and occupational roles (Stadin et al., 2020), the present work focuses on the IT / ITES sector to ensure uniformity of employee experience, particularly with regard to organizational supports and work expectations in an ICT driven environment. A minimum work experience of one year was stipulated so that only those individuals with an adequate understanding of the ICT intensive work context and its dynamics will be enlisted in the study. Besides work experience and the requirement that all participants must use ICT as part of their day-to-day work, no other restrictions were placed to be part of the study.

1.5 STRUCTURE OF THE THESIS

This chapter introduces the background for the study. It also provides the motivation for the study, the research gaps and subsequent research objectives this study addresses. It also briefly defines the key variables used in the study.

Chapter 2, which is the review of literature discusses in detail the theoretical underpinnings of this work. It also provides a theoretical justification for the selection of variables and builds the conceptual framework in the form of testable hypotheses.

Chapter 3 explains the method of investigation for the study. This chapter elaborates on the research design, the population for the study, the scales used and the steps involved in the questionnaire validation. Further, this chapter discusses who formed part of the sample and why, as well as their demographic profiles. Steps taken to prevent common method bias are explained, following which the results of the confirmatory factor analysis (CFA) are presented.

For the purpose of statistical control, Chapter 4 first discusses whether the demographic factors such as gender, age, educational qualification, work experience, ICT use frequency, and ICT control influence the variables of the study. This was analyzed using Statistical Package for the Social Sciences (SPSS) version 22. This chapter then goes on to describe how the assumptions for structural equation modelling (SEM) are met by this study's dataset, following which the results of the hypotheses tests are presented. The hypotheses were tested using Structural Equation Modelling (SEM) on the AMOS 22 software package.

Chapter 5 provides an overall summary of the work. This chapter discusses the theoretical contributions and managerial implications of the study. It lists the limitations as well as outlines future research directions that can take this work forward.

CHAPTER 2: REVIEW OF LITERATURE

The following chapter aims to review the literature in the technostress, job demands-resources, psychological need satisfaction, mindfulness, and LMX quality domains to arrive at a conceptual framework that can help fulfil the research objectives outlined in Chapter 1. A narrative literature review method was used to derive the conceptual framework; in particular, a general literature review approach was used. General literature reviews are objective syntheses of the current knowledge about a concept. They are characterized by the underlying propositions which guide future research (Onwuegbuzie & Frels, 2016). In this study, the published articles on technostressors, job demands-resources, psychological need satisfaction, mindfulness, and LMX quality were critically evaluated to identify meaningful associations between them and further develop hypotheses for empirical validation. Fig. 2.1 illustrates the organization of the chapter which begins with an introduction to technostressors, followed by the theoretical justification for a nested sub-system model. Further to this, the development of the hypotheses is explained in detail along with their respective theoretical underpinnings.

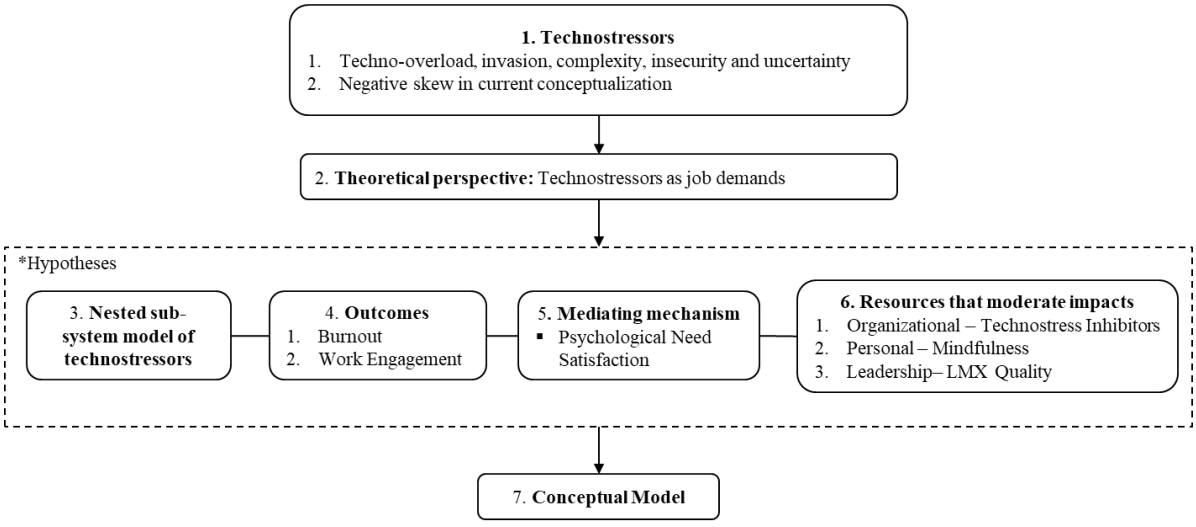

Fig 2. 1 Organization of the chapter

2.1 TECHNOSTRESSORS – AN OVERVIEW

Antecedents to technostress, i.e., the aspects of technology use that create pressures for ICT users have been characterized as 'technostress creators' or 'technostressors'. Extant literature identifies five technostressors namely, techno-overload, techno-invasion, techno-complexity, techno- uncertainty and techno- insecurity, which are described in detail below (Ragu-Nathan et al., 2008; Tarafdar et al., 2007) *Techno-overload* refers to situations where ICTs require employees to work longer and faster (Tarafdar et al., 2007). It is characterized by the need to complete more work in less time, due to both high computational speed and increased network access such as e-mails and virtual platforms (Day et al., 2012). The latter has been associated with information overload, a continued experience of which causes anxiety, frustration, and reduced professional efficacy over conflicting yet important goals (Galluch et al., 2015; Taylor et al., 2005). *Techno-invasion* refers to the intrusive effect of ICTs that enable employees' continued involvement with work-related tasks even after hours and in non-work contexts (Tarafdar et al., 2007). The instant connectivity provided by ICT fuels 'presenteeism', which is an expectation of round the clock availability from employees (Ayyagari et al., 2011). This culture of instant accessibility and immediate response expectancies enabled by technology prevents employees from fully disengaging from work activities after work hours, thereby creating work-home conflicts, role ambiguity and strain (Berkowsky, 2013). *Techno-complexity* denotes circumstances where the pace of technological change forces employees to spend additional time and effort, over and above their regular work functions to learn, update and understand the latest developments (Tarafdar et al., 2007). Expectations for continual learning due to either new technology implementation or upgradation of existing platforms create frustration and stress (Day et al., 2012). *Techno-insecurity* is associated with contexts where employees feel insecure about losing their jobs in the face of new ICT and/or to co-

workers who might know more about these ICTs (Tarafdar et al., 2007). *Techno-uncertainty* refers to situations where users report frequent organization-wide software, hardware and network changes, and a lack of control over these changes (Tarafdar et al., 2007, 2019). The following Table 2.1 outlines the characteristics of each of these technostressors (Marsh et al., 2022; Tarafdar et al., 2019).

Table 2. 1 Descriptions of technostressors

Technostressor	Descriptions
Techno-overload	• Time pressures from expectations to do more using technology • Information overload • Conflicting priorities due to multi-tasking • Expectation management when using applications like social media
Techno-invasion	• The need to be constantly connected and reachable • Immediate response expectations
Techno-complexity	• Pressure to constantly learn the latest ICT tool/application • Difficulty understanding new functions and jargon associated with the latest ICT • Difficulty finding time to learn new developments • Handling complications, interruptions in the process of up-skilling
Techno-insecurity	• Fear of automation replacing their jobs • Insecurity that co-workers' superior technology use knowledge will replace them
Techno-uncertainty	• Frequent ICT changes or upgrades, in either hardware, software or networks used • Concerns over the speed of change

2.2 THE SKEW TOWARDS NEGATIVE OUTCOMES IN EXTANT LITERATURE

Technostressors and their resultant outcomes impact both individuals and organizations. Studies indicate that factors relevant for the success of an organization such as productivity (Hung et al., 2015; Tarafdar et al., 2007), performance (Brooks & Califf, 2017; Tarafdar et al., 2010; Tarafdar, Pullins, et al., 2015), organizational commitment (Jena, 2015) and innovation (Tarafdar, Pullins, et al., 2015) are negatively affected by technostressors. Technostressors have also been shown to negatively affect

factors relevant to the individual employee's success. For example, the intrusive and dynamic features of ICT result in psychological strain (Ayyagari et al., 2011; Galluch et al., 2015). Technostressors have also been specifically linked to increased negative affectivity (Jena, 2015), role stress (Tarafdar, Pullins, et al., 2015), work-life conflict (Oh & Park, 2016), job dissatisfaction and job distress (Ragu-Nathan et al., 2008) among employees.

However, the use of ICT per se is neutral, i.e., it can either enable or oppress employees who use them for work (Coovert & Thompson, 2014). Preliminary evidence indicates some benefits. For example, work-related ICT use after hours, i.e., techno-invasion, predicted an increased focus on opportunities, i.e., positive beliefs involving future work goals and plans (Shi et al., 2018). The number of hours of mobile technology use for work impacted work engagement positively through increased work autonomy (Fujimoto et al., 2016). Thus, when the use of ICT at work can be a double-edged sword, their conceptualization as leading to only negative outcomes is restrictive. While it is true that technostressors can create frustration, unpredictability and uncertainty for employees (Agogo & Hess, 2018; Pirkkalainen & Salo, 2016; Ragu-Nathan et al., 2008; Weil & Rosen, 1997), their potential for enabling positive states through increased information access, temporal and spatial flexibility, and growth opportunities have remained unexamined (Day et al., 2010; Tarafdar et al., 2019). Therefore, this thesis examines differential (both positive and negative) outcomes of technostressors as well as the underlying mechanisms that support these differential outcomes.

2.3 THEORETICAL PERSPECTIVE OF TECHNOSTRESS

The negative bias in existing studies of technostress may have resulted from the two major theoretical frameworks used, namely the Person-Environment (P-E) fit (Edwards

& Cooper, 1990), and Transactional Model of Stress and coping (TMS) (Lazarus & Folkman, 1987). Person-Environment fit refers to the "compatibility between individuals and their environment" and any discrepancies between the individual's attributes and the organization's attributes result in negative outcomes (Van Vianen, 2018, p *76*). In the technostress literature, the P-E fit model was first used in the seminal work of Ayyagari et al. (2011) and views strain as the reflection of a mismatch between an individual's values and abilities and the work environment characterized by technology features of dynamism, intrusiveness and complexity. The idea of match/mismatch implies a non-changing, almost static relationship between the individual's characteristics and the environment's attributes (Mark & Smith, 2008). However, the dynamic environmental attributes of ICT intensive work environments push employees into situations they did not originally anticipate, prompting higher misfit and inevitably negative outcomes (Tong et al., 2015; X. Wang et al., 2020).

P-E fit theories have come under criticism for their lack of clarity in defining what attributes constitute the 'person' and the 'environment', as well as their inability to make specific predictions regarding related constructs (Edwards, 2008). Further, the characteristics of the work environment play a more pivotal role than the P-E fit itself as outcomes have been more strongly associated with environmental attributes than with either P-E fit or personal attributes (Van Vianen, 2018). In today's work environments, where ICT use is both a fundamental necessity as well as the primary driver of change in the ways work is done, presence of fixed environmental attributes is highly improbable. Subsequently, individual employees must continually revise their personal values and expectations about these changing environmental attributes. This, in turn, renders the fit concept ineffective in predicting employee outcomes.

In addition to the person and environment attributes, a technologically complex

business landscape necessitates changing patterns of interactions between employees and their work characteristics (Cascio & Montealegre, 2016). The interaction between the person and their environment is addressed in the Transactional Model of Stress and Coping (TMS) (Lazarus & Folkman, 1987). As per this theory, stress results from a transaction between "a condition that causes stress" and an "individual's response to it". Stressors are considered as stimuli in the work environment perceived by most employees in most situations as having a negative impact on them (Demerouti et al., 2001). Stressors create strain through psychological mechanisms of stress appraisals. Therefore, stressors, by definition require a negative cognitive appraisal of a "threat, loss or challenge" attached to them (McCrae, 1984). By taking the view that all ICT characteristics are stressors, the potential benefits of ICT usage such as opportunities for flexible work, greater access to information, and capitalizing on new business models such as the gig economy get underrepresented.

Although the stressor-strain literature makes the distinction between challenge and hindrance stress, this differentiation has its theoretical foundations in the job demands literature. Cavanaugh et al. (2000, p 66-67) in their influential paper define challenge stress as "*work stress associated with challenging job demands*" and hindrance stress as "*stress associated with job demands or work circumstances that involve excessive or undesirable constraints that interfere with or hinder an individual's ability to achieve valued goals*." This suggests that challenge or hindrance stress results from dealing with specific types of challenge or hindrance demands. The TMS also underscores the importance of employees' specific cognitive appraisals or independent evaluations of the stressors in creating strain and subsequent negative outcomes. But the use of ICT for work is not subject to determination by employees based on their individual evaluations of whether it is helpful or not. Rather it is a ubiquitous presence that

employees must expend effort to deal with (Cascio & Montealegre, 2016). Therefore, a theoretical perspective that goes beyond stress appraisals and investigates technostressors as inherent characteristics of the work environment is required. In this regard, the Job Demands-Resources model is proposed as an alternate theoretical lens that overcomes the shortcomings of the P-E fit model and Transactional Model of Stress and Coping in studying technostressors.

2.4 TECHNOSTRESSORS AS JOB DEMANDS

While stressors come with a negative connotation as those aspects of the work environment that exceed an employee's capacity to deal with, job demands refer to "physical, psychological, social, or organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) effort or skills and are therefore associated with certain physiological and/or psychological costs" (Schaufeli & Bakker, 2004, p 296). This implies that irrespective of positive or negative evaluations about ICT usage, employees will have to attend to and continue to use ICT at the workplace. Aspects of the work environment that have been characterized as demands include work overload, work-home conflict, time pressure, role ambiguity, computer problems, complexity, job insecurity, cognitive demands and pace of change (Schaufeli, 2017; Schaufeli & Taris, 2014). As can be seen from this list, technostressors create similar pressures such as overload, work-home conflict, complexity, insecurity and uncertainty as do the existing job demands, but differ from them primarily by the intensive use of technology to carry out one's work functions.

In addition to the skew towards negative outcomes, extant studies of technostressors do not consider whether there exist interrelationships between them; instead, combine them all as a single construct. If the use of technology can differentially relate to work outcomes, as indicated by empirical studies that show some employees find it enabling

(Fujimoto et al., 2016) and others find it stressful (Agogo & Hess, 2018), its conceptualization as a homogeneous construct masks true relationships between the individual technostressors and work outcomes. That is, merging the different technostressors under a single construct may cancel out or minimize its true effect on work outcomes, especially if positive associations can be expected between some of these technostressors and work outcomes and negative associations can be expected between the others and work outcomes. Therefore, this thesis investigates technostressors' distinctive work outcomes through a nested sub-system model that accounts for their interrelationships as well as their proximal and distal influences on outcomes of burnout and work engagement. While there are calls to investigate influences on technostressors (Tarafdar et al., 2019), no study has examined whether some of these technostressors can lead to others. To address this, an alternate conceptualization using the locus of control theory (Spector, 1982) is examined - where techno-overload, techno-invasion, and techno-complexity positively influence techno-insecurity and techno-uncertainty, thus forming a nested sub-system within the overall construct of technostressors.

2.5 NESTED SUB-SYSTEM MODEL OF TECHNOSTRESSORS

In the organizational behaviour domain, studies of both job insecurity and uncertainty have demonstrated that factors such as overload, work-home conflicts and ambiguity positively impact insecurity and uncertainty. For instance, the job insecurity literature identifies overload, role conflict and diminished core-self evaluations as predictive of job insecurity (Blackmore & Kuntz, 2011; Greenhalgh & Rosenblatt, 2010; Låstad et al., 2014). The job uncertainty literature identifies strategic changes such as mergers and acquisitions, structural changes involving job roles and reporting structures, and job-related changes such as technology-mediated work as contributing to job

uncertainty (Bordia et al., 2004). Strategic and structural uncertainty involves macroeconomic conditions and top management decisions that are outside the purview of this thesis. Antecedents of job-related uncertainty include ambiguity of work tasks (A. De Jong et al., 2001) and time urgency (Rastegary & Landy, 1993). Within the organizational behaviour literature, it can be seen that insecurity and uncertainty are influenced by factors similar to overload, invasion and complexity. Therefore, it may be fruitful to examine whether these five technostressors are components of an interrelated nested sub-system. The rationale for employing a nested sub-system is explained in the subsequent paragraphs.

Locus of control originated from Rotter's Social Learning Theory (SLT) (Rotter, 1972) and refers to the extent to which people believe they have control over events (Phares, 1968; Rotter, 1966). Within the social learning theory, locus of control is an expectancy about the extent to which outcomes are contingent upon individual effort and includes both generalized and specific expectancies (Nowicki, 2017). Generalized expectancies refer to situations that are ambiguous, fluid and amorphous, where having an internal locus of control is more likely to protect individuals from adverse consequences. In contrast, specific expectancies refer to situations where one is experienced and has adequate knowledge about the task, and where one's locus of control does not necessarily play a role in determining one's behaviours.

As has been outlined earlier, technology-intensive work environments are characterized by frequent changes, upgradations, accessibility, and time pressures, thereby creating conditions that promote generalized expectancies (J. Lee, 2016). In such situations, stable and enduring core self-evaluations and efficacy beliefs gain even more importance in protecting the individual from fear of job loss or uncertainty. An internal locus of control, as opposed to an external one, has been related to greater self-efficacy,

core self-evaluations, competence and behavioural control (Galvin et al., 2018; Ng et al., 2006; Phillips & Gully, 1997). However, the three technostressors of overload, invasion and complexity hinder one's core self-evaluations and self-efficacy beliefs leading to techno-insecurity and uncertainty for reasons detailed in the following sections.

2.5.1 Impact of Techno-Overload, Invasion and Complexity on Techno-Insecurity

First, techno-overload, through increased expectations of efficiency and productivity introduces new and ever-increasing 'temporal standards' for performance, i.e. to produce more in lesser time (Rastegary & Landy, 1993). However, this increased performance expectation is also accompanied by interruptions (such as frequent e-mails) and multi-tasking (such as divided attention between virtual meetings and impending work tasks) that prevent the successful completion of valued work goals (Galluch et al., 2015). Second, techno-invasion, through increased 'availability' expectations, blur work-home boundaries (Ayyagari et al., 2011; Schlachter et al., 2018), and create fear of losing out if not connected continuously (S. B. Lee et al., 2016). Thus, both techno-overload and techno-invasion reduce employees' sense of control over when, where and how they will accomplish valued work goals. Lastly, techno-complexity not only represents learning pressures over and above regular work tasks but also makes up objective demands in the work environment (Tarafdar et al., 2007). The complexity of technology, necessitating frequent skill revisions may not allow individuals to generate stable and enduring core self-evaluations or efficacy beliefs about their technological prowess (Ragu-Nathan et al., 2008). As employees learn and familiarize a current skill set, newer and emerging technologies create additional learning pressures and cognitive overload (O'Driscoll et al., 2010).

Research has already established that perceptions of control over one's work function (Debus et al., 2014; Greenhalgh & Rosenblatt, 2010) and enduring core self-evaluations (Låstad et al., 2014) negatively influence job insecurity. Greater external work locus of control, where environmental characteristics (such as technology) drive the nature and pace of work, has been implicated in increased feelings of general job insecurity (Bosman et al., 2005; Keim et al., 2014). Therefore, by reducing one's internal sense of control and efficacy over one's job, techno-overload, invasion and complexity positively impact techno-insecurity.

Hypothesis 1: *a) Techno-overload, b) Techno-invasion and c) Techno-complexity will be positively related to techno-insecurity*

2.5.2 Impact of Techno-Overload, Invasion and Complexity on Techno-Uncertainty

Uncertainty created by technology changes is made up of workflow and task uncertainty. Workflow uncertainty occurs when the work system's external environment is dynamic and complex. It refers to the lack of knowledge by the employee about "what, where, and when inputs and outputs will enter or leave the workstation" (Slocum & Sims, 1980, p. 195). Techno-overload, through time urgency, work intensification and managing multiple streams of information simultaneously, and techno-invasion, through expectations of availability and immediate responses, prevent individuals from creating structurally well-defined work tasks and role expectations, indicative of a loss of internal control. Task uncertainty, on the other hand, is a result of "incomplete technical knowledge about how to produce the desired outcome" and refers to the challenges faced by the individual employee in accomplishing the work tasks due to this lack of knowledge (Slocum and Sims, 1980, p 195). Techno-complexity, through learning pressures and the need to constantly upskill oneself in the face of new and emerging technologies, therefore, contribute to task uncertainty. It

could also contribute to debilitating feelings of self-esteem or efficacy, due to constantly shifting standards of knowledge and performance.

There is some evidence indicating that an internal locus of control helps managers more effectively adapt technology resources in high uncertainty situations (Chong & Eggleton, 2003), and that core self-evaluations, comprising self-efficacy, self-esteem and locus of control, serve a protective function in the presence of general change and task uncertainty (Haynie et al., 2016). Although studies indicate that an internal locus of control can help cope with organizational change (such as brought upon by hardware, software and network upgrades) (Judge et al., 1999; Lau & Woodman, 1995), characteristics of techno-overload, invasion and complexity precipitate a shift from internal to an external, in this case, technology-dependent sense of control. Given the above general pattern of associations, it is expected that techno-overload, techno-invasion and techno-complexity positively influence techno-uncertainty.

Hypothesis 2: *a) Techno-overload, b) Techno-invasion and c) Techno-complexity will be positively related to techno-uncertainty*

2.6 IMPACT OF THE NESTED SUB-SYSTEM MODEL OF TECHNOSTRESSORS ON BURNOUT AND WORK ENGAGEMENT

The presence of job demands influences work outcomes such as burnout and work engagement. Burnout is an individual's psychological response to chronic occupational stressors (Halbesleben & Demerouti, 2005). It is characterized by a) *emotional exhaustion*, implying feelings of 'being overextended' and drained of one's energies, b) *cynicism*, referring to feelings of apathy, detachment and hostility towards one's job, and c) *reduced professional efficacy,* denoting reductions in feelings of proficiency, adequacy and productivity with regard to one's skills and competencies at work (Maslach et al., 2001). While this conceptualization has led to the development of a

three-component Maslach Burnout Inventory (MBI), researchers point to its psychometric limitations due to potential wording biases (Halbesleben & Buckley, 2004). To overcome this bias, the Oldenburg Burnout Inventory (OLBI) was developed along similar theoretical lines, but with two instead of three sub-scales namely exhaustion and disengagement from work (Halbesleben & Demerouti, 2005). Exhaustion has been defined as a "consequence of intensive physical, affective and cognitive strain, that is, as a long-term consequence of prolonged exposure to certain job demands", while disengagement from work has been defined as "distancing oneself from one's work in general, work object, and work content" (Demerouti et al., 2010, p 210)

Contrary to burnout, work engagement refers to an active, positive work-related state of mind characterized by high levels of vigour, dedication and absorption with one's work tasks (Schaufeli et al., 2006). Vigour denotes high energy, mental resilience, arousal and maintenance of effort in one's work. Dedication refers to feelings of significance, inspiration, enthusiasm, and pride in one's work. Absorption implies persistent attention and concentration at work (Schaufeli et al., 2002). Work engagement, a widely studied construct in organizational behaviour literature (for a review, see Bailey et al., 2017) has received scant attention within studies of technostressors.

The Job Demands-Resources theory also provides the theoretical support for factors leading to burnout and work engagement (Demerouti et al., 2001). Job demands, i.e., pressures that require employees to expend cognitive, emotional and/or behavioural effort in addressing these pressures, impact burnout and work engagement through dual processes of health-impairing and motivational pathways respectively. The health-impairing pathway asserts that burnout is positively influenced by job demands, and is

supported by empirical studies demonstrating both quantitative job demands such as overload and time pressures, and qualitative job demands such as role conflict and ambiguity impact burnout positively (Maslach et al., 2001). With regard to the impact of job demands on work engagement, although the initial conceptions of the JD-R theory did not predict any relationship between these two (Bakker et al., 2007), later studies did not support this (Mauno et al., 2010). For instance, a meta-analysis by Halbesleben (2010) identified that job demands negatively predicted all three dimensions of work engagement. While general job demands have received adequate support in predicting burnout and work engagement, technostressors as job demands unique to technology-intensive work environments have not received attention within both the JD-R and technostress literature.

As has been explained earlier by the nested sub-system model of technostressors, techno-overload, techno-invasion and techno-complexity positively impact techno-insecurity and techno-uncertainty. However, with regard to the impact of techno-insecurity and techno-uncertainty, it is proposed that the unique technology aspect of these demands will lead to different predictions than has been observed within the general job demands literature. The distinction between challenge and hindrance demands is used to predict differential main effects for techno-insecurity and techno-uncertainty.

2.6.1 Challenge and Hindrance Job Demands

Specifically, job demands are classified as challenge or hindrance demands (Van den Broeck et al., 2010). Challenge demands are those work characteristics that although pressurizing, act as enablers or motivators towards the realization of work goals. Hindrance demands are also work characteristics that are pressurizing, but they act in

a manner that creates stress thereby detracting employees from the realization of their work goals. As challenge and hindrance demands can both exert pressure on employees, they are related positively to burnout. However, with regard to work engagement, challenge demands increase work engagement, whereas hindrance demands reduce work engagement (Crawford et al., 2010).

The nature of demands that are characterized as challenges involve greater workloads, time pressures and higher responsibilities; the nature of demands that are characterized as hindrances involve role conflicts, role overloads and organizational factors beyond the control of the individual, such as organizational politics, and job insecurity (Lepine et al., 2005; Podsakoff et al., 2007). The job demands literature classifies both job insecurity and uncertainty, as hindrance demands increasing burnout and reducing work engagement (Crawford et al., 2010; N. P. Podsakoff et al., 2007). Evidence points to job insecurity resulting in poorer mental health (Sverke et al., 2002) and insecure working conditions, such as distrust of co-workers leading to poorer job performance (B. De Jong et al., 2015). Uncertainty in the work environment lead to decrements in goal clarity and precision impeding job satisfaction and performance (Arvey et al., 1976). The present work posits that techno-insecurity increases burnout and reduces work engagement, acting as a hindrance demand. But, contrary to the general expectation, techno-uncertainty is proposed to increase both burnout and work engagement, serving a challenge demand function.

2.6.2 Impact of Techno-Insecurity and Techno-Uncertainty as Challenge and Hindrance Demands

Hindrance demands primarily lead to tensions, anxiety and exhaustion (Netemeyer et al., 1995; N. P. Podsakoff et al., 2007). Studies have already established that job insecurity positively predicts burnout (De Witte et al., 2016; Jiang & Lavaysse, 2018)

and negatively predicts work engagement (De Spiegelaere et al., 2014; Guarnaccia et al., 2018; Vander Elst et al., 2012). Studies of insecurity within ICT intensive work environments report its positive influence on work stress and negative influence on job satisfaction (Florkowski, 2019). In line with the predictions of the JD-R theory, it is hypothesized that techno-insecurity, characterized by fears of job loss, either to emerging technology or to more technologically skilled co-workers acts as a hindrance demand and positively influences burnout, while negatively influencing work engagement.

Hypothesis 3: *Techno-insecurity a) positively impacts burnout and b) negatively impacts work engagement*

Podsakoff et al. (2007) state that challenging work characteristics motivate learning and growth (Boswell et al., 2004; Lepine et al., 2005). Techno-uncertainty, through frequent upgrades, introduces ambiguities that are beyond the individual's ability to predict or control (Tarafdar et al., 2007). Frequent ICT upgrades create pressures to keep up and up-skill, but they also provide the necessary, up-to-date tools for employees to carry out their work efficiently. For example, upgrading ICT infrastructure by modernizing hardware, software, internet and communications applications improved administrative performance in terms of better time management and planning ability (Limbu et al., 2014). In the context of sales performance, the adoption of new technologies positively influenced job performance (Jelinek et al., 2006). Therefore, this work expects that the frequent changes in hardware, software and network denoting techno-uncertainty acts like a challenge demand and influences both burnout and work engagement positively.

Hypothesis 4*: Techno-uncertainty a) positively impacts burnout and b) positively impacts work engagement*

2.7 MEDIATION THROUGH PSYCHOLOGICAL NEEDS SATISFACTION

In addition to the skew towards negative outcomes, the mechanisms underlying the impact of technostressors are unexamined (Tarafdar et al., 2019; Tarafdar, Gupta, et al., 2015). Towards resolving this, the Self Determination Theory (SDT) is used to propose psychological needs satisfaction (PNS) as the mechanism (Deci & Ryan, 2000) that explains the differential effects of techno-insecurity and techno-uncertainty on burnout and work engagement. Despite its relevance in the general job demands literature, the role of PNS remains unexplored in studies of technostressors.

SDT explains that there exist three innate and basic psychological needs across all individuals (Deci & Ryan, 2000; Ryan & Deci, 2000; Vansteenkiste & Ryan, 2013). They are i) the need for autonomy, denoting one's desire to steer one's work tasks and career as per one's own choice; ii) need for competence, denoting a desire for task mastery and ability to accomplish one's goals despite challenges; and iii) need for relatedness, denoting a desire to belong to, identify and have meaningful relationships with individuals in one's work environment (Baard et al., 2004; Deci et al., 2017). The presence of job demands can either promote or reduce employees' psychological need satisfaction. Psychological need satisfaction has been linked to increases in intrinsic motivation and performance (Deci & Ryan, 2000; Deci et al., 2017). When the needs of autonomy, competence and relatedness are satisfied, there is increased performance, vitality, individual well-being and psychological growth, whereas need frustration impairs psychological health (Gagné & Deci, 2005; Vansteenkiste & Ryan, 2013).

The proposition that techno-insecurity and techno-uncertainty as job demands impact employees' psychological need satisfaction is further supported using the Conservation of Resources theory (Hobfoll, 1989). According to the Conservation of Resources

theory, the presence of demands diminishes an individual's finite corpus of cognitive and affective capacities. This, in turn, affects the extent to which individuals' needs for autonomy, competence and relatedness are satisfied. The seminal study by Van den Broeck et al. (2008) identified that need satisfaction could play a role in the relationship between demands, resources, exhaustion and vigour. Further, a meta-analysis by Van den Broeck et al. (2016) identified that it is not merely the presence of a demand but rather its nature that determines the impact of job demands on need satisfaction. This study identified that certain demands, such as cognitive demands relate positively to need for competence and relatedness while emotional demands associated with role stressors and job insecurity related negatively to the need for autonomy, competence and relatedness.

Techno-insecurity representing the fear of losing one's job and skill advantage to colleagues or to advanced technology restricts the satisfaction of the basic psychological needs. Studies within the job insecurity literature underscore this assertion. Urbanaviciute et al. (2018) demonstrated that qualitative job insecurity (perceived threats of losing salient job features but not the job itself) significantly undermined psychological needs satisfaction. Quantitative job insecurity (the fear of losing the job itself) has been related to the frustration of the basic psychological needs of autonomy, competence and relatedness (Vander Elst et al., 2012), as well as to hindrance appraisals further resulting in emotional exhaustion (Charkhabi, 2019). Similar outcomes may be expected in the presence of techno-insecurity, when feelings of insecurity arise due to intensive work-related use of technology.

Per SDT, the work environment must provide the necessary conditions for satisfaction of basic psychological needs for individuals to stay motivated, engaged and not burnt out. However, techno-insecurity impedes relationship need satisfaction through

reductions in knowledge sharing and teamwork, for fear of replacement by one's colleagues who might know more about the technology (Tarafdar et al., 2007). It also undermines competence need satisfaction by creating the constant need to update one's technology skills, failing which an employees' current skills become redundant and lose competitive advantage (Nam, 2019; Pirkkalainen et al., 2019; Van Den Broeck et al., 2014). Further, techno-insecurity is detrimental to autonomy need satisfaction because of fears of being replaced if one does not keep up with the pace of technology-intensive work. This affects employees' sense of control and volition, characteristics intrinsic to the need for autonomy (Ryan & Deci, 2000).

While uncertainty in the job demands literature is expected to be a hindrance demand (Cavanaugh et al., 2000; Crawford et al., 2010; N. P. Podsakoff et al., 2007), within the context of technology-intensive work environments, uncertainty will be a challenge demand, increasing employees' engagement and motivation at work. Techno-uncertainty connotes the frequent hardware, software and network upgradations carried out by the organization (Tarafdar et al., 2007) which requires the individual to be open to novelty and alert to distinctions with every hardware and software update. This is indicative of attentional and cognitive demands, both of which promote the satisfaction of basic psychological needs (Van den Broeck et al., 2010). For example, technological uncertainty was positively related to task autonomy (Brass, 1985). This study argued that high technological uncertainty prevents a rigid formalization of the work processes. Instead, high uncertainty, stemming from increased technology use encourages organizations to provide greater flexibility to employees in the conduct of their work, thereby possibly satisfying their need for autonomy. Further, the frequent technology upgrades, although straining an employee's resources to keep up, may also be perceived as being 'provided with the latest and cutting-edge tools' necessary to

perform one's work function efficiently. For instance, at the firm level, propensity for technology upgrades provided a greater competitive advantage in terms of technical competence (Claybaugh et al., 2017). Similarly, at the individual level too, techno-uncertainty, while creating pressures to keep up with the frequent software, hardware and network changes, may contribute to feelings of competence. Technology changes and upgrades will necessitate communication and coordination between and across members of different teams (Barrett, 2018). This in turn enhances relatedness need satisfaction.

The mediating role of psychological need satisfaction has been demonstrated between job characteristics and outcomes such as turnover intentions, work-related well-being (Ilardi et al., 1993), strain and performance (De Gieter et al., 2018). However, there exists no test of its role in relation to technostressors, as also its role in creating differential effects when techno-insecurity and techno-uncertainty act as job demands. The earlier arguments provide grounds to expect a negative association between techno-insecurity and need satisfaction, but a positive association between techno-uncertainty and need satisfaction. Hence, the present work hypothesizes that:

Hypothesis 5*: Psychological need satisfaction mediates:*

a) *The positive relationship between techno-insecurity and burnout*
b) *The negative relationship between techno-insecurity and work engagement*

Hypothesis 6: *Psychological need satisfaction mediates:*

a) *The positive relationship between techno-uncertainty and burnout*
b) *The positive relationship between techno-uncertainty and work engagement*

2.8 MODERATING EFFECTS OF RESOURCES

Per the JD-R theory, the presence of demands in the workplace is counter-balanced by the presence of resources. Job resources refer to "aspects of the job that may: (a) be functional in achieving work goals; (b) reduce job demands and the associated

physiological and psychological costs; and (c) stimulate personal growth and development" (Schaufeli & Bakker, 2004, p. 296). These could be at the physical, psychological, social or organizational level (Bakker et al., 2005) and irrespective of the level at which they are available (individual, leader or organization), predict performance and well-being (Nielsen et al., 2017). Organizational work resources reflect organizational support intended to design and manage work in a manner that seeks to increase discretion, skills and autonomy while coping with the pressures imposed by workplace demands. They include organizational justice, internal communication, training and development, availability of tools, and participatory decision making (Schaufeli, 2017). Individual resources are intrinsic qualities or behaviours that allow employees to deal with workplace demands without decreases in well-being or performance (Xanthopoulou et al., 2007). Mindfulness, psychological capital (hope, optimism, efficacy, resilience) and organizational based self-esteem are examples of personal resources (Grover et al., 2017, 2018; Xanthopoulou et al., 2007). Leadership resources reflect social supports that reduce job demands and promote positive work attitudes and job performance (Bakker & Demerouti, 2017). They include styles of leadership, such as transactional, transformative or engaging leadership as well as the nature of the supervisor-subordinate relationship, such as Leader-Member-Exchange (LMX) quality (Breevaart et al., 2014; Hakanen et al., 2018; Thomas & Lankau, 2009).

In the following sections, the potential of each kind of resource, organizational, personal and leader support, in buffering the negative impacts and boosting the positive impacts of technostressors are examined. The Conservation of Resources (COR) theory is utilized to justify the moderating role of resources in the relationships that follow. Per COR, resources offset the impact of demands by creating additional cognitive and

emotional capacities, or, by replenishing existing but diminished capacities (Hobfoll, 1989). The new and replenished capacities alleviate burnout through the health-impairing pathway, and promote work engagement through the motivational pathway (Bakker et al., 2014).

2.9 TECHNOSTRESS INHIBITORS AS ORGANIZATIONAL RESOURCES

In the context of technostress, the mitigation mechanisms are analogous to workplace resources as they are aimed at increasing the performance, well-being and efficiency of the employee by either reducing job demands, or by creating support systems to manage existing demands. One of the recorded mitigation mechanisms is the resource provided by the organization called 'technostress inhibitors' which refer to support systems provided by the organization to better manage and reorganize ICT intensive work (Ragu-Nathan et al., 2008; Tarafdar et al., 2011; Tarafdar, Pullins, et al., 2015). Ragu-Nathan et al. (2008) delineate literacy facilitation, involvement facilitation and technical support provision as technostress inhibitors provided by the organization. *Literacy facilitation* refers to the implementation of training and development programmes and the creation of knowledge sharing platforms to increase learning opportunities that widen the range of employees' ICT skills. Providing end-user training before the implementation of a new ICT work feature and actively encouraging knowledge sharing while dealing with technology-related complexities are examples of literacy facilitation. *Technical support provision* refers to the availability of adequate support systems and knowledgeable staff for the unhindered use of ICT for the execution of work tasks (e.g., availability and ease of access to helpdesks and responsiveness to support requests). *Involvement facilitation* refers to consulting employees on ICT deployment and use decisions. Getting the employees' buy-in for the method and manner of ICT use, incentivizing learning and experimenting with the latest technology are examples of involvement facilitation. Literacy facilitation,

technical support provision and involvement facilitation reflect opportunities for development, task-related supports and job control, all of which have been positively linked to work engagement (Bailey et al., 2017). Within the technostress literature, technostress inhibitors have been linked to positive outcomes such as job satisfaction, continuance commitment and organizational commitment (Ragu-Nathan et al., 2008), and satisfaction with ICT use (Fuglseth & Sorebo, 2014).

Resources are expected to moderate the adverse impact of demands on outcomes (Bakker et al., 2005). However, given that current studies have not examined a nested sub-system model of technostressors, it is unclear as to how technostress inhibitors as organizational resources will buffer the impacts of techno-overload, invasion and complexity on techno-insecurity and uncertainty, as well as the differential impacts of techno-insecurity and uncertainty on burnout and work engagement.

2.9.1 Technostress Inhibitors as a Buffer Within the Nested Sub-System Model of Technostressors

As has been outlined earlier, the primary mechanism through which techno-overload, invasion and complexity negatively impact techno-insecurity and techno-uncertainty is through erosions in perceptions of control, efficacy and core self-evaluations. Provisions for consultative and participative decision-making, made available through involvement facilitation, can reduce perceptions of job insecurity among employees (Probst, 2005). Resources such as literacy facilitation promote learning opportunities, increases in which can help deal with the challenges posed by techno-complexity. Technical support provision provides the specialized know-how and assistance to keep up with the overload and complexity associated with intensive ICT use at work. Determining the extent of engagement with technology during non-work hours, as is available through involvement facilitation could buffer the unfavourable impacts of

techno-invasion on the outcomes (Schlachter et al., 2018). Therefore, it is proposed that the greater availability of technostress inhibitors will a) weaken the impact of a) techno-overload, b) techno-invasion and c) techno-complexity on techno-insecurity and techno-uncertainty.

Hypothesis 7: *Under conditions of high technostress inhibitors, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened*

Hypothesis 8: *Under conditions of high technostress inhibitors, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened*

Although studies indicate that technostress inhibitors were directly positively related to job satisfaction, performance and productivity, organizational commitment (Jena, 2015; Ragu-Nathan et al., 2008) and end-user satisfaction (Fuglseth & Sorebo, 2014), their moderating role in the relationship between technostressors and outcomes were not supported (Hung et al., 2015; Ragu-Nathan et al., 2008; Schwarz, 2000). The empirical evidence regarding general ICT supports is also ambiguous. While the presence of 'organization-level ICT supports' reduced the effect of ICT hassles and ICT induced learning expectations on strain (Day et al., 2012), a field experimental study by Chen et al. (2009) indicated there was no effect of an ICT resource workshop on reduction of anticipatory stress after a new technology implementation. Despite the finding that technostress inhibitors were directly negatively related to technostress creators (Tarafdar, Pullins, et al., 2015), technostress inhibitors as a moderator of the technostressor-outcomes relationship have received mixed support.

2.9.2 The Impact of Technostress Inhibitors on the Mediated Relationship

The mixed evidence on the effectiveness of technostress inhibitors has the implication

that studies thus far have overlooked proximal mediating variables through which resources effect changes, i.e., how exactly technostress inhibitors as resources could offset the immediate impacts of technostressors on outcomes. Since job resources influence the job demands-outcomes relationships through pathways of psychological need satisfaction (PNS) (Van den Broeck et al., 2008), this thesis proposes PNS as a proximal mediating mechanism through which technostress inhibitors influence relationships to burnout and work engagement.

Technostress inhibitors, as organizational resources promote the intrinsic satisfaction of the psychological needs of autonomy, relatedness and competence based on the following evidence. Indirect empirical support for the moderating role of technostress inhibitors can be found in studies conducted in other work contexts. For example, job-specific training, such as simulation-based training in resuscitation among medical residents and nutrition training among nutrition counsellors led to increased competence in their respective fields (Langhan et al., 2009; Sunguya et al., 2013); decision latitude promoted control and autonomy over one's work tasks (Karasek, 1979); and task-related supports such as providing advice or direct assistance in completing difficult assignments lead to coordination gains among team members (Hüffmeier & Hertel, 2011). In a related manner, despite the presence of technostressors, literacy facilitation provides training and development opportunities, thereby satisfying competence needs; involvement facilitation activates feelings of decision latitude and belongingness, thereby satisfying autonomy and relatedness needs; technical support provision increases availability and assistance, thereby satisfying competence and relatedness needs. Satisfaction of the basic needs of autonomy, relatedness and competence will, in turn, impact burnout and work engagement (Van den Broeck et al., 2008). In light of the above evidence, it is proposed

that higher levels of technostress inhibitors will lead to differential impacts of techno-insecurity and techno-uncertainty on burnout and work engagement, through its influence on work-related psychological need satisfaction.

Hypothesis 9*: Under conditions of high technostress inhibitors,*

- *a. The positive relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker*
- *b. The negative relationship of techno-insecurity mediated by psychological need satisfaction to work engagement will be weaker*
- *c. The positive relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be weaker*
- *d. The positive relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger*

2.10 PERSONAL RESOURCES

In addition to organization provided resources, the concept of personal resources has been gaining attention within the JD-R framework (Xanthopoulou et al., 2007). They refer to "positive self-evaluations that are linked to resiliency and refer to individuals' sense of their ability to control and impact upon their environment successfully" (Xanthopoulou et al., 2009, p. 236). However, within the technostress literature, a majority of the studies have investigated only the organizational level support mechanisms (Day et al., 2012; Ragu-Nathan et al., 2008; Tarafdar et al., 2010; Tarafdar, Pullins, et al., 2015). There is a dearth of studies on how employees who are ICT users can by themselves tackle demands imposed by technostressors (Pirkkalainen & Salo, 2016; Tarafdar et al., 2019).

2.10.1 Mindfulness as a Personal Resource

The origins of mindfulness date back to Buddhist texts of the second millennium BC (Ekman et al., 2005). Mindfulness has been defined as "a state of consciousness characterized by receptive attention to and awareness of present events and experiences, without evaluation, judgment, and cognitive filters" (Glomb et al., 2011, p 119). It refers to the awareness resulting from an attentive, non-judgmental perception of

present moment stimuli (Kabat-Zinn, 1994). Common across all definitions of mindfulness is the idea that it is a state of consciousness in which the individual intentionally focuses attention on both internal and external stimuli. Also called 'bare attention', it allows the individual to perceive experience as it is, without applying one's pre-conceived formulations and expectations of what the experience could have been or what it should be (Bodhi, 2011). The emotional balance that accompanies mindfulness reduces cognitive pre-potent or auto-pilot reactions which are known to prolong stress cycles (K. W. Brown & Ryan, 2003).

Although organizations are now increasingly adopting mindfulness at the workplace (for a review see Lomas et al., 2017; Sutcliffe et al., 2016), it was originally intended to mitigate chronic pain and prevention of relapse in major depressive episodes through processes of self-regulation (K. W. Brown et al., 2007; J. D. Creswell, 2017; Kabat-Zinn, 1982; Teasdale et al., 2000). Eventually, the concept was expanded to develop positive mental states such as subjective well-being (K. W. Brown & Ryan, 2003) and flow (Cathcart et al., 2014). Examination of its role as a personal resource is even more recent and calls for further investigation (Grover et al., 2017). Through the adoption of a decentered perspective, greater response flexibility, reduced automaticity and more positive emotions, mindfulness promotes resilience and self-control (Glomb et al., 2011; Good et al., 2016) - attributes that characterize personal resources (Xanthopoulou et al., 2007).

Personal resources have the potential to enhance work engagement as per the JD-R theory. Mindfulness too can positively impact work engagement through increases in authentic functioning, and attention to and involvement with the task (Leroy et al., 2013; Malinowski & Lim, 2015). Despite its prevalence and use as a stress reduction program, dispositional mindfulness has not received adequate attention within the

technostress mitigation paradigm (which has been skewed towards institutional support). Studies have also indicated that mindfulness can serve a protective function when encountering difficult work circumstances. For instance, Fisher et al. (2019) have identified the potential of mindfulness to weaken the relationship between overload and mental and physical symptoms of strain. Similarly, Grover et al. (2017) have conceived of mindfulness as a personal resource in reducing perceptions of emotional demands and psychological stress. Employees with higher mindfulness encountered lesser need frustration when subjected to a controlling work environment (Schultz et al., 2015). Mindfulness also contributed to employee well-being by acting as a buffer against rude and uncivil treatment at work (Tarraf et al., 2019). It is possible, therefore, to conceive of mindfulness as a boundary condition wherein high or low levels of mindfulness can impact the hypothesized relationships differently.

In addition to the COR theory that explains how resources mitigate detrimental impacts of job demands, the theoretical underpinnings for the moderating role of mindfulness also stem from literature in cognitive, clinical and counselling psychology. The primary mechanism through which mindfulness serves a protective function is decentering (K. W. Brown et al., 2007), also known as reperceiving (Shapiro et al., 2006). Decentering connotes the objective relationship a mindful individual develops towards their thoughts and emotions. At its core, it involves a shift in perspective, from narrow self-referential processing coloured by cognitive and emotional distortions to an open, non-judgmental acceptance characterized by perceptual clarity and equanimity (Shapiro et al., 2006; Sears and Kraus, 2009). This in turn enhances self-regulation, flexibility in responses, and greater capacity to pay attention to and engage with difficult situations. An unbiased processing of technostressors can thus become possible through the decentering capacity of mindfulness.

Further, neuroscience literature indicates that mindfulness improves two distinct forms of attention–'concentrative' and 'receptive' attention (Jha et al., 2007). The former is confined to a specific focus, while the latter denotes an open awareness of all that constitutes one's current experience, such as sensations, thoughts, emotions and memories. In the context of technostressors, this concentrative attention could translate to greater absorption to one's work tasks in the face of multiple information and communication distractions (Chan & Woollacott, 2007). The receptive attention widens perceptual breadth by maintaining non-reactive awareness of one's immediate environment. This could translate to alertness and awareness in the face of frequent ICT upgrades, and developing adaptive responses through appropriate conflict monitoring and task prioritization (Chiesa et al., 2011). Through focused attention and open awareness, mindfulness could protect individuals from the attentional and cognitive demands posed by technostressors such as techno-overload and techno-complexity, while the quality of emotional balance protects individuals from stress and anxiety that could stem from emotional demands of techno-invasion.

2.10.2 Mindfulness as Self-Regulated Attention and Orientation to Experience

Specifically, the present work aims to investigate mindfulness as two components namely self-regulated attention (SRA) and orientation to experience (OTE). A single unidimensional view of mindfulness is not suitable for the general population who are not exclusive mindfulness practitioners (Aguado et al., 2015; Gu et al., 2016; Williams et al., 2014). This aligns with studies that find a single higher-order factor does not emerge among non-mindfulness practitioners for certain measures such as the Five Facet Mindfulness Questionnaire (Baer et al., 2006). In line with the conceptual definitions of mindfulness proposed by Bishop et al., 2004 and Shapiro et al. (2006), self-regulated attention comprises the observing, describing and non-reactivity to

present moment experience as attributes of mindfulness, whereas orientation to experience comprises the acting with awareness and non-judgmental acceptance of present moment experience as attributes of mindfulness. Self-regulated attention involves the ability to simply observe and label thoughts without reacting to inner and outer experiences that are indicative of present moment attentiveness (Lutz et al., 2008; Tran et al., 2013); orientation to experience involves being non-judgmental of inner experience and acting with awareness (Tran et al., 2013)

2.10.3 Mindfulness as a Buffer within the Nested Sub-System Model of Technostressors

Techno-overload, techno-invasion and techno-complexity create pressures to keep up with the work intensification, continuous availability and constant learning, failing which one fears losing one's job to technology or individuals more knowledgeable about the technology (Nam, 2019). Evidence from cognitive psychology indicates that mindful individuals are less susceptible to attentional lapses and off-task interruptions (Slutsky et al., 2018) created by techno-overload. They are also less susceptible to the automatic-pilot reactions created by techno-invasion. Through non-judgmental appraisals and reduced ego-referential processing, mindfulness enables positive states of mind that could serve a protective function amidst fears of techno-insecurity. Mindfulness also enables individuals to be less attached to their personal preferences (Hafenbrack et al., 2014; Hopthrow et al., 2017), but instead non-judgmentally recognize and engage with the merits of learning pressures associated with techno-complexity (K. W. Brown & Ryan, 2003).

Further, studies in other contexts indicate the positive association of mindfulness with self-efficacy (Hanley et al., 2015; Roche et al., 2014), perceived control (Pagnini et al., 2016), and core self-evaluations (Kong et al., 2014), all of which are implicated in the

negative impact of techno-overload, invasion and complexity on techno-insecurity and techno-uncertainty. Therefore, through the above processes, SRA and OTE components of mindfulness are expected to reduce the negative impacts of techno-overload, techno-invasion and techno-complexity on techno-insecurity and uncertainty.

Hypothesis 10: *Under conditions of high self-regulated attention, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened*

Hypothesis 11: *Under conditions of high self-regulated attention, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened*

Hypothesis 12: *Under conditions of high orientation to experience, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened*

Hypothesis 13: *Under conditions of high orientation to experience, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened*

2.10.4 The Impact of Mindfulness on the Mediated Relationship

Mindfulness enables the satisfaction of basic psychological needs of competence, autonomy and relatedness (Rigby et al., 2014). Reductions in mindfulness relate to reduced personal competence in a sample of college students (Ying, 2008); and a mindful education programme in the classroom increased the social and emotional competence of adolescents (Schonert-Reichl & Lawlor, 2010). Competence involves not just the desire to succeed, but also to grow beyond one's current potential, requiring an open acceptance and receptivity towards feedback (Deci & Ryan, 1985). Mindfulness was also shown to impact high-risk students' psychological well-being and distress through increases in autonomy (Parto & Besharat, 2011). In a study of daily behavioural motivation, mindful individuals tended to show greater autonomously motivated behaviour than less mindful individuals (Levesque & Brown, 2007). An

acute perception of current experiences could increases one's autonomy orientation (Hodgins et al., 2006). Relatedness- the need to have a sense of belongingness and meaningful connections depends in large part on one's empathy and ability to be emotionally available for others. Mindfulness was associated with increased relationship satisfaction in both studies of familial relationships (Carson et al., 2004; Barnes et al., 2007) and among the general population (Saavedra et al., 2010). While mindfulness can contribute to positive work outcomes in highly dynamic work environments (Dane & Brummel, 2014), its impact on psychological need satisfaction, particularly within the technostress context is yet to be examined. Both in accordance with the JD-R theory that a personal resource can serve a stress-buffering role (Schaufeli & Taris, 2014) and based on the above arguments the following hypotheses on the role of SRA and OTE are put forward:

Hypothesis 14: *Under conditions of high self-regulated attention:*

a. *The positive relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker*
b. *The negative relationship of techno-insecurity mediated by psychological need satisfaction to work engagement will be weaker*
c. *The positive relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be weaker*
d. *The positive relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger*

Hypothesis 15*: Under conditions of high orientation to experience:*

a. *The positive relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker*
b. *The negative relationship of techno-insecurity mediated by psychological need satisfaction to engagement will be weaker*
c. *The positive relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be weaker*
d. *The positive relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger*

2.11 LEADERSHIP RESOURCES

Leadership support is a social resource within the JD-R theory (Bakker & Demerouti, 2017). Leaders inspire and strengthen followers by a) creating and replenishing resources such as job control, timely feedback, b) reducing demands by appropriately regulating work-home interference or work overload, and c) establishing social resources such as a good team atmosphere (Schaufeli, 2017).

2.11.1 Leader-Member Exchange (LMX) Quality as a Leadership Resource

LMX is a relationship-based view of leadership, whose central tenet is that effective leadership is the result of a mature leader-follower partnership that create avenues for incremental influence on the part of the leader (Graen & Uhl-Bien, 1995). Unlike styles of leadership that depend on the personal characteristics of the leader, who may either be immediate supervisors or include even top management, LMX focuses on the nature and quality of the dyadic relationship between employees (follower) and their immediate reporting authority. Although leadership research has validated the beneficial effects of transformational and authentic leaders on subordinates' stress and well-being (Nielsen et al., 2008; Tims et al., 2011), a meta-analysis by Harms et al. (2017) has shown that the leaders' behaviours and the nature of their relationship with their subordinates has a greater impact on subordinate stress and well-being than the personal attributes that make up a certain leadership style, such as a transactional or transformational leadership style. This supervisor-subordinate relationship quality has received scant attention in studies of technostress mitigation. Therefore, per JD-R theory, leader-member-exchange (LMX) quality as a leadership resource in the relationships between technostressors and hypothesized outcomes is investigated (Ellis et al., 2019)

2.11.2 LMX Quality as A Buffer Within the Nested Sub-System Model of Technostressors

Higher LMX quality mitigates the impact of techno-overload, information and communication overload on perceptions of insecurity and uncertainty through better clarity and communication of work goals. Specifically, in the context of technology overload, Harris et al. (2015) found that LMX quality moderated the negative influence of system feature and communication overload on work-family conflict. LMX quality mitigates the impact of techno-invasion, by giving employees the choice and control to establish their preferred work-life boundaries, thus reducing employee fears of 'losing out' or being perceived as inefficient if they did not stay connected. Studies show that higher LMX quality is protective in the face of high work and time pressures, and low work-family balance (Aleksić et al., 2017; Tummers & Bronkhorst, 2014)

LMX quality promotes a feeling of 'organizational insider status' thereby reducing perceptions of job insecurity (H. J. Wang et al., 2019). LMX quality can ensure adequate advance communication about organization level technology upgrades and hence reduce some uncertainty associated with the same. Empirical work demonstrates that employees with higher LMX quality reported greater satisfaction with regard to personal feedback in one-on-one supervisory communication, as well as with corporate communication intimating organization-wide policies (Mueller & Lee, 2002). Since high-quality LMX reinstates a greater sense of internal locus of control by enabling greater decision latitude, trust, empowerment and mutual respect (Ellis et al., 2019; Erdogan & Enders, 2007), it is hypothesized that it will weaken the negative effect of techno-overload, techno-invasion and techno-complexity on techno-insecurity and techno-uncertainty.

Hypothesis 16: *Under conditions of high LMX quality, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened*

Hypothesis 17: *Under conditions of high LMX quality, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened*

2.11.3 The Impact of LMX Quality on The Mediated Relationship

Per COR theory, high LMX quality will reduce the negative impact of job demands and serve a motivating role by both adding new capacities and by replenishing diminishing capacities of individuals. Accordingly, studies show that LMX quality reduced feelings of job insecurity by promoting 'organizational insider status' (H. J. Wang et al., 2019) and contribute to better performance by reducing uncertainties in the work context (Rosen et al., 2011). As in general job insecurity and uncertainty, similar gains are expected in the presence of techno-insecurity and techno-uncertainty. Specifically, it is hypothesized that LMX quality reduces the negative impact of techno-insecurity on PNS and boosts the positive impact of techno-uncertainty on PNS for the following reasons.

Employees perceiving a high-quality LMX relationship feel valued, acknowledged, and supported by their supervisors (Graen & Uhl-Bien, 1995). A meta-analysis of LMX research indicates that employees perceive greater psychological empowerment and lesser role ambiguities and conflict when LMX quality is high (Dulebohn et al., 2012). Other studies also report increased occupational self-efficacy (Jawahar et al., 2018; Schyns et al., 2005) and psychological capital (Liao et al., 2017) as a result of high LMX quality. High LMX quality promotes open conversations about work goals and timelines and therefore contributes to greater autonomy and control over one's job (Mueller & Lee, 2002). The mutual trust and reciprocal obligation characterizing LMX quality could satisfy employee needs for relatedness and belongingness (Graen & Uhl-

Bien, 1995). High LMX quality relationships are also characterized by greater feedback-seeking (Eichhorn, 2009) and support for continued employee engagement in learning activities (Bezuijen et al., 2010), both of which are crucial in competence need satisfaction.

The interpersonal climate created by immediate supervisors are instrumental to subordinate perceptions of self-worth and need satisfaction (Deci et al., 1989, 2017). However, its role as a leadership resource moderating the influence of techno-insecurity and techno-uncertainty as job demands (through PNS) remains unexamined, leading to the following hypotheses:

Hypothesis 18: *Under conditions of high LMX quality,*

- *a. The positive relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker*
- *b. The negative relationship of techno-insecurity mediated by psychological need satisfaction to engagement will be weaker*
- *c. The positive relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be weaker*
- *d. The positive relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger*

The hypothesized relationships are illustrated in Fig 2.2

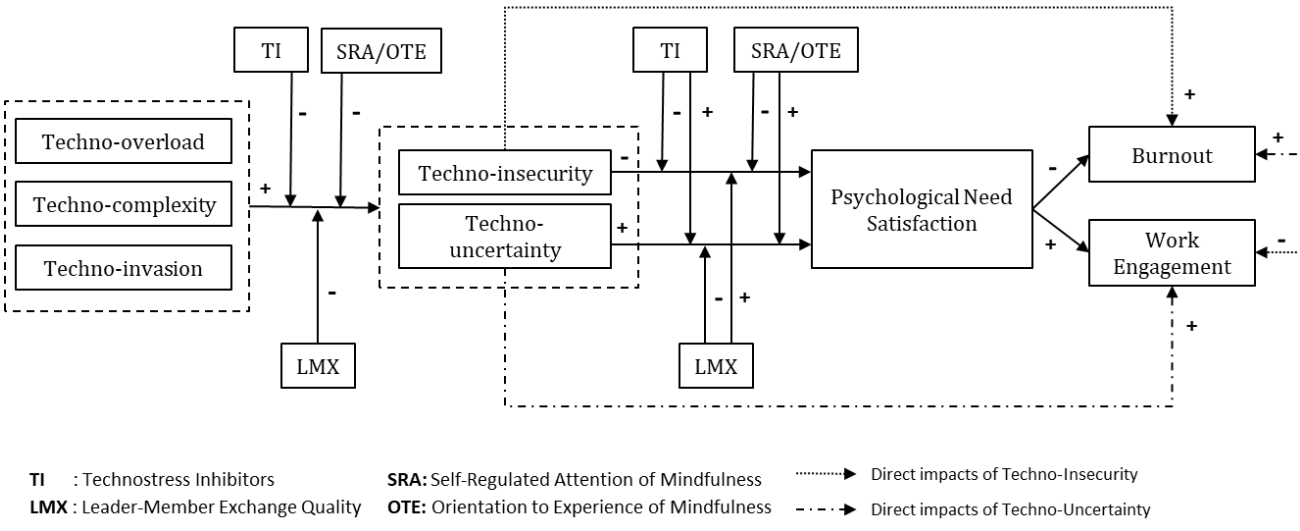

Fig 2. 2 Conceptual Model

2.12 CHAPTER SUMMARY

In summary, this chapter examined the existing studies of technostressors and identified a negative skew in the outcomes associated with them. Evaluating the underlying theories used in extant literature helped in determining their disadvantages when applied to the study of technostressors. Therefore, an alternate theoretical perspective of the Job Demands-Resources theory was proposed to study the relationships between the technostressors and their outcomes. The Locus of Control theory was used to substantiate the nested sub-system among the technostressors, and the Self Determination theory was used to explain psychological need satisfaction as a mediator leading to distinctive positive and negative impacts of technostressors. Lastly, the concept of organizational, personal and leadership resources as detailed in the Job Demands - Resources theory was used to support technostress inhibitors, mindfulness and LMX quality as moderators of the technostressors – outcomes relationships. Based on an extensive analysis of existing evidence, a novel conceptual model (Fig. 2.2) was developed with eighteen hypotheses for further empirical testing.

CHAPTER 3: METHODOLOGY

The previous chapters discuss the purpose of the study, demonstrate the need for the study by articulating the research gaps, and review the preceding literature that lay the foundation for the present study. This chapter will discuss, at length, the research methodology adopted to conduct this study. This will include a description of the research design, selected population, steps taken to design and assess the questionnaire and the selected sampling methodology. Specifics of the research methodology adopted are discussed in the sections that follow.

3.1 RESEARCH DESIGN

A research design represents the plan or blueprint of how the researcher will go about solving the research problems (J. W. Creswell, 2014). This plan is an intersection of the three components of research philosophy, research design and research methods. The present study uses the postpositivist research philosophy as it is best suited to address the research questions of the study namely, i) to what extent do technostressors, delineated as a nested sub-system impact burnout and work engagement, ii) the role of psychological need satisfaction as a mediating mechanism, and iii) to what extent do resources namely technostress inhibitors, mindfulness and leader-member exchange quality act as moderators of the technostressors – outcomes relationship.

In a postpositivist paradigm, the existing theory is used to build hypotheses aimed at providing rich explanations and predictions of the phenomena under investigation (Saunders et al., 2019). Other key assumptions include the objectivity of the researcher and standardized measurements. This paradigm typically uses deductive inquiry using highly structured quantitative methods and large samples. A deductive method starts with a set of hypotheses, followed by data collection and analyses. If the results of the

data analyses support the original premise, the underlying theory is corroborated; if not, the theory is modified and this process is restarted to examine the modified theory (Blaikie, 2010). Quantitative methods seek to explain attitudes and trends of a population by examining a subset of that population (J. W. Creswell, 2014). Specifically, this study employs a cross-sectional survey design using structured questionnaires to validate the hypotheses framed in the preceding chapter. Since the objectives of the study include exploring novel relationships not tested before as well as comparing effects of multiple variables at the same time, a cross-sectional method is found appropriate (Bethlehem, 1999). Getting the time and interest of employees working full time in organizations for a research study is challenging (Lindsay, 2005). A cross-sectional design solves this problem by contacting participants only at a single point in time. Further, it ensures greater anonymity and privacy of participants which are important concerns when they are asked to rate work-related experiences. Figure 3.1 (adapted from Saunders et al., 2019) presents a snapshot of the present study's research plan.

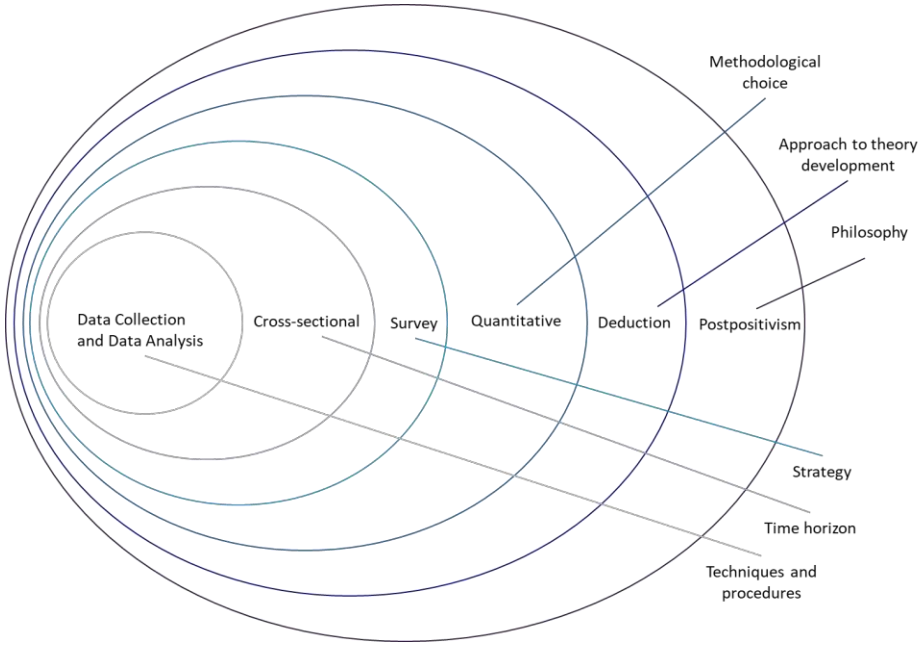

Fig 3. 1 Snapshot of the Research Plan

3.2 QUESTIONNAIRE DESIGN

Self-reporting via administered surveys has been the preferred method to measure psychological variables in social sciences (Stoop & Harrison, 2012). Survey methodology incorporates a predefined series of questions to collect responses from a geographically-distributed sample, and the results produced by this methodology can be generalized to the population of interest (Fowler, 2009). Well-established scales were used to operationalize the study variables. The questionnaire was designed to collect information that would provide insights on the impact of work-related Information and Communication Technology (ICT) on an employee's well-being and engagement. Throughout the survey, participants were asked questions about how using ICT for work-related purposes has impacted them. The questionnaire consisted of twelve sections – two sections each for technostressors, mindfulness, psychological need satisfaction (PNS), burnout, and one section each for technostress inhibitors (TI), leader-member exchange quality (LMX) and work engagement. Demographic variables measured were age, gender, marital status, highest educational qualification, work experience in the current organization, total work experience, frequency of ICT use as part of day-to-day work, a measure of how much control a participant had in using ICT to carry out their work tasks, position in the organization, functional area of work, presence of meditation practice, and duration across time of said meditation practice.

3.2.1 Scales Used

Technostressors

The five technostressors were measured using 23 items from the Technostressors' scale (Tarafdar et al., 2007) with a five-point Likert type response format (1 = Strongly

Disagree to 5 = Strongly Agree). Technostressors comprise five subdimensions. **Techno-Overload** occurs when ICTs coerce users to work faster and longer. **Techno-Invasion** occurs when ICTs create a culture that blurs work-related and personal contacts, such that employees are always reachable and feel compelled to be constantly connected. **Techno- Complexity** occurs when users feel that their computer skills are inadequate and are forced to spend time and effort in learning and understanding ICTs due to their perceived complexity. **Techno- Insecurity** occurs when users feel threatened about losing their jobs either due to automation or being replaced by people who have a better understanding of ICTs. **Techno-Uncertainty** occurs due to continuous ICT upgrades that unsettle users such that they feel compelled to constantly keep up with changing ICTs.

Table 3. 1 Measurement Items for Technostressors

Variable	Item Code	Item
Techno-Overload	ts_1	I feel I need to work much faster due to availability of technology
	ts_2	I feel I need to do more work than I can handle due to availability of technology
	ts_3	Due to availability of technology, I feel I need to work with very tight time schedules
	ts_4	When technology changes, I feel I need to also change my work habits to adapt to them
	ts_5	I have a higher workload because of increased technology complexity
Techno-Invasion	ts_6	I spend less time with my family due to availability of technology
	ts_7	I have to be in touch with my work even during holidays due to presence of technology
	ts_8	I use my vacation and weekend time to keep current on new technology
	ts_9	I feel my personal life is being invaded by availability of technology
Techno-Complexity	ts_10	I do not know enough about latest technologies to handle my job satisfactorily
	ts_11	I need a long time to understand and use new technologies
	ts_12	I do not find enough time to study and upgrade my technology skills
	ts_13	I find new recruits to this organization know more about computer technology than I do
	ts_14	I often find it too complex for me to understand and use new technologies
Techno-Insecurity	ts_15	I feel constant threat to my job security due to new technologies
	ts_16	I have to constantly update my skills to avoid being replaced
	ts_17	I am threatened by coworkers with newer technology skills
	ts_18	I do not share my knowledge with my coworkers for fear of being replaced
	ts_19	I feel there is less sharing of knowledge among coworkers for fear of being replaced
Techno-Uncertainty	ts_20	There are always new developments in the technologies we use in our organization
	ts_21	There are frequent upgrades in computer software in our organization
	ts_22	There are frequent upgrades in computer hardware in our organization
	ts_23	There are frequent upgrades in computer networks in our organization

Burnout

Burnout is defined as a psychological response to chronic work stress (Halbesleben & Demerouti, 2005), and in the present context, specifically a response to technostressors. Burnout was measured along two subdivisions using 16 items from the Oldenburg Burnout Inventory (Demerouti et al., 2010), with a four-point Likert type response format (1 = Strongly Agree to 4 = Strongly Disagree). **Emotional exhaustion** is an intensive physical, affective, and cognitive strain as a result of prolonged exposure to certain job demands. **Disengagement** is when an individual distances oneself from work in general, work object, and work content.

Table 3. 2 Measurement Items for Burnout

Variable	Item Code	Item
Emotional Exhaustion	bo_2	There are days when I feel tired before I arrive at work (R)
	bo_4	After work, I tend to need more time than in the past in order to relax and feel better (R)
	bo_5	I can tolerate the pressure of my work very well
	bo_8	During my work, I often feel emotionally drained (R)
	bo_10	After working, I have enough energy for my leisure activities
	bo_12	After my work, I usually feel worn out and weary (R)
	bo_14	Usually, I can manage the amount of my work well
	bo_16	When I work, I usually feel energized
Disengagement	bo_1	I always find new and interesting aspects in my work
	bo_3	It happens more and more often that I talk about my work in a negative way (R)
	bo_6	Lately, I tend to think less at work and do my job almost mechanically (R)
	bo_7	I find my work to be a positive challenge
	bo_9	Over time, one can become disconnected from this type of work (R)
	bo_11	Sometimes I feel sickened by my work tasks (R)
	bo_13	This is the only type of work that I can imagine myself doing
	bo_15	I feel more and more engaged in my work

(R) indicates reverse scored items

Work Engagement

Work engagement is an active and positive work-related state determined by vigour, dedication, and absorption and was measured using 9 items from the Utrecht Work Engagement Scale (Schaufeli et al., 2006). The scale had a seven-point Likert-type response format (0 = Never to 6 = Everyday). **Vigour** denotes the high levels of energy and resilience while working, an investment in one's work, and persistence in the face of challenges. **Dedication** denotes a sense of pride and enthusiasm towards one's work. **Absorption** denotes deep concentration in one's work such that one experiences difficulties separating oneself from work and time spent working passes quickly.

Table 3. 3 Measurement Items for Work Engagement

Variable	Item Code	Item
Vigour	eng_1	At my work, I feel bursting with energy
	eng_2	At my job, I feel strong and vigorous
	eng_3	When I get up in the morning, I feel like going to work
Dedication	eng_4	I am enthusiastic about my job
	eng_5	My job inspires me
	eng_6	I am proud of the work that I do
Absorption	eng_7	I feel happy when I am working intensely
	eng_8	I am immersed in my work
	eng_9	I get carried away when I am working

Psychological need satisfaction

Psychological need satisfaction is the fulfilment of an individual's needs of autonomy, competence, and relatedness (Deci & Ryan, 2000). **Need for Autonomy** represents an individual's desire to experience a sense of choice and freedom when engaging in an activity. **Need for Competence** represents an individual's desire to feel effective when interacting with the environment. **Need for Relatedness** represents an individual's disposition to feel connected to others, to love and care and be loved and cared for. Psychological need satisfaction was measured using 16 items from the work-related

psychological needs satisfaction scale (Van den Broeck et al., 2010), with a five-point Likert type response format (1 = Totally Disagree to 5 = Totally Agree).

Table 3. 4 Measurement Items for Psychological Need Satisfaction

Variable	Item Code	Item
Need for autonomy	pns_1	I feel like I can be myself at my job
	pns_2	At work, I often feel like I have to follow other people's commands (R)
	pns_3	If I could choose, I would do things at work differently (R)
	pns_4	The tasks I have to do at work are in line with what I really want to do
	pns_5	I feel free to do my job the way I think it could best be done
	pns_6	In my job, I feel forced to do things I do not want to do (R)
Need for competence	pns_7	I really master my tasks at my job
	pns_8	I feel competent at my job
	pns_9	I am good at the things I do in my job
	pns_10	I have the feeling that I can even accomplish the most difficult tasks at work
Need for relatedness	pns_11	I don't really feel connected with other people at my job (R)
	pns_12	At work, I feel part of a group
	pns_13	I don't really mix with other people at my job (R)
	pns_14	At work, I can talk with people about things that really matter to me
	pns_15	I often feel alone when I am with my colleagues (R)
	pns_16	Some people I work with are close friends of mine

(R) indicates reverse scored items

Technostress Inhibitors

Technostress Inhibitors are mechanisms in the organization that could potentially reduce technostress. They constitute three sub-divisions measured on a 10-item scale (Ragu-Nathan et al., 2008) with a five-point Likert type response format (1 = Strongly Disagree to 5 = Strongly Agree). **Literacy facilitation** encompasses mechanisms that foster the sharing of ICT-related knowledge within the organization. **Technical**

support provision includes end-user support activities that solve users' ICT-related problems to reduce the effects of technostress. **Involvement facilitation** refers to providing users with information about the rationale for introducing new ICTs.

Table 3. 5 Measurement Items for Technostress Inhibitors

Variable	Item Code	Item
Literacy facilitation	ti_1	Our organization emphasizes teamwork in dealing with new technology-related problems
	ti_2	Our organization provides employee training before the introduction of new technology
	ti_3	Our organization fosters a good relationship between IT department and employees
	ti_4	Our organization provides clear documentation to end users on using new technologies
Technical support provision	ti_5	Our employee IT help desk is well staffed by knowledgeable individuals
	ti_6	Our employee IT help desk is easily accessible
	ti_7	Our employee IT help desk is responsive to employee requests
Involvement facilitation	ti_8	Our employees are rewarded for using new technologies
	ti_9	Our employees are consulted before introduction of new technology
	ti_10	Our employees are involved in technology change and/or implementation

Mindfulness

Mindfulness is the awareness that results from an attentive, non-judgmental perception of stimuli in the present moment (Kabat-Zinn, 1994). Mindfulness was assessed using 24 items from the Short version of the Five Facet Mindfulness Questionnaire (FFMQ) scale (Bohlmeijer et al., 2011) originally constructed as a 39 item scale (Baer et al., 2008). It consisted of five sub-dimensions, with a five-point Likert type response format (1 = Never True to 5 = Always True). **Observing** involves attending to internal and external experiences, such as sensations, cognitions, emotions, sights, sounds, and smells. **Describing** involves labelling internal experiences. **Acting with awareness**

involves behaviours grounded in the present moment experience, which can be contrasted with behaving mechanically while attention is focused elsewhere. **Nonjudging of inner experience** involves attending to thoughts and feelings without placing arbitrary evaluations of good/ bad or right/ wrong on them. **Nonreactivity to inner experience** involves noticing thoughts and feelings without impulsively responding to them with action.

Since the study participants were drawn from a community sample and not exclusively from a pool of mindfulness practitioners, a single factor higher-order structure for mindfulness with the FFMQ may not be suitable. This aligns with studies that find a single higher-order factor structure may not emerge among non-mindfulness practitioners (Baer et al., 2006). Other studies too have reported that a single higher-order factor solution may not be suitable to assess overall mindfulness, especially when using non-practitioner community samples (Aguado et al., 2015; Gu et al., 2016; Williams et al., 2014). Therefore, this study utilizes the two higher-order constructs of self-regulated attention (comprising observing, describing and non-reactive components) and orientation to experience (comprising acting with awareness and non-judgmental components) identified via their definitions proposed by Bishop et al. (2004) and Shapiro et al. (2006)

Table 3. 6 Measurement Items for Mindfulness

Variable	Sub-Dimension	Item Code	Item
Self-Regulated Attention	Observing	mf_6	I pay attention to physical experiences, such as the wind in my hair or sun on my face.
		mf_10	Generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
		mf_15	I notice the smells and aromas of things.
		mf_20	I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
	Describing	mf_1	I'm good at finding words to describe my feelings.
		mf_2	I can easily put my beliefs, opinions, and expectations into words (R)
		mf_5	It's hard for me to find the words to describe what I'm thinking.
		mf_11	When I feel something in my body, it's hard for me to find the right words to describe it (R)
		mf_16	Even when I'm feeling terribly upset, I can find a way to put it into words.
	Nonreactivity to inner experience	mf_3	I watch my feelings without getting carried away by them.
		mf_9	When I have distressing thoughts or images, I don't let myself be carried away by them.
		mf_13	When I have distressing thoughts or images, I feel calm soon after.
		mf_18	Usually when I have distressing thoughts or images I can just notice them without reacting.
		mf_21	When I have distressing thoughts or images, I just notice them and let them go.
Orientation to Experience	Acting with awareness	mf_8	I find it difficult to stay focused on what's happening in the present moment (R)
		mf_12	It seems I am "running on automatic" without much awareness of what I'm doing (R)
		mf_17	I rush through activities without being really attentive to them (R)
		mf_22	I do jobs or tasks automatically without being aware of what I'm doing (R)
		mf_23	I find myself doing things without paying attention (R)
	Nonjudging of inner experience	mf_4	I tell myself I shouldn't be feeling the way I'm feeling (R)
		mf_7	I make judgments about whether my thoughts are good or bad (R)
		mf_14	I tell myself that I shouldn't be thinking the way I'm thinking (R)
		mf_19	I think some of my emotions are bad or inappropriate and I shouldn't feel them (R)
		mf_24	I disapprove of myself when I have illogical ideas (R)

(R) indicates reverse scored items

Leader-Member Exchange Quality

Leader-Member Exchange (LMX) quality ascertains the dyadic relationship between an employee and their supervisor (Dienesch & Liden, 1986). LMX quality is measured using a 7-item scale (Scandura & Graen, 1984) with a five-point response format, but with different anchor names for each item as was intended in the original measure.

Table 3. 7 Measurement Items for LMX quality

Variable	Item Code	Item
LMX Quality	lmx_1	Do you usually know how satisfied your immediate supervisor is with what you do?
	lmx_2	How well does your supervisor understand your problems and needs?
	lmx_3	How well does your supervisor recognize your potential?
	lmx_4	What are the chances that your supervisor will use their position to help you solve problems in your work?
	lmx_5	What are the chances that your supervisor will "help you out," even if it will cost them something (like time, effort, money or any other resource) to do so?
	lmx_6	I have enough confidence in my immediate supervisor that I would defend and justify their decisions if they were not present to do so.
	lmx_7	How would you characterize your working relationship with your immediate supervisor?

3.3 QUESTIONNAIRE VALIDATION

Content validity refers to "the extent to which the items on a measure assess the same content or how well the content material was sampled in the measure" (Rubio et al., 2003, p 94). Content validity was ensured by adapting items from well-established scales used in previous research studies. To ensure further rigour, a face validity exercise was conducted. Face validity is the extent to which the items are judged to be covering the content of the survey in the context in which it is being used (Anastasi, 1988; Holden, 2010). It is a common scholarly practice to check the relevance, clarity, and applicability of items underlying the constructs with experts and prospective

participants in the field (Connell et al., 2018). Five experts who held senior management positions in the IT /ITES sector were sent a letter with an explanation about the goals of the validity exercise, the aim of the study, and a brief description of the constructs being studied by the questionnaire. Common decision rules that determine which items are to be retained in the final questionnaire include relevance, clarity and representativeness of the items (Hardesty & Bearden, 2004). Accordingly, the experts were asked to indicate their judgment of the items on the questionnaire across the following parameters:

- **Relevance:** Experts were asked to indicate how relevant the item is for the construct being measured (1= Not Relevant; 2=Needs Major Revisions; 3=Needs Minor Revisions; 4= Relevant).

- **Clarity:** Experts were asked to indicate how clear and understandable the item is for the construct being measured (1=Not clear; 2=Needs Major Revisions; 3=Needs Minor Revisions; 4= Clear).

- **Representativeness:** Experts were asked to indicate whether the item represents the construct being studied (1=Not representative; 2=Needs Major Revisions; 3=Needs Minor Revisions; 4=Representative).

All items were judged by these experts to have high relevance, clarity and representativeness. They recommended the wording of five items be changed - the word 'forced to' in the first four items measuring techno-overload were identified as being non-neutral and were suggested to be modified to 'feel the need to'; the item wording of the fifth item in LMX quality was advised to be changed from "bail them out" to "help them out" as some participants may find 'bail them out' confusing. Further, a

committee including supervisors and a random sample of ten individuals who fit the planned sample's profile were also asked to comment on the questions. Their comments aligned with the suggestions given by the experts who helped with face validity, and hence the changes were incorporated into the final questionnaire. In addition to this, as suggested by IT employees who validated the survey, the word end-user in the technostress inhibitors scale was substituted by 'employee' to improve the relatability of the item to the survey respondent.

3.4 POPULATION FOR THE STUDY

The population for the study comprises professionals from the Indian Information Technology (IT)/ Information Technology Enabled Services (ITES) sector. The reasons to limit the study to IT / ITES organizations are provided here. First, IT/ITES organizations are one of the largest job providers in India's organized industry segment, with an estimated 4.5 million people directly employed, and another 12 million people indirectly employed in this sector (Government of India Ministry of Electronics and Information technology, 2021; India Brand Equity Foundation, 2021). Second, it is a sector in which the formal job roles necessitate employees to be continually engaged with and updated about the latest ICT developments. Third, although studies do report that technostressors could impact employees equally irrespective of industry segment (Stadin et al., 2020), it is believed meaningful conclusions can be drawn by ensuring homogeneity of employee experience with ICT and hence confined the population to employees of IT / ITES organizations in India.

3.5 SAMPLING METHODOLOGY

The study was conducted using an individual unit of analysis. Employees of IT/ITES organizations in India were considered as the potential sampling frame for this study.

Despite the prevalent use of ICT within this sector, the intensity with which employees used ICT for their work may differ. Therefore, while recruiting participants for the study, a purposive sampling method was used. Purposive sampling is a non-probability sampling technique that yields highly robust data, as only the responses by participants who meet the set a-priori inclusion criteria are considered for analysis (J. W. Creswell, 2014; Lavrakas, 2008). Screening questions that assess the inclusion criteria included: 1. overall work experience of one year or more and 2. ICT must form some part of their day-to-day work (Day et al., 2012; Maier et al., 2015). An ethics clearance was obtained before commencing data collection for this study.

3.6 DATA COLLECTION

A 5:1 ratio of sample size to the number of free parameters is recommended in the literature (Bentler & Chou, 1987; Kenny, 2020). This study measured 105 items along with 15 demographic questions, rendering a total of 120 indicators. Per the proposed ratio requirement, 120 indicators require a minimum sample size of 600.

The survey was circulated using the Qualtrics online survey platform. The data was collected in two ways. First, with prior approvals from the management board and HR departments, an online link was shared with employees of seven organizations belonging to the small and medium sized enterprise (SME) category. A total of 466 completed responses were received through this approach. Second, data was obtained from individuals who worked at IT / ITES organizations through a snowball method. The social media platforms of Whatsapp and Facebook were used to circulate the survey to individual respondents. A message inviting participants to take part in the study along with the survey link was posted. This message was brief, outlining who was conducting the study, estimated time taken to complete the survey, anonymity of

the respondent and confidentiality of respondent answers. When individuals clicked on the survey link, they were provided with a brief introduction to the study, the structure of the questionnaire as well as an embedded link to the Participant Information and Consent form. The Participant Information and Consent form assured the participants that there were no foreseeable risks by taking part in this study, and that complete confidentiality of responses will be maintained. It also briefly outlined the data management plan by stating that the security and confidentiality of all the information will be ensured by storing the data collected securely on password protected laptops, and that the data stored in any university storage platform will be retained for a period of 7 years. The participants were informed that their participation was completely voluntary and that they can withdraw at any time without having to provide an explanation and without any negative consequence. No monetary or other incentives were provided to participants. However, if they wished to know the results of the study, they could provide their email address to receive the same. The participants were also informed that the results of this study will be used to present conference papers, publish journal articles and book chapters within this area and that no organization or individual will be named in any publications arising from this research. The research supervisor's email address and the Ethics Officer's contact details were also provided in the Information and Consent form, in case any participant wished to contact them.

A total of 252 completed responses were received through this approach, thus leading to a total of 718 responses. Of the 718 responses, 65 were removed due to experience of less than a year or unengaged responses across items, giving a final sample size of 653. There were no significant differences between participants from these two sources on all variables except techno-complexity and work

engagement. To control for this, paths from the type of source to both techno-complexity and work engagement were included in the structural model (Collier, 2020).

3.7 PROFILE OF RESPONDENTS

Analysis of demographic variables namely, gender, age, educational qualification, and work experience are as follows.

Table 3. 8 Demographic Data of Respondents (n=653)

Variable	**Count (%)**	**Variable**	**Count (%)**
Gender		**Education**	
Men	428 (65.5%)	Diploma	43 (6.6%)
Women	218 (33.4%)	Undergraduate Degree	292 (44.7%)
Not specified	7 (1.1%)	Postgraduate degree	273 (41.8%)
		Doctoral degree	4 (0.6%)
		Other	41 (6.3%)
Age		**Experience**	
Less than 21 years	2 (0.3%)	1-3 years	205 (31.4%)
21-30 years	448 (68.6%)	4-6 years	209 (32%)
31-40 years	164 (25.1%)	7-10 years	108 (16.5%)
41-50 years	36 (5.5%)	10-14 years	72 (11%)
Over 51 years	3 (0.5%)	Over 14 years	59 (9.1%)

33.4% of the participants were women, 65.5% were men, and 1.1% of participants did not report their gender. Age was measured as a categorical variable where respondents were required to choose the age group they belonged to. A majority of the participants (68.9%) were under the age of 30, 25.1% of participants were between 31-40 years of age, and another 6% of participants were over 41 years of age. The highest qualification

for 44.7% of the respondents was an undergraduate degree, 41.8 % held a postgraduate degree, and only 0.6 % of survey respondents had a Doctorate. Total work experience ranged from 1 year to over 14 years. 31.4% of participants had work experience ranging from 1-3 years, 32% of participants had work experience ranging from 3-5 years, 16.5% of participants had work experience ranging from 7-10 years, 11% of participants had work experience ranging from 10-14 years, and 9.1 % of participants had work experience of over 14 years.

3.8 PROCEDURAL MEASURES TO ADDRESS COMMON METHOD VARIANCE

One of the main concerns with administering self-report surveys to collect data about both the dependent and independent variables simultaneously is systematic measurement error among said variables. Campbell and Fiske (1959) noted that any measuring instrument inevitably has (a) systematic trait/construct variance due to features that are intended to represent the trait/construct of interest, (b) systematic error variance due to characteristics of the specific method being employed which may be common to measures of other traits/constructs, and (c) random error variance. Malhotra et al. (2006, p 1865) defined Common Method Variance (CMV) as "the amount of spurious co-variance shared among variables because of the common method used in collecting data." When response variations can be attributed to the measurement instrument than the constructs measured by the items of a self-reporting tool, this is known as CMV (Buckley et al., 1990). To minimize CMV, the following procedural precautions as recommended by Podsakoff et al. (2012) were put in place while designing the questionnaire, before data collection:

1. The introduction of a temporal, proximal, or psychological separation between the predictor and criterion variables can control method bias. Through this, the

researcher can reduce the likelihood of a participant relying on using previous answers to fill in the gaps during recall, infer missing details, or answer subsequent questions. Proximal separation was used in this study due to its significant advantages over temporal separation. To counterbalance the presentation of the predictor, criterion, moderator and mediator variables, the order of presentation was randomized using the in-built function of the data collection platform. This ensured that different participants were presented with a different order of the survey sections enabling a proximal separation across the 653 respondents.

2. Unambiguous and concise items were presented in the questionnaire to increase the probability of participants responding accurately, and decrease the likelihood of them defaulting to their personal stylistic response tendencies as well as their sensitivity to context effect. Not more than 12 items per page were presented to participants, for ease of filling. Response fatigue was controlled by permitting participants to take breaks while responding to the questionnaire.

3. The accuracy of responses can be undermined by item wording, such that participants are motivated to edit their responses to be more socially acceptable. This can bias the relationship between the predictor and the criterion. To control for this, participants were informed about the purpose of the study, and informed consent was acquired. Participants were told that there were no right or wrong answers. Their anonymity and confidentiality as participants of this study were guaranteed.

4. Researchers have observed that common scale properties such as scale type, number of scale points, anchor labels, polarity, etc., shared by items used to measure different constructs can also contribute to method bias. To minimize the likelihood

of this bias, different response formats (4-point, 5-point, and 7-point) were provided across various sections of the questionnaire, with different anchors (Strongly disagree to strongly agree; never true to always true) for different scales.

5. Researchers have demonstrated that scale formats that require participants to respond with how strongly they agree or disagree with the survey item may be susceptible to response style biases, i.e., they may disproportionately tend to answer either on the positive or negative side of the scale. This bias can impact the reliability of the measures, correlation and regression coefficients, as well as factor analytic solutions. To control for this bias, three of the seven scales used reverse-scored items interspersed between positively worded items.

3.9 STATISTICAL MEASURES TO ADDRESS COMMON METHOD VARIANCE

After the data collection, the presence of CMV were assessed using the following methods. CMV was first evaluated with Harman's Single Factor test. If CMV were present, when forced to load on a single factor, this factor should account for a large proportion of the covariance. In this study, it was found that the single factor accounted for only 11.46% of the total variance, which is far below the benchmark value of 50%. The method variance was also assessed using the unmeasured latent method factor technique (P. M. Podsakoff et al., 2003, 2012). In this technique, the items are loaded onto their proposed constructs (default model) as well as a first-order common latent factor. The significance of the parameters is then tested for both the models, one with the common latent factor and the other without. A comparison of the regression weights of all the items with the common method factor and without showed a very minimal difference. This indicates the absence of a common latent factor that explained as much or more variance than the default model.

Further, the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was found to be 0.86. Values between 0.8 to 1 indicate the sampling is adequate. Bartlett's test of Sphericity was significant as well, with p values less than 0.05 indicating that the variables are unrelated and therefore the data suitable for factor analysis.

Table 3. 9 Results of the KMO and Bartlett's Test

Test Details	**Results**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.860
Bartlett's Test of Sphericity	$\chi 2$ 28763.407 df 5460 Sig. 0.00

3.10 RELIABILITY AND VALIDITY

Scale reliability determines the extent to which items on the scale are dependable. A measure is said to be reliable if it consistently yields the same results with each measurement, i.e. when a scale is used to measure a construct multiple times, the same result is obtained each time (Peter, 1979). 105 items were measured, of which 35 items were removed due to poor loadings. The remaining 70 items, comprising 66.66% of the total measured items were retained. The retained items with their respective factor loadings are provided in Appendix A. The Cronbach's Alpha of the scales and sub-scales with the retained items are presented in the Table 3.10

Table 3. 10 Cronbach's Alpha of the Scales and Sub-Scales

Second Order Factor	**First Order Factor**	**Cronbach's Alpha for First Order Factors**	**Cronbach's Alpha for Second Order Factors**
Technostressors	Techno- Overload	0.78	0.82
	Techno- Invasion	0.68	
	Techno- Complexity	0.78	
	Techno- Insecurity	0.72	
	Techno-Uncertainty	0.83	
Burnout	Emotional Exhaustion	0.68	0.79
	Disengagement	0.68	
Work Engagement	Vigour	0.7	0.87
	Dedication	0.86	
	Absorption	0.71	

Second Order Factor	First Order Factor	Cronbach's Alpha for First Order Factors	Cronbach's Alpha for Second Order Factors
Psychological Need Satisfaction	Need for autonomy	0.66	0.75
	Need for competence	0.72	
	Need for relatedness	0.59	
Technostress Inhibitors	Literacy facilitation	0.82	0.88
	Technical support provision	0.86	
	Involvement facilitation	0.81	
Self- Regulated Attention	Observing	0.65	0.75
	Describing	0.69	
	Nonreactivity to inner experience	0.65	
Orientation to Experience	Acting with awareness	0.76	0.74
	Nonjudging of inner experience	0.62	
-	LMX Quality	0.84	-

Their respective Composite Reliability (CR) index and Average Variance Extracted (AVE) are outlined in Table 3.11.

Table 3. 11 Establishing Convergent and Discriminant Validity

	1	2	3	4	5	6	7	8	9	10	11	12
1. Self-Regulated Attention	**0.707**											
2. Techno-Overload	0.100	**0.752**										
3. Techno-Complexity	-0.075	0.408	**0.740**									
4. Techno-Invasion	0.072	0.412	0.311	**0.70**								
5. LMX Quality	0.255	-0.093	-0.266	-0.188	**0.719**							
6. Psychological Need Satisfaction	0.659	0.010	-0.102	-0.164	0.568	**0.743**						
7. Techno-Insecurity	-0.127	0.370	0.726	0.323	-0.276	-0.199	**0.727**					
8. Techno-Uncertainty	0.285	0.307	0.227	0.156	0.140	0.258	0.231	**0.795**				
9. Burnout	-0.202	0.097	0.185	0.243	-0.324	-0.401	0.217	-0.063	**0.969**			
10. Work Engagement	0.421	0.007	-0.150	-0.207	0.397	0.580	-0.183	0.178	-0.512	**0.937**		
11. Technostress-Inhibitors	0.448	0.091	-0.063	-0.157	0.426	0.548	-0.130	0.339	-0.259	0.396	**0.792**	
12. Orientation to Experience	-0.362	-0.371	-0.383	-0.397	0.274	0.144	-0.418	-0.101	-0.367	0.220	-0.051	**0.739**
Composite Reliability (CR)	0.73	0.79	0.78	0.70	0.84	0.78	0.77	0.84	0.97	0.96	0.83	0.71
Average Variance Extracted (AVE)	0.50	0.57	0.55	0.49	0.52	0.55	0.53	0.63	0.94	0.98	0.63	0.55

Convergent validity was established with all parameter estimates significantly different from zero at the 0.001 level. The composite reliability and average variance extracted (AVE) were calculated to establish the reliability of the constructs. The composite reliabilities ranged from 0.71 to 0.97, above the 0.60 cut-off suggested by Fornell and Larcker (1981). Most of the constructs meet the 0.50 level of AVE recommended by Fornell and Larcker (1981). Discriminant validity is the extent to which the construct being studied differs from other constructs under consideration. To establish discriminant validity, the Average Variance Extracted (AVE) of each construct was calculated to see if it exceeds the highest squared correlation with any other latent construct (Fornell & Larcker, 1981). The data is said to have discriminant validity if the AVEs of a construct are greater than their squared inter-construct correlations. As indicated by the bold values across the diagonal of Table 3.11, the data shows adequate discriminant validity to proceed with the factor analysis.

3.11 CONFIRMATORY FACTOR ANALYSIS

There are some variables relevant to the theoretical interest of researchers that cannot be directly observed from data. These variables, also known as latent constructs are identified using factor analyses. Confirmatory factor analysis (CFA) is a multivariate statistical test that determines whether the measured items represent the selected constructs, i.e., the construct validity of a proposed theory of measurement. The primary objective of CFA is to test the extent to which a researcher's a-priori theoretical or empirical knowledge of the underlying relationship between variables is representative of the actual data. It is used as a confirmatory test of the theory of measurement, i.e., to see if the data fits the hypothesised measurement model (Hair Jr et al., 2010)

3.11.1 Model fit

The two-step process established by Anderson and Gerbing (1988) was followed to first test the measurement model before testing the relationships using a structural model. The psychometric properties of all the scales were assessed using confirmatory factor analysis (CFA) with AMOS version 20. It is suggested that a good model meets both the absolute and incremental fit indices to establish goodness of fit. With regards to the measurement model, the $\chi 2$, the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Residual (SRMR) are presented as absolute fit indices. The Comparative Fit Index (CFI) is presented as an incremental fit index. A CFI value of over 0.90, $\chi 2$/df value less than 3, SRMR values of less than 0.08 and RMSEA values of less than 0.07 establish a good fit (Hair Jr. et al., 2017).

Two measurement models were tested – one with the five technostressors as first-order factors loading onto a second higher-order factor, and another model with each of the five technostressors retained independently. The other latent variables of the study were also included in both models. As seen in Table 3.12, not all model fit indices of the first model fall within acceptable limits proposed in the literature. The second model shows a better fit compared to the first one, indicating that the five technostressors studied individually contribute to more robust interpretations of the data as opposed to combining all five factors into an overarching second-order construct. The fit indices of the second model ($\chi 2$ = 4029.84, *df* = 2254, $\chi 2/df$ = 1.79, CFI = 0.90, RMSEA = 0.04, SRMR = 0.05) also fall within the acceptable limits as recommended by Hair Jr. et al. (2017). These results lend support to continue with structural model testing retaining the five technostressors as distinct variables.

Table 3. 12 Fit Indices of Models Tested

Model	No of factors	Factors	*χ2/df*	CFI	RMSEA	SRMR
1	8	Technostressors as one-second order factor, Burnout, Work Engagement, Psychological Need Satisfaction, Technostress Inhibitors, Self-Regulated Attention, Orientation to Experience, LMX Quality	1.84	0.88	0.04	0.08
2	12	Techno-overload, Techno-invasion, Techno-complexity, Techno-insecurity, Techno-uncertainty, Burnout, Work Engagement, Psychological Need Satisfaction, Technostress Inhibitors, Self-Regulated Attention, Orientation to Experience, LMX Quality	1.79	0.90	0.035	0.05

3.12 CHAPTER SUMMARY

In summary, this chapter explained the research design adopted for the study, along with an enumeration of the sampling technique, the sample profile, instrumentation, data collection methods as well as the reliability and validity assessments. A Confirmatory Factor Analysis also demonstrated that the data showed acceptable fit indices. This allows a further test of the structural model to verify the hypotheses developed in Chapter 2. The following chapter explains the results of the data analysis, the structural model test as well as explains the insights that can be derived from the obtained results.

CHAPTER 4: RESULTS

The results of the quantitative analyses are explained in this chapter. The chapter begins with the descriptive statistics and correlation analysis of the study variables. Next, the results of the univariate analyses of the seven study variables across the different categories of the demographic variables are presented. These univariate analyses were done to identify the demographic variables that need to be statistically controlled in the structural model. This is followed by tests to ensure the assumptions for Structural Equation Modelling (SEM) are met. Subsequently, the results of the hypothesis tests of the relationships detailed in Chapter 2 are elaborated upon.

4.1 SUMMARY STATISTICS

Descriptive statistics provide a meaningful way to summarize the data so that measures of both the central position of the frequency distribution and the spread of the distribution become readily apparent. In this section the Mean, Standard Deviation (SD), Minimum and Maximum possible scores of the twelve variables under study are discussed. Since there is variability in the response choice formats and anchors, the following table cannot be used to linearly compare the means and SDs of these variables with each other. However, it does provide a useful overview of the data.

Table 4. 1 Descriptive Statistics (n= 653)

Variables	Mean	Std. Deviation	Minimum	Maximum
Techno-overload	3.27	0.92	1	5
Techno-invasion	3.30	0.91	1	5
Techno-complexity	2.56	0.88	1	5
Techno-insecurity	2.46	0.86	1	5
Techno-uncertainty	3.27	0.87	1	5
Technostress Inhibitors	3.60	0.68	1	5
Self-Regulated Attention	3.39	0.59	1	5
Orientation to Experience	3.14	0.69	1	5
Leader-Member Exchange Quality	3.60	0.80	1	5
Psychological Need Satisfaction	3.81	0.52	1	5
Burnout	2.06	0.51	1	4
Work Engagement	5.62	1.32	1	7

4.2 CORRELATION BETWEEN STUDY VARIABLES

Correlation is a statistical tool used to test the relationship between two variables, i.e., it is a measure of the extent to which things are related (Dodge, 2008). Correlations analyze the pairwise relationship between variables, whereas multicollinearity tests are used to analyze joint relationships between multiple variables (Hair Jr et al., 2010). Correlations are calculated and described using correlation coefficients, to describe the strength of the relationship between two variables. In the current study, the Pearson correlation coefficient 'r' was used to assesses the degree as well as direction of a linear relationship between any two variables (Jackson, 2011). SPSS 22 was used to perform the correlation analysis and the results are presented in Table 4.2.

Table 4. 2 Correlations Between Variables

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Techno-overload	1											
2. Techno-invasion	0.36**	1										
3. Techno-complexity	0.33**	0.25**	1									
4. Techno-insecurity	0.32**	0.28**	0.57**	1								
5. Techno-uncertainty	0.26**	0.13**	0.17**	0.17**	1							
6. Technostress Inhibitors	0.07	-0.13**	-0.03	-0.10*	0.29**							
7. Self-Regulated Attention	0.06	0.07	-0.08	-0.08*	0.21**	0.32**	1					
8. Orientation to Experience	-0.27**	-0.27**	-0.25**	-0.30**	-0.09*	-0.06	-0.20**	1				
9. Leader-Member Exchange Quality	-0.08*	-0.14**	-0.21*	-0.23**	0.12**	0.35**	0.20**	0.18**	1			
10. Psychological Need Satisfaction	0.02	-0.08*	-0.08*	-0.16**	0.21**	0.41**	0.41**	0.07	0.39**	1		
11. Burnout	0.09*	0.17**	0.15**	0.18**	-0.04	-0.18**	-0.15**	-0.24**	-0.24**	-0.27**	1	
12. Work Engagement	-0.02	-0.16**	-0.12**	-0.17**	0.14**	0.35**	0.27**	0.14**	0.33**	0.41**	-0.40**	1

(n=653, ** p<.01, * p<.05)

The significant relationships in this table indicate weak to moderate correlations between the technostressors, negative relationships between the technostressors, self-regulated attention, orientation to experience and LMX quality. Depending on the specific technostressor, there are also mixed positive and negative relationships with psychological need satisfaction, burnout and work engagement. Specifically, significant small to moderate positive correlations ranging from 0.125 to 0.566 between the five technostressors can be observed. Psychological need satisfaction is negatively correlated with techno-invasion, techno-complexity, techno-insecurity and burnout, and positively correlated with techno-uncertainty and work engagement. These correlation results provide tentative support for the study's expectations, wherein all technostressors except techno-uncertainty positively correlate with burnout, and negatively with psychological need satisfaction and work engagement.

The rule of thumb of interpreting the size of a correlation coefficient is that when the correlation coefficients of independent variables are greater than 0.90, they indicate a high correlation, i.e., a strong relationship between the variables (Hinkle et al., 2003). Since none of the variables in the study exhibited a high correlation coefficient, the concerns of multicollinearity were reduced. Furthermore, data were examined for possible multicollinearity using Tolerance and Variance Inflation Factor (VIF) scores, as reported under Section 4.4.5.

4.3 ANALYSIS OF DEMOGRAPHIC VARIABLES FOR STATISTCAL CONTROL

As detailed in Chapter 3, demographic data of the participants were collected during the survey. An Analysis of Variance (ANOVA) was conducted to test for significant differences between the means of the groups with respect to the twelve variables under

investigation. Demographic variables for which significant differences existed were subsequently controlled in the SEM analysis.

4.3.1 Gender

In the study, participants were asked to indicate their gender as either "Male", "Female", or "Do Not Want to Specify." Since there were three groups, a one-way ANOVA was conducted. An important assumption of ANOVA is the homogeneity of variance between groups. The Levene's test was used to verify this; four of the variables—techno-complexity, techno-insecurity, techno-uncertainty, and technostress inhibitors demonstrated significance under this test, indicating that the groups were not homogenous for these variables. Since the data defied the homogeneity of variances per a classic ANOVA, a Welch's ANOVA was conducted across the gender groups to observe whether the means were equal. Results of the Welch test indicate that gender did not significantly influence the 12 variables of the study, as can be seen by the seen by the significance values, all greater than 0.05. These results are illustrated in Table 4.3.

Table 4. 3 Analysis of Gender on Study Variables

Variables	Gender	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Techno-overload	Male	428	0.07	1.02	0.3	0.74	2.8	0.09
	Female	218	-0.11	0.98				
	Do not want to specify	7	-0.34	1.09				
Techno-invasion	Male	428	0.04	1	1.43	0.24	0.69	0.52
	Female	218	-0.05	1.04				
	Do not want to specify	7	0.1	0.58				

Table 4.3 (**contd.**)

Variables	Gender	N	Mean	Std. Deviation	Levene Welch		Welch	
					Statistic	Sig.	Statistic	Sig.
Techno-complexity	Male	428	0.02	1.03	3.9	0.02	2.65	0.1
	Female	218	-0.03	0.94				
	Do not want to specify	7	-0.42	0.48				
Techno-insecurity	Male	428	0	1.06	7.2	0	3.58	0.06
	Female	218	-0.01	0.86				
	Do not want to specify	7	-0.76	0.73				
Techno-uncertainty	Male	428	0.02	1.04	3.29	0.04	2.92	0.08
	Female	218	-0.02	0.89				
	Do not want to specify	7	-0.96	1.06				
Technostress Inhibitors	Male	428	0.05	1	6.88	0	1.05	0.37
	Female	218	-0.06	0.99				
	Do not want to specify	7	-0.52	1.95				
Self-Regulated Attention	Male	428	0.04	1.02	0.02	0.98	0.58	0.57
	Female	218	-0.05	1.01				
	Do not want to specify	7	0.11	1				
Orientation to Experience	Male	428	-0.04	1	0.54	0.58	2.76	0.09
	Female	218	0.09	0.98				
	Do not want to specify	7	0.59	0.83				
Leader-Member Exchange Quality	Male	428	-0.04	1.01	1.66	0.19	1.16	0.34
	Female	218	0.07	0.97				
	Do not want to specify	7	-0.48	1.55				
Psychological Need Satisfaction	Male	428	0.05	1.01	2.08	0.13	1.17	0.34
	Female	218	-0.06	0.99				
	Do not want to specify	7	-0.32	1.38				

Table 4.3 (**contd.**)

Variables	Gender	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Burnout	Male	428	-0.03	1.02	0.34	0.71	0.62	0.55
	Female	218	0.06	0.99				
	Do not want to specify	7	-0.21	1.29				
Work Engagement	Male	428	0.05	1.01	0.04	0.97	0.57	0.58
	Female	218	-0.04	0.98				
	Do not want to specify	7	0.12	1.34				

(n=653)

4.3.2 Age

Age was measured using five groups. In order to determine if there was any significant difference that could be observed across the 12 variables due to age, the Levene's test was used to determine homogeneity of variance between groups. The Levene's test was not significant for any of the variables (Table 4.4), indicating that the ANOVA F test could be conducted. On conducting the ANOVA F test among the five different age groups for the 12 variables, it was identified that burnout and work engagement showed significant differences between the groups due to age. These data are available in Table 4.4

Table 4. 4 Analysis of Age on Study Variables

Variables	Age	N	Mean	Std. Deviation	Levene		F	
					Statistic	Sig.	Statistic	Sig.
Techno-overload	Less than 21 Years	2	-0.11	1.3	0.43	0.79	2.32	0.06
	21-30 Years	448	-0.05	0.99				
	31-40 Years	164	0.16	1.05				
	41-50 Years	36	0.07	0.96				
	Over 51 Years	3	-1.15	0.76				
Techno-invasion	Less than 21 Years	2	-0.87	1.83	0.69	0.6	0.8	0.53
	21-30 Years	448	0.02	1				
	31-40 Years	164	0.04	1.01				
	41-50 Years	36	-0.18	1.11				
	Over 51 Years	3	0.29	0.77				
Techno-complexity	Less than 21 Years	2	-0.07	0.8	0.81	0.52	0.21	0.93
	21-30 Years	448	-0.02	1.02				
	31-40 Years	164	0.04	0.97				
	41-50 Years	36	0.09	0.95				
	Over 51 Years	3	0	0.58				
Techno-insecurity	Less than 21 Years	2	-1.31	0.54	0.75	0.56	1.51	0.2
	21-30 Years	448	-0.03	0.98				
	31-40 Years	164	0.08	1.04				
	41-50 Years	36	-0.05	0.93				
	Over 51 Years	3	-0.54	1.02				

Table 4.4 (**contd.**)

Variables	Age	N	Mean	Std. Deviation	Levene		F	
					Statistic	Sig.	Statistic	Sig.
Techno-uncertainty	Less than 21 Years	2	-0.88	0.8	1.45	0.22	1.32	0.26
	21-30 Years	448	-0.04	0.96				
	31-40 Years	164	0.11	1.02				
	41-50 Years	36	0.06	1.21				
	Over 51 Years	3	-0.44	0.95				
Technostress Inhibitors	Less than 21 Years	2	0.27	0.7	1.6	0.17	1.12	0.34
	21-30 Years	448	0.05	0.98				
	31-40 Years	164	-0.12	1.13				
	41-50 Years	36	0.08	0.95				
	Over 51 Years	3	0.55	1.23				
Self-Regulated Attention	Less than 21 Years	2	-0.32	1.35	1.28	0.28	0.14	0.97
	21-30 Years	448	0.01	0.95				
	31-40 Years	164	0.01	1.2				
	41-50 Years	36	0.03	1.02				
	Over 51 Years	3	0.35	1.08				
Orientation to Experience	Less than 21 Years	2	1.2	0.76	1.85	0.12	1.85	0.12
	21-30 Years	448	-0.04	0.95				
	31-40 Years	164	0.07	1.12				
	41-50 Years	36	0.28	0.8				
	Over 51 Years	3	0.12	1.12				

Table 4.4 (**contd.**)

Variables	Age	N	Mean	Std. Deviation	Levene		F	
					Statistic	Sig.	Statistic	Sig.
Leader-Member Exchange Quality	Less than 21 Years	2	-0.14	0.9	1.21	0.3	0.66	0.62
	21-30 Years	448	-0.02	0.96				
	31-40 Years	164	-0.05	1.12				
	41-50 Years	36	0.22	1.07				
	Over 51 Years	3	0.42	1.15				
Psychological Need Satisfaction	Less than 21 Years	2	-1	1.06	1.72	0.14	1.54	0.19
	21-30 Years	448	-0.03	0.95				
	31-40 Years	164	0.11	1.11				
	41-50 Years	36	0.15	1.14				
	Over 51 Years	3	0.6	1.91				
Burnout	Less than 21 Years	2	1.05	1.17	0.22	0.93	3.41	**0.01**
	21-30 Years	448	0.08	0.99				
	31-40 Years	164	-0.21	1.01				
	41-50 Years	36	-0.16	1.08				
	Over 51 Years	3	0.33	1.49				
Work Engagement	Less than 21 Years	2	0.46	0.21	1.03	0.39	3.31	**0.01**
	21-30 Years	448	-0.07	0.98				
	31-40 Years	164	0.16	1.05				
	41-50 Years	36	0.43	0.91				
	Over 51 Years	3	0.26	1.27				

(n=653)

A post-hoc Tukey-Kramer test, chosen due to unequal sample sizes across groups, was performed on the variables of burnout and work engagement. While there are many post-hoc tests available in SPSS, the Tukey-Kramer was conducted as it demonstrates the most reasonable balance between power and Type I error control (Field, 2013). The entire results, including non-significant findings are included in Appendix B. The significant results are highlighted here in Table 4.5. On conducting the Tukey-Kramer test, significant differences were identified in the following groups: between 21-30 and 31-40 age groups for Burnout, and between 21-30 and 41-50 age groups for Work Engagement. Burnout is significantly higher among 21-30 year old participants than 31-40 year old participants. Supporting this, meta-analytic studies indicate a negative correlation between age and aspects of burnout such as emotional exhaustion (Brewer & Shapard, 2004) and depersonalization (Gómez-Urquiza et al., 2017). Work engagement is significantly higher among 41–50-year-old participants than 21-30 year old participants. Studies demonstrate that older, compared to younger employees have higher work engagement (Goštautaite & Bučiuniene, 2015; Kim & Kang, 2017). Subsequently, the influence of age on burnout and work engagement were controlled for in the path model.

Table 4. 5 Tukey-Kramer Post hoc for Age

Variable	**Age**		**Mean Difference**	**Sig.**
Burnout	21-30 Years	Less than 21 Years	-0.96	0.66
		31-40 Years	**0.29**	**0.01**
		41-50 Years	0.24	0.63
		Over 51 Years	-0.25	0.99
Work Engagement	21-30 Years	Less than 21 Years	-0.53	0.95
		31-40 Years	-0.22	0.10
		41-50 Years	**-0.50**	**0.03**
		Over 51 Years	-0.33	0.98

* The mean difference is significant at the 0.05 level.

4.3.3 Educational Qualification

Participants indicated their educational qualifications in one of five categories. In order to determine whether there were significant differences between groups based on educational qualifications, the Levene's test was conducted to determine the homogeneity of variance. Two of the variables namely techno-overload and techno-uncertainty showed significant values indicating that these data violated the assumption of homogeneity of variance between the groups. Based on the results of the Levene's test, a Welch ANOVA was computed for the data across groups. Significant differences based on educational qualification were detected in the following variables—techno-overload, techno-uncertainty, technostress inhibitors, burnout, and work engagement. These data can be seen in Table 4.6

Table 4. 6 Analysis of Educational Qualification (Edu. Qual.) on Study Variables

Variables	**Edu. Qual.**	**N**	**Mean**	**Std. Deviation**	**Levene**		**Welch**	
					Statistic	**Sig.**	**Statistic**	**Sig.**
Techno-overload	Diploma	43	0.38	0.64	3.23	0.01	3.07	**0.03**
	UG Degree	292	0.02	1.02				
	PG Degree	273	-0.04	1.04				
	Doctoral Degree	4	0.35	0.81				
	Other	41	-0.22	1.12				
Techno-invasion	Diploma	43	0.19	0.9	0.8	0.55	1.77	0.16
	UG Degree	292	0	0.96				
	PG Degree	273	0.04	1.05				
	Doctoral Degree	4	-0.87	1.26				
	Other	41	-0.53	1				

Table 4.6 (**contd.**)

Variables	Edu. Qual.	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Techno-complexity	Diploma	43	0.2	0.85	0.63	0.68	1.36	0.27
	UG Degree	292	0.07	1.02				
	PG Degree	273	-0.08	0.99				
	Doctoral Degree	4	-0.07	1.13				
	Other	41	-0.1	1				
Techno-insecurity	Diploma	43	0.11	0.97	0.45	0.82	1.87	0.14
	UG Degree	292	0.09	1.01				
	PG Degree	273	-0.09	0.97				
	Doctoral Degree	4	0.13	0.91				
	Other	41	-0.4	1.02				
Techno-uncertainty	Diploma	43	0.08	0.82	2.6	0.02	4.51	**0**
	UG Degree	292	0.07	0.98				
	PG Degree	273	-0.04	1.04				
	Doctoral Degree	4	-0.41	0.19				
	Other	41	-0.17	0.81				
Technostress Inhibitors	Diploma	43	0.08	0.86	0.81	0.55	3.5	**0.01**
	UG Degree	292	0.11	1.02				
	PG Degree	273	-0.08	1.01				
	Doctoral Degree	4	0.28	0.23				
	Other	41	0.14	1.18				
Self-Regulated Attention	Diploma	43	-0.13	0.97	1.06	0.38	1.22	0.33
	UG Degree	292	0.07	1.08				
	PG Degree	273	0	0.96				
	Doctoral Degree	4	0.32	0.79				
	Other	41	-0.08	1.11				

Table 4.6 (**contd.**)

Variables	Edu. Qual.	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Orientation to Experience	Diploma	43	0.04	0.75	1.03	0.4	0.61	0.69
	UG Degree	292	0.02	1.02				
	PG Degree	273	-0.01	0.99				
	Doctoral Degree	4	-0.06	0.76				
	Other	41	0.4	1.03				
Leader-Member Exchange Quality	Diploma	43	-0.22	0.92	0.15	0.98	0.62	0.68
	UG Degree	292	-0.03	1.01				
	PG Degree	273	0.05	1.02				
	Doctoral Degree	4	-0.07	1.17				
	Other	41	0.07	1.02				
Psychological Need Satisfaction	Diploma	43	-0.14	0.85	0.61	0.69	0.78	0.57
	UG Degree	292	0.04	1.02				
	PG Degree	273	0.01	1				
	Doctoral Degree	4	-0.53	1.11				
	Other	41	0.31	1.3				
Burnout	Diploma	43	0.37	0.77	0.55	0.74	16.24	**0**
	UG Degree	292	-0.16	0.95				
	PG Degree	273	-0.03	0.95				
	Doctoral Degree	4	0.3	0.5				
	Other	41	-0.13	1.04				
Work Engagement	Diploma	43	-0.12	1.09	1.73	0.13	3.2	**0.02**
	UG Degree	292	0.06	1				
	PG Degree	273	0.02	1				
	Doctoral Degree	4	-0.82	1.4				
	Other	41	0.45	1.01				

(n=653)

Since the assumption of homogeneity of variance was not met for these data, the Games-Howell post hoc test was used to identify specific differences between pairs of differing educational qualifications. This post hoc test was selected as it is most appropriate for handling unequal sample sizes, as is the case here (Field, 2013). The entire results, including non-significant findings are included in Appendix B. The significant results are highlighted here in Table 4.7.

The one study that examines the role of educational level on techno-overload and techno-uncertainty did not find significant relationships between them (Marchiori et al., 2018). However, in the present study, diploma holders reported higher techno-overload than both the UG and PG degree holders; and the UG degree holders reported greater techno-uncertainty than doctoral degree holders. The UG degree holders also reported higher technostress inhibitors. Regarding burnout, Bachelor degree holders showed higher tendency for burnout than the other groups (Mukundan & Khandehroo, 2009). In a study of educators, the diploma holders did not show any differences in burnout compared to Bachelor's, Master's and PhD degree holders (Jamaludin & You, 2019). But, in the present study, the diploma holders reported higher burnout than both the UG and PG degree holders. In line with studies in other contexts indicating that individuals with higher educational qualification have greater work engagement (Barkhuizen & Rothmann, 2006; Denton et al., 2008), this study shows that those with UG and PG degrees have higher work engagement. Given such influence of educational qualification on the study variables, it was included as a control variable in the path model.

Table 4. 7 Games-Howell Post hoc for Educational Qualification

Variable	Educational Qualification		Mean Difference	Sig.
Techno-overload	Diploma	UG Degree	0.37	**0.02**
		PG Degree	0.42	**0.01**
		Doctoral Degree	0.03	1
		Other	0.6	0.28
Techno-uncertainty	UG Degree	Diploma	-0.01	1
		PG Degree	0.11	0.78
		Doctoral Degree	0.48	**0.04**
		Other	0.25	0.8
Burnout	Diploma	UG Degree	0.53	**0**
		PG Degree	0.4	**0.04**
		Doctoral Degree	0.07	1
		Other	0.5	0.43
Technostress Inhibitors	Other	Diploma	-0.69	0.08
		UG Degree	-0.72	**0.03**
		PG Degree	-0.53	0.19
		Doctoral Degree	-0.89	**0.02**
Work Engagement	Other	Diploma	-0.31	0.68
		UG Degree	-0.50	**0.02**
		PG Degree	-0.45	**0.05**
		Doctoral Degree	0.39	0.99

* The mean difference is significant at the 0.05 level.

4.3.4 Work Experience

To observe the influence of Work Experience on the 12 variables of the study, a Welch ANOVA was conducted as the Levene's test for homogeneity of variances showed significant results for six of the variables, namely techno-complexity, techno-uncertainty, self-regulated attention, leader-member exchange quality, psychological need satisfaction, and work engagement. Statistically significant differences between the groups based on work experience was observed for the variables of techno-overload, orientation to experience, psychological need satisfaction, burnout, and work engagement. These data are available under Table 4.8

Table 4. 8 Analysis of Work Experience on Study Variables

Variables	Work Experience	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Techno-overload	1-3 Years	205	-0.09	0.94	2.33	0.06	2.51	**0.04**
	4-6 Years	209	0.02	1.06				
	7-10 Years	108	0.09	1.01				
	10-14 Years	72	0.30	0.97				
	Over 14 Years	59	-0.08	1.13				
Techno-invasion	1-3 Years	205	0.00	1.02	0.93	0.45	0.20	0.94
	4-6 Years	209	0.08	0.97				
	7-10 Years	108	0.02	1.00				
	10-14 Years	72	0.00	1.05				
	Over 14 Years	59	-0.01	0.96				
Techno-complexity	1-3 Years	205	-0.08	0.94	3.33	0.01	0.96	0.43
	4-6 Years	209	0.03	1.11				
	7-10 Years	108	-0.04	0.93				
	10-14 Years	72	0.17	0.99				
	Over 14 Years	59	0.02	0.94				
Techno-insecurity	1-3 Years	205	-0.04	0.97	0.59	0.67	0.97	0.42
	4-6 Years	209	-0.03	0.96				
	7-10 Years	108	0.13	1.03				
	10-14 Years	72	0.10	1.05				
	Over 14 Years	59	-0.15	1.03				
Techno-uncertainty	1-3 Years	205	-0.11	0.89	2.62	0.03	1.21	0.31
	4-6 Years	209	0.06	0.98				
	7-10 Years	108	0.05	1.05				
	10-14 Years	72	0.08	1.08				
	Over 14 Years	59	0.10	1.13				
Technostress Inhibitors	1-3 Years	205	0.05	0.95	0.63	0.65	0.38	0.82
	4-6 Years	209	0.06	1.04				
	7-10 Years	108	-0.07	1.04				
	10-14 Years	72	0.08	1.08				
	Over 14 Years	59	-0.01	1.01				
Self-Regulated Attention	1-3 Years	205	-0.05	0.89	3.42	0.01	1.44	0.22
	4-6 Years	209	0.15	0.94				
	7-10 Years	108	-0.07	1.24				
	10-14 Years	72	0.02	1.20				
	Over 14 Years	59	0.13	1.05				

Table 4.8 (**contd.**)

Variables	Work Experience	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Orientation to Experience	1-3 Years	205	0.12	0.94	2.08	0.08	3.06	**0.02**
	4-6 Years	209	-0.11	0.95				
	7-10 Years	108	-0.09	1.05				
	10-14 Years	72	-0.08	1.17				
	Over 14 Years	59	0.28	0.89				
Leader-Member Exchange Quality	1-3 Years	205	-0.03	0.96	3.28	0.01	0.44	0.78
	4-6 Years	209	0.07	0.95				
	7-10 Years	108	-0.06	1.00				
	10-14 Years	72	-0.06	1.27				
	Over 14 Years	59	0.01	1.12				
Psychological Need Satisfaction	1-3 Years	205	-0.14	0.99	3.03	0.02	2.68	**0.03**
	4-6 Years	209	0.12	0.87				
	7-10 Years	108	0.02	1.15				
	10-14 Years	72	0.15	1.03				
	Over 14 Years	59	0.24	1.14				
Burnout	1-3 Years	205	0.08	0.92	0.35	0.84	4.23	**0.00**
	4-6 Years	209	-0.01	0.97				
	7-10 Years	108	-0.09	1.02				
	10-14 Years	72	-0.16	1.01				
	Over 14 Years	59	-0.44	0.89				
Work Engagement	1-3 Years	205	-0.03	0.99	3.77	0.01	8.26	**0.00**
	4-6 Years	209	-0.11	1.02				
	7-10 Years	108	0.04	1.02				
	10-14 Years	72	0.16	1.13				
	Over 14 Years	59	0.53	0.70				

(n=653)

Since the homogeneity of variance assumption of the data was violated, the Games-Howell test used as the post-hoc test. The entire results, including non-significant findings are included in Appendix B. The significant results are highlighted here in Table 4.9. The one study of the influence of work experience on techno-overload did not report a significant association (Marchiori et al., 2018); but, in the present study participants with 10-14 years of work experience reported greater techno-overload than

those with 1-3 years of work experience. Evidence indicates that the impact of mindfulness was stronger for those with more work experience (J. Zhang & Wu, 2014). In line with this, participants with over 14 years of work experience reported higher orientation to experience than those with 4-6 years of work experience. Although there are no studies specifically investigating the effect of work experience on psychological need satisfaction, some evidence points to a negative correlation between the two (Vansteenkiste et al., 2007). But, in the present study, a positive direction was identified, where participants with higher work experience of 4-6 years reported greater psychological need satisfaction than those with lesser work experience of 1-3 years. Lastly those with over 14 years of work experience reported higher work engagement than all the other three groups, as can be expected from other studies that find similar results where more experienced employees indicated higher work engagement than less experienced employees (Mahboubi et al., 2015; Soydan & Bahçecik, 2018; Spence Laschinger et al., 2009). In summary, from Table 4.9, it can be seen that higher one's work experience, higher the techno-overload, orientation to experience, psychological need satisfaction as well as work engagement. In light of these data, work experience was controlled for in the path model.

Table 4. 9 Games-Howell Post hoc for Work Experience

Variable	Work Experience		Mean Difference	Sig.
Techno-overload	1-3 Years	4-6 Years	-0.11	0.81
		7-10 Years	-0.18	0.54
		10-14 Years	-0.4	**0.03**
		Over 14 Years	-0.01	1.00
Orientation to Experience	4-6 Years	1-3 Years	-0.23	0.14
		7-10 Years	-0.02	1.00
		10-14 Years	-0.02	1.00
		Over 14 Years	-0.39	**0.04**
Psychological Need Satisfaction	1-3 Years	4-6 Years	-0.26	**0.06**
		7-10 Years	-0.16	0.75
		10-14 Years	-0.29	0.24
		Over 14 Years	-0.38	0.15
Work Engagement	Over 14 Years	1-3 Years	0.56	**0.00**
		4-6 Years	0.63	**0.00**
		7-10 Years	0.49	**0.00**
		10-14 Years	0.36	0.17

* The mean difference is significant at the 0.05 level.

4.3.5 ICT Use Frequency

Participants were asked to respond with the degrees to which they used ICT for work-related purposes, ranging from very rare to very frequent use. Homogeneity of variance was checked using the Levene's test across these five groups for all 12 variables, and significant results were obtained for the following variables: technostress inhibitors, leader-member exchange quality, psychological needs satisfaction, burnout, and work engagement. Since the data violated the assumption of homogeneity of variance across groups for frequency of ICT usage, a Welch ANOVA test was conducted to determine significance of differences between groups. Significant results were obtained for the following eight variables—techno-complexity, techno-insecurity, techno-uncertainty, technostress inhibitors, self-regulated attention, leader-member exchange quality, psychological needs satisfaction, and burnout. These data are available in Table 4.10

Table 4. 10 Analysis of ICT Use Frequency on Study Variables

Variables	ICT Use Frequency	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Techno-overload	Very rare use	29	0.21	1.09	1.18	0.32	0.80	0.53
	Rare use	67	0.13	0.89				
	Occasional use	135	-0.04	1.00				
	Frequent use	256	0.01	1.02				
	Very frequent use	166	-0.05	1.04				
Techno-invasion	Very rare use	29	0.09	1.14	0.52	0.72	0.12	0.98
	Rare use	67	0.06	0.92				
	Occasional use	135	0.01	1.03				
	Frequent use	256	0.01	1.03				
	Very frequent use	166	-0.02	0.98				
Techno-complexity	Very rare use	29	-0.04	1.02	0.64	0.64	7.30	**0.00**
	Rare use	67	0.25	0.99				
	Occasional use	135	0.26	0.94				
	Frequent use	256	-0.02	1.00				
	Very frequent use	166	-0.29	0.96				
Techno-insecurity	Very rare use	29	0.06	1.09	1.32	0.26	5.38	**0.00**
	Rare use	67	0.27	1.06				
	Occasional use	135	0.19	0.96				
	Frequent use	256	-0.04	0.99				
	Very frequent use	166	-0.25	0.93				
Techno-uncertainty	Very rare use	29	-0.38	1.09	0.86	0.49	2.89	**0.02**
	Rare use	67	0.14	0.88				
	Occasional use	135	-0.17	0.96				
	Frequent use	256	0.10	0.99				
	Very frequent use	166	-0.01	1.01				
Technostress Inhibitors	Very rare use	29	-0.81	1.57	5.85	0.00	3.30	**0.01**
	Rare use	67	-0.08	0.88				
	Occasional use	135	-0.06	0.87				
	Frequent use	256	0.09	1.01				
	Very frequent use	166	0.13	1.00				
Self-Regulated Attention	Very rare use	29	-0.39	1.31	0.73	0.57	5.08	**0.00**
	Rare use	67	-0.40	1.09				
	Occasional use	135	-0.10	1.00				
	Frequent use	256	0.15	0.97				
	Very frequent use	166	0.12	0.95				

Table 4.10 (**contd.**)

Variables	**ICT Use Frequency**	**N**	**Mean**	**Std. Deviation**	**Levene**		**Welch**	
					Statistic	**Sig.**	**Statistic**	**Sig.**
Orientation to Experience	Very rare use	29	-0.14	1.32	1.50	0.20	1.67	0.16
	Rare use	67	0.04	0.96				
	Occasional use	135	-0.14	0.99				
	Frequent use	256	0.02	0.98				
	Very frequent use	166	0.14	0.96				
Leader-Member Exchange Quality	Very rare use	29	-0.57	1.30	2.56	0.04	9.03	**0.00**
	Rare use	67	-0.20	0.91				
	Occasional use	135	-0.31	1.05				
	Frequent use	256	0.07	0.92				
	Very frequent use	166	0.29	0.98				
Psychological Need Satisfaction	Very rare use	29	-0.47	1.52	2.76	0.03	5.41	**0.00**
	Rare use	67	-0.10	0.87				
	Occasional use	135	-0.23	0.93				
	Frequent use	256	0.09	0.99				
	Very frequent use	166	0.22	0.97				
Burnout	Very rare use	29	0.60	1.57	6.98	0.00	2.55	**0.04**
	Rare use	67	0.19	1.03				
	Occasional use	135	0.03	0.91				
	Frequent use	256	-0.04	0.95				
	Very frequent use	166	-0.14	1.02				
Work Engagement	Very rare use	29	-0.18	1.28	3.03	0.02	1.78	0.14
	Rare use	67	-0.23	1.10				
	Occasional use	135	-0.04	1.01				
	Frequent use	256	0.11	0.95				
	Very frequent use	166	0.06	0.96				

(n=653)

As a result of the assumption of homogeneity of variance being violated by the data, a post hoc Games-Howell test was administered across the eight variables to ascertain significant differences between groups regarding frequency of ICT usage. The entire results, including non-significant findings are included in Appendix B. The significant results are highlighted here in Table 4.11. The limited studies that directly examine the impact of ICT use frequency on technostressors show mixed results – some indicate no significant influence (Qi, 2019; Syvanen et al., 2016), while others indicate a positive

effect of high ICT usage on technostressors (Heinrich, 2020). The present study does detect differences based on ICT use frequency among some technostressors. It can be seen that very frequent users reported the least techno-complexity compared to rare, occasional and frequent users; rare and occasional users had higher techno-insecurity than very frequent users; frequent and very frequent users reported experiencing greater presence of technostress inhibitors than very rare users. This is in line with findings in the context of teleworking, where those with low intensity of teleworking were more susceptible to technostressors than those with high intensity of teleworking (Suh & Lee, 2017). Some evidence points to a positive association between ICT use frequency and mindfulness if the ICT enables primary work task performance (B. Wang et al., 2020). Here, frequent and very frequent users reported greater self-regulated attention than rare users. Very frequent users in the present study reported higher LMX quality relationships than very rare, rare or occasional users. This is opposite to evidence that frequent communication through ICT weakened LMX quality through subordinates' feelings of increased distance from their supervisors (Smith, 2019). Frequent and very frequent users also reported higher psychological need satisfaction than occasional users similar to findings that ICT need satisfaction is higher when there is greater ICT availability and use (S. Li et al., 2020). Therefore, ICT frequency was subsequently included as a control variable in the path model.

Table 4. 11 Games-Howell Post hoc for ICT Use Frequency

Variable	ICT Use Frequency		Mean Difference	Sig.
Techno-complexity	Very frequent use	Very rare use	-0.25	0.73
		Rare use	-0.54	**0.00**
		Occasional use	-0.55	**0.00**
		Frequent use	-0.27	**0.04**
Techno-insecurity	Very frequent use	Very rare use	-0.32	0.59
		Rare use	-0.52	**0.01**
		Occasional use	-0.44	**0.00**
		Frequent use	-0.21	0.18
Technostress Inhibitors	Very rare use	Rare use	-0.73	0.15
		Occasional use	-0.75	0.12
		Frequent use	-0.90	**0.04**
		Very frequent use	-0.94	**0.03**
Self-Regulated Attention	Rare use	Very rare use	-0.01	1.00
		Occasional use	-0.30	0.33
		Frequent use	-0.55	**0.00**
		Very frequent use	-0.51	**0.01**
Leader-Member Exchange Quality	Occasional use	Very rare use	0.26	0.85
		Rare use	-0.11	0.93
		Frequent use	-0.38	**0.00**
		Very frequent use	-0.60	**0.00**
	Very frequent use	Very rare use	0.86	**0.02**
		Rare use	0.49	**0.00**
		Occasional use	0.60	**0.00**
		Frequent use	0.22	0.15
Psychological Need Satisfaction	Occasional use	Very rare use	0.24	0.92
		Rare use	-0.13	0.87
		Frequent use	-0.31	**0.02**
		Very frequent use	-0.45	**0.00**

* The mean difference is significant at the 0.05 level.

4.3.6 ICT control

The extent to which participants can control work-related ICT usage was measured across five degrees of control from very low to very high control. The Levene's statistic measuring homogeneity of variance was significant for the following five variables—

techno-overload, technostress inhibitors, psychological need satisfaction, burnout, and work engagement. Since the assumption of homogeneity of variance was violated, the Welch ANOVA was conducted next. The Welch statistic was significant across the following eight variables—techno-complexity, techno-insecurity, technostress inhibitors, self-regulated attention, leader-member exchange equality, psychological needs satisfaction, burnout, and work engagement. These data are available under Table 4.12

Table 4. 12 Analysis of ICT Control on Study Variables

Variables	**ICT Control**	**N**	**Mean**	**Std. Deviation**	**Levene**		**Welch**	
					Statistic	**Sig.**	**Statistic**	**Sig.**
Techno-overload	Very low control	12	0.01	1.36	3.99	0.00	1.21	0.32
	Low control	42	0.15	0.93				
	Avg control	141	0.02	0.97				
	High control	382	0.04	0.97				
	Very high control	76	-0.26	1.21				
Techno-invasion	Very low control	12	-0.17	1.26	1.72	0.14	0.84	0.51
	Low control	42	0.01	0.92				
	Avg control	141	0.00	1.05				
	High control	382	0.06	0.97				
	Very high control	76	-0.17	1.10				
Techno-complexity	Very low control	12	0.19	0.94	2.13	0.08	5.43	**0.00**
	Low control	42	0.16	1.05				
	Avg control	141	0.29	0.96				
	High control	382	-0.07	0.95				
	Very high control	76	-0.31	1.13				
Techno-insecurity	Very low control	12	-0.26	1.06	0.52	0.72	6.71	**0.00**
	Low control	42	0.17	0.99				
	Avg control	141	0.32	0.98				
	High control	382	-0.08	0.96				
	Very high control	76	-0.35	1.05				

Table 4.12 (**contd.**)

Variables	ICT Control	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Techno-uncertainty	Very low control	12	0.00	1.01	0.79	0.53	1.09	0.37
	Low control	42	-0.30	1.17				
	Avg control	141	-0.05	0.98				
	High control	382	0.05	0.97				
	Very high control	76	-0.02	1.04				
Technostress Inhibitors	Very low control	12	-1.00	1.58	7.37	0.00	4.94	**0.00**
	Low control	42	-0.56	1.29				
	Avg control	141	-0.08	0.76				
	High control	382	0.12	0.96				
	Very high control	76	0.12	1.23				
Self-Regulated Attention	Very low control	12	-0.48	1.57	0.71	0.58	8.90	**0.00**
	Low control	42	-0.40	1.06				
	Avg control	141	-0.33	0.95				
	High control	382	0.16	0.99				
	Very high control	76	0.18	0.96				
Orientation to Experience	Very low control	12	0.05	1.48	1.87	0.11	2.06	0.10
	Low control	42	-0.08	0.94				
	Avg control	141	-0.03	0.87				
	High control	382	-0.02	1.02				
	Very high control	76	0.32	1.00				
Leader-Member Exchange Quality	Very low control	12	-0.82	1.62	2.24	0.06	3.64	**0.01**
	Low control	42	-0.06	1.02				
	Avg control	141	-0.18	0.99				
	High control	382	0.02	0.98				
	Very high control	76	0.29	0.95				
Psychological Need Satisfaction	Very low control	12	-0.31	2.10	6.15	0.00	6.76	**0.00**
	Low control	42	-0.31	1.03				
	Avg control	141	-0.23	0.94				
	High control	382	0.06	0.93				
	Very high control	76	0.46	1.09				

Table 4.12 (**contd.**)

Variables	ICT Control	N	Mean	Std. Deviation	Levene		Welch	
					Statistic	Sig.	Statistic	Sig.
Burnout	Very low control	12	1.21	1.37	10.18	0.00	11.11	**0.00**
	Low control	42	0.81	1.37				
	Avg control	141	0.15	0.79				
	High control	382	-0.08	0.91				
	Very high control	76	-0.49	1.14				
Work Engagement	Very low control	12	-0.26	1.45	5.20	0.00	7.28	**0.00**
	Low control	42	-0.60	1.08				
	Avg control	141	-0.19	1.09				
	High control	382	0.13	0.93				
	Very high control	76	0.26	0.85				

(n=653)

Since the data violated the homogeneity of variance, a Games-Howell post hoc test was administered. From Table 4.13, it can be seen that those with average control over ICT use had higher techno-complexity and techno-insecurity than those with high and very high control. Although studies have not directly examined ICT control in relation to technostressors, lack of ICT control has been implicated in general ICT stress (Day et al., 2012). Participants with high control over ICT use reported greater experience of technostress inhibitors than those with low control over ICT use. Since job control is a job resource (Demerouti et al., 2001; Häusser et al., 2010), it is possible for one form of job control, namely ICT control to positively influence the organizational resource of technostress inhibitors. Studies are lacking on the direct relationship between ICT control and mindfulness. But evidence indicates that job control positively related to mindfulness (Lawrie et al., 2018). Likewise, those with high and very high control over ICT use reported more self-regulated attention than those with low and average control over ICT use in this study. Those with very high control over ICT use also reported higher LMX quality relationships than those with high, average and low control over ICT use. Similar to findings that higher control over one's work increased work

engagement (Bakker & Demerouti, 2008; Swanberg et al., 2011), the present study reported that those with high and very high control over ICT use reported greater work engagement than those with low and average control over ICT use. Therefore, ICT control was included as a control variable in the path model.

Table 4. 13 Games-Howell Post hoc for IT Control

Variable	ICT Control		Mean Difference	Sig.
Techno-complexity	Avg control	Very low control	0.11	1.00
		Low control	0.14	0.94
		High control	0.37	**0.00**
		Very high control	0.6	**0.00**
Techno-insecurity	Avg control	Very low control	0.58	0.41
		Low control	0.15	0.91
		High control	0.4	**0.00**
		Very high control	0.67	**0.00**
Technostress Inhibitors	Low control	Very low control	0.44	0.90
		Avg control	-0.47	0.17
		High control	-0.67	**0.02**
		Very high control	-0.68	0.05
Self-Regulated Attention	Low control	Very low control	0.08	1.00
		Avg control	-0.07	1.00
		High control	-0.56	**0.02**
		Very high control	-0.58	**0.03**
	Avg control	Very low control	0.15	1.00
		Low control	0.07	1.00
		High control	-0.49	**0.00**
		Very high control	-0.51	**0.00**
Leader-Member Exchange Quality	Very high control	Very low control	0.77	0.73
		Low control	0.78	**0.00**
		Avg control	0.7	**0.00**
		High control	0.4	**0.03**
Work Engagement	Low control	Very low control	-0.34	0.94
		Avg control	-0.4	0.23
		High control	-0.73	**0.00**
		Very high control	-0.86	**0.00**
	Avg control	Very low control	0.06	1.00
		Low control	0.4	0.23
		High control	-0.32	**0.02**
		Very high control	-0.45	**0.01**

* The mean difference is significant at the 0.05 level.

4.4 STATISTICAL TECHNIQUES ADOPTED

SEM is an extension of multivariate statistical techniques, particularly factor analysis and multiple regression analysis (Collier, 2020). It helps to examine dependence relationships (where a dependent variable becomes an independent variable for the next relationship) simultaneously. Before proceeding with SEM, the data was checked on whether it satisfied the assumptions of SEM. Some of the assumptions that must be examined before conducting a SEM analysis are sampling adequacy, the interactions underlying linear relationships, error term distribution normality, and the absence of multicollinearity (Kline, 2012). The following subsections discuss how the data meets each assumption in detail.

4.4.1 Sampling Adequacy

In a standard ordinary least squares multiple regression analysis, a good rule of thumb for sample size is 15 cases per predictor (Stevens & Stevens, 2001). Due to the similarities between SEM and multiple regression, 15 cases per measured variable in SEM is sufficient as well. It is possible for researchers to go as low as five cases per parameter estimate in structural modelling (Bentler & Chou, 1987). It is important to note that the authors specify five cases per parameter estimate as opposed to per measured variable. Since measured variables usually have at least one path coefficient corresponding with another variable in the analysis, it is prudent to recognize that the above-mentioned researchers' recommendations, at the very least, correlate at approximately 15 cases per measured variable. Regardless of the interpretation, either five cases per item or 15 cases per measured variable, the sample size of the present study exceeds this established minimum criterion. With 70 items retained in the analysis, the minimum sample size should be 350, and with 12 measured variables, the

minimum sample size should be 180. With n=653, the data meets the assumption of sampling adequacy.

4.4.2 Linearity

A second assumption to carry out SEM is linearity, i.e., any change in the dependent variable can be attributed to changes in the independent variable. The linearity assumption was tested with scatterplots of the residuals. Residuals are error terms, the differences between the observed value of the dependent variable and the estimated value. They reflect the portion of unexplained variance in a dependent variable in dependence relationships. Since there is more than one independent variable, partial regression plots were used to examine the residuals. These are presented in the Appendix C. From the partial regression plots, it can be seen that the residuals are distributed symmetrically and tend to cluster towards the middle, thus satisfying the assumption of linearity of relationship between the dependent and independent variables.

4.4.3 Normal Distribution of Error Terms of Endogenous Variables

Another important assumption of multivariate statistical techniques is that the error terms are normally distributed. An assumption of SEM is that endogenous (dependent and mediating) variables are distributed continuously, while the residuals are distributed normally. The histogram of residuals with the normal curve superimposed on the graph, and the Normal P-P plot of the residuals are examined to test this assumption. A visual inspection of Figures 4.1-4.10 reveals a normal distribution with the residual line following the normal distribution diagonal.

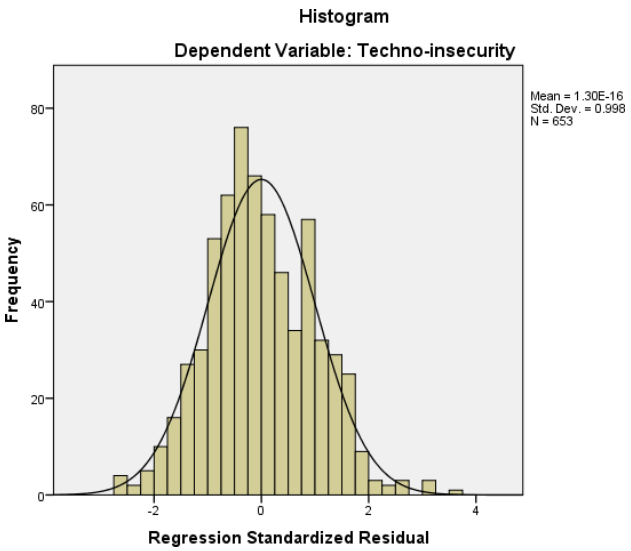

Fig 4. 1 Histogram and Normal Distribution for Techno-Insecurity Across Study Variables

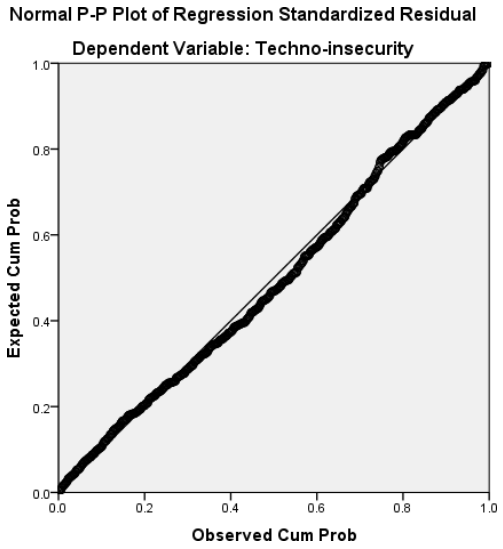

Fig 4. 2 Normal P-P plots for Techno-Insecurity Across Study Variables

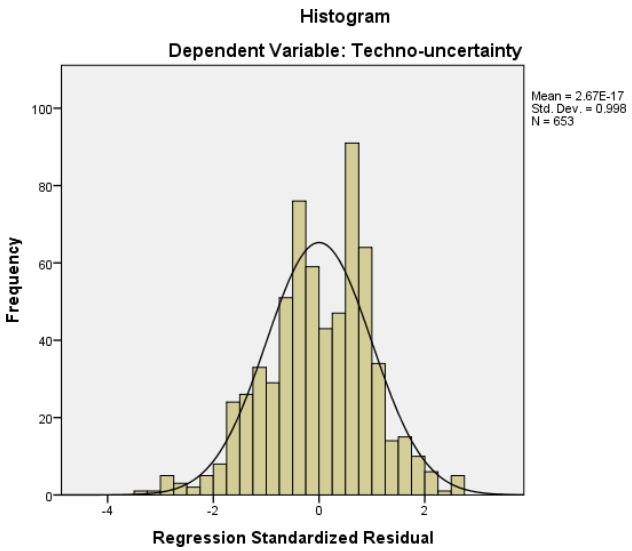

Fig 4. 3 Histogram and Normal Distribution for Techno-Uncertainty Across Study Variables

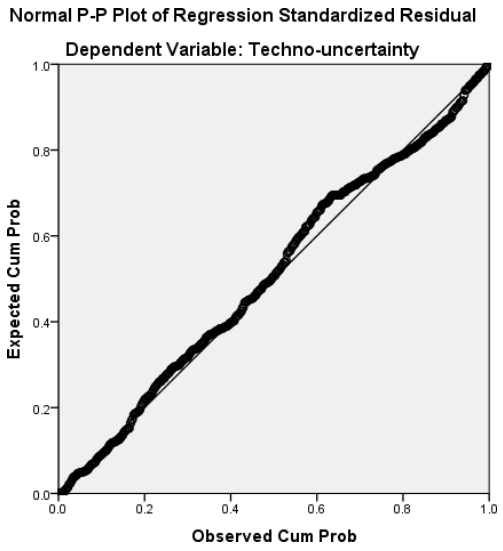

Fig 4. 4 Normal P-P plots for Techno-Uncertainty Across Study Variables

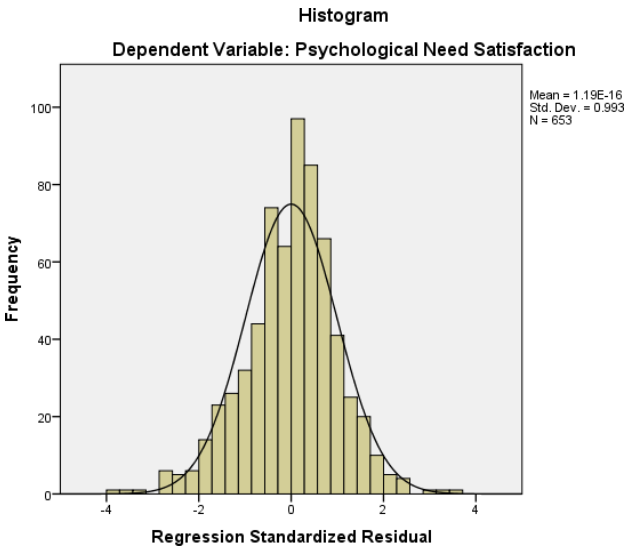

Fig 4. 5 Histogram and Normal Distribution for Psychological Need Satisfaction Across Study Variables

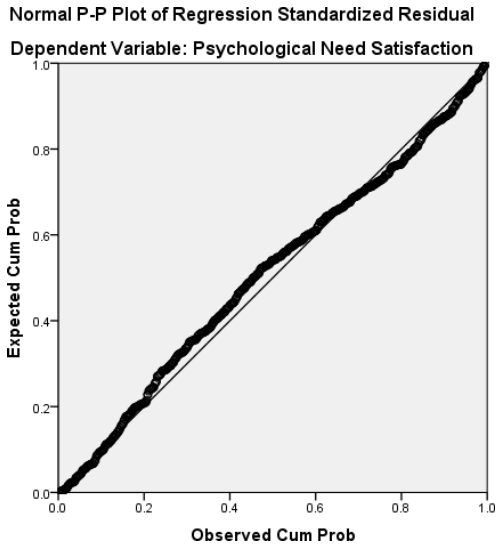

Fig 4. 6 Normal P-P plots for Psychological Need Satisfaction Across Study Variables

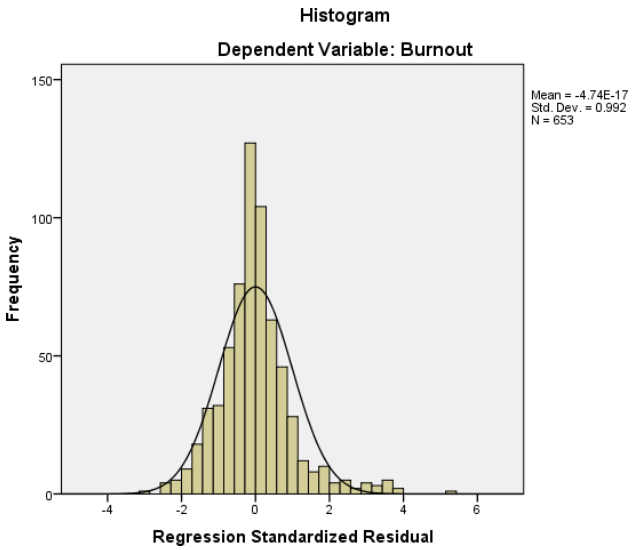

Fig 4. 7 Histogram and Normal Distribution for Burnout Across Study Variables

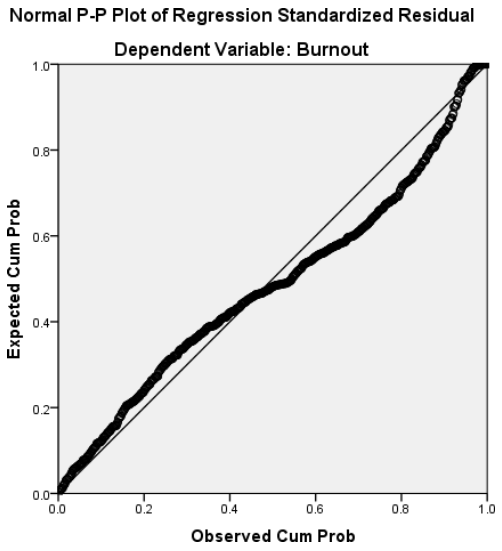

Fig 4. 8 Normal P-P plots for Burnout Across Study Variables

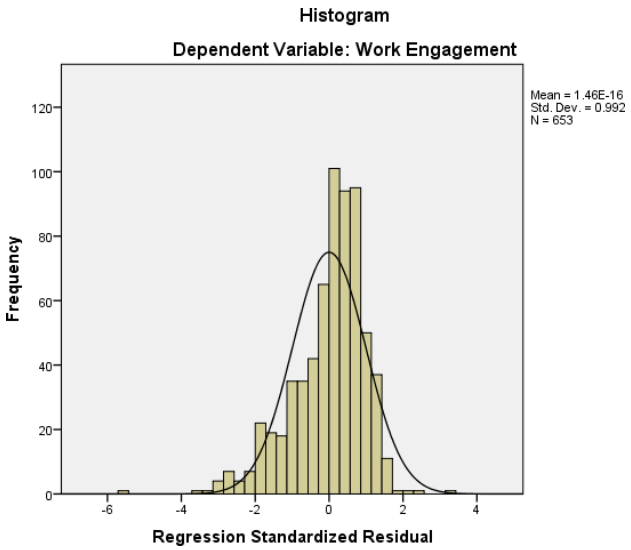

Fig 4. 9 Histogram and Normal Distribution for Work Engagement Across Study Variables

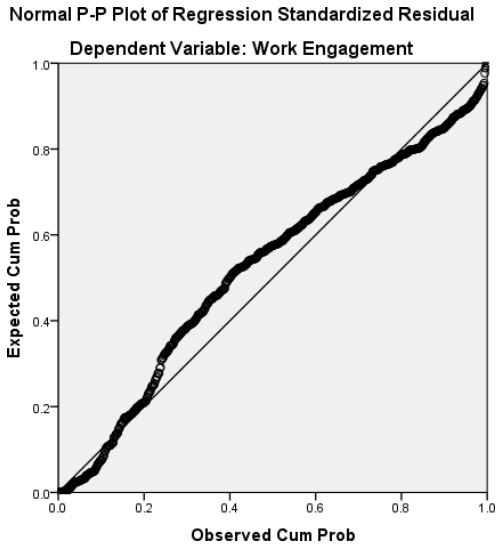

Fig 4. 10 Normal P-P plots for Work Engagement Across Study Variables

To further validate the normality assumption, the skewness and kurtosis statistics of the twelve variables of the study were examined. Both these parameters are used to measure deviation from normality. Skewness measures the extent to which a distribution is asymmetrical, i.e., deviation from the symmetry around the mean. Kurtosis refers to the "peakedness" or "flatedness" of a distribution, with a kurtosis value near 0 indicating a shape that is close to normal. Skewness and kurtosis values between -1 to +1 are deemed to be excellent, and values between -2 to +2 are considered acceptable (George & Mallery, 2011; Westfall & Henning, 2013). These results are illustrated in Table 4.14.

Table 4. 14 Skewness and Kurtosis Estimates

Descriptive Statistics	**Skewness**		**Kurtosis**	
	Statistic	**Std. Error**	**Statistic**	**Std. Error**
Techno-overload	-0.42	0.096	-0.46	0.191
Techno-invasion	-0.26	0.096	-0.40	0.191
Techno-complexity	0.37	0.096	-0.45	0.191
Techno-insecurity	0.35	0.096	-0.48	0.191
Techno-uncertainty	-0.29	0.096	-0.18	0.191
Technostress Inhibitors	-0.76	0.096	1.31	0.191
Self-Regulated Attention	-0.13	0.096	0.55	0.191
Orientation to Experience	-0.27	0.096	0.38	0.191
Leader-Member Exchange Quality	-0.48	0.096	0.19	0.191
Psychological Need Satisfaction	-0.57	0.096	1.32	0.191
Burnout	0.74	0.096	1.79	0.191
Work Engagement	-1.08	0.096	0.49	0.191

From Table 4.14, it can be seen that the skewness and kurtosis values of all the twelve variables fall within the acceptable range. Except for work engagement whose value is -1.08, all skewness values actually fall within the conservative -1 to +1 range, and all kurtosis values are less than 2. This indicates the shape of the distribution is normal.

4.4.4 Homoscedasticity

Data are said to be homoscedastic when the variance of the error terms is constant across several predictor variables. Homoscedasticity is tested by plotting the residuals

against the standardized predicted values to check if the points are distributed equally across all values of the predictor variables. A visual inspection of the scatter plots for both the dependent variables in Figures 4.11 and 4.12 show that the scatter plots are evenly distributed around zero. Thus, the assumption of homoscedasticity is met.

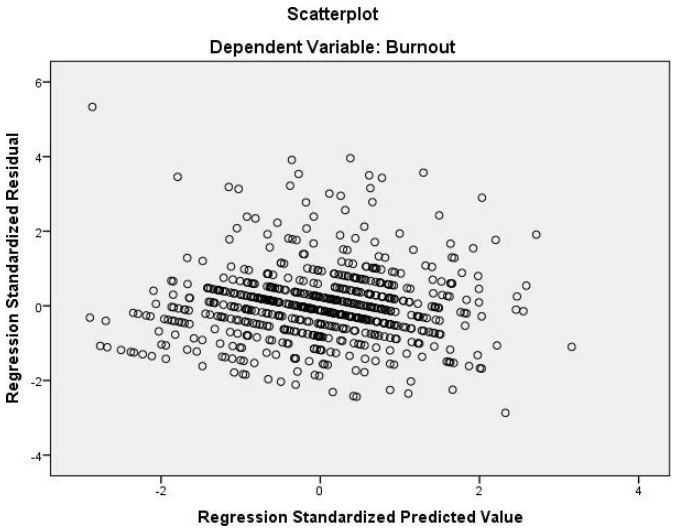

Fig 4. 11 Scatter Plot of Residuals with Burnout as Dependent Variable

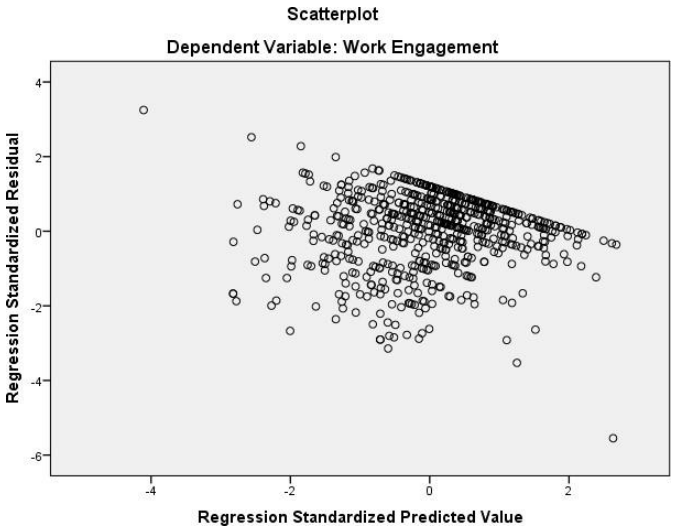

Fig 4. 12 Scatter Plot of Residuals with Work Engagement as Dependent Variable

4.4.5 Multicollinearity

Multicollinearity is tested by observing the inter-correlations among independent variables under study. An increase in multicollinearity complicates the interpretation of the variate, as it becomes more difficult to determine the effect of any single variable due to the interrelationships between multiple independent variables. Multicollinearity of the data can be tested using variance inflation factors (VIF) or tolerance values (Thompson et al., 2017). Both these statistical tools are especially useful when the correlation between two variables does not approach unity, but is large enough to jeopardize the discovery of the true effects of individual predictors. VIF values greater than 10 and tolerance values less than 0.1 suggest multicollinearity (Hair Jr et al., 2010). Table 4.15 represents the multicollinearity statistics. It can be seen that all VIF values are less than 10, and all tolerance values are greater than 0.1, indicating the absence of multicollinearity.

Table 4. 15 Multicollinearity Statistics for Independent Variables

Independent Variables	**Collinearity Statistics**	
	Tolerance	**VIF**
Techno-overload	0.76	1.32
Techno-invasion	0.80	1.26
Techno-complexity	0.63	1.58
Techno-insecurity	0.61	1.64
Techno-uncertainty	0.82	1.23
Technostress Inhibitors	0.71	1.41
Self-Regulated Attention	0.74	1.35
Orientation to Experience	0.77	1.30
Leader-Member Exchange Quality	0.75	1.34
Psychological Need Satisfaction	0.67	1.49

4.5 HYPOTHESES TESTS USING SEM

Having established that the assumptions are met, the structural model and the results of the hypothesis tests are presented in this section. Since, SEM allows for the simultaneous examination of multiple dependent relationships, it is most in testing the conceptual model described in Chapter 2. The AMOS version 22 was used to conduct these tests.

Following the two-step process established by (Anderson & Gerbing, 1988), the measurement model was first tested to assess the psychometric properties of all the scales. As discussed in Section 3.11, a Confirmatory Factor Analysis (CFA) was conducted to examine the measurement model fit, i.e., whether the items measured the latent variables of interest as they were expected to. The proposed twelve-factor model showed a good fit with the fit indices ($\chi 2$ = 4029.84, *df* = 2254, $\chi 2/df$ = 1.79, CFI = 0.90, GFI = 0.85, RMSEA = 0.04, SRMR = 0.05) within acceptable limits proposed by Hair Jr et al. (2010). Next, the structural model with the path relationships between the constructs was tested. The structural model showed a good fit ($\chi 2$ = 191.508, *df* = 87, $\chi 2/df$ = 2.201, CFI = 0.98, GFI = 0.99, RMSEA = 0.04, SRMR = 0.02). Fit indices are shared in Table 4.16 for reference.

Table 4. 16 Model Fit Indices

Model	***χ2 (df)***	**CMIN/df**	**CFI**	**GFI**	**RMSEA**	**SRMR**
Measurement Model	4029.84 (2254)	1.79	0.90	0.85	0.04	0.05
Structural Model	191.51 (87)	2.20	0.98	0.99	0.04	0.02
Note: df= degree of freedom, CFI= Comparative Fit Index, GFI= Goodness-of-Fit Index, RMSEA= Root Mean Square Error of Approximation, SRMR= Standardized Root Mean Square Residual						

The R square values of the endogenous (dependent) variables were 0.40 for techno-insecurity, 0.19 for techno-uncertainty, 0.34 for psychological need satisfaction, 0.26 for burnout, and 0.28 for work engagement, all significant at the $p<0.001$ level. Figure 4.13 highlights the significant results.

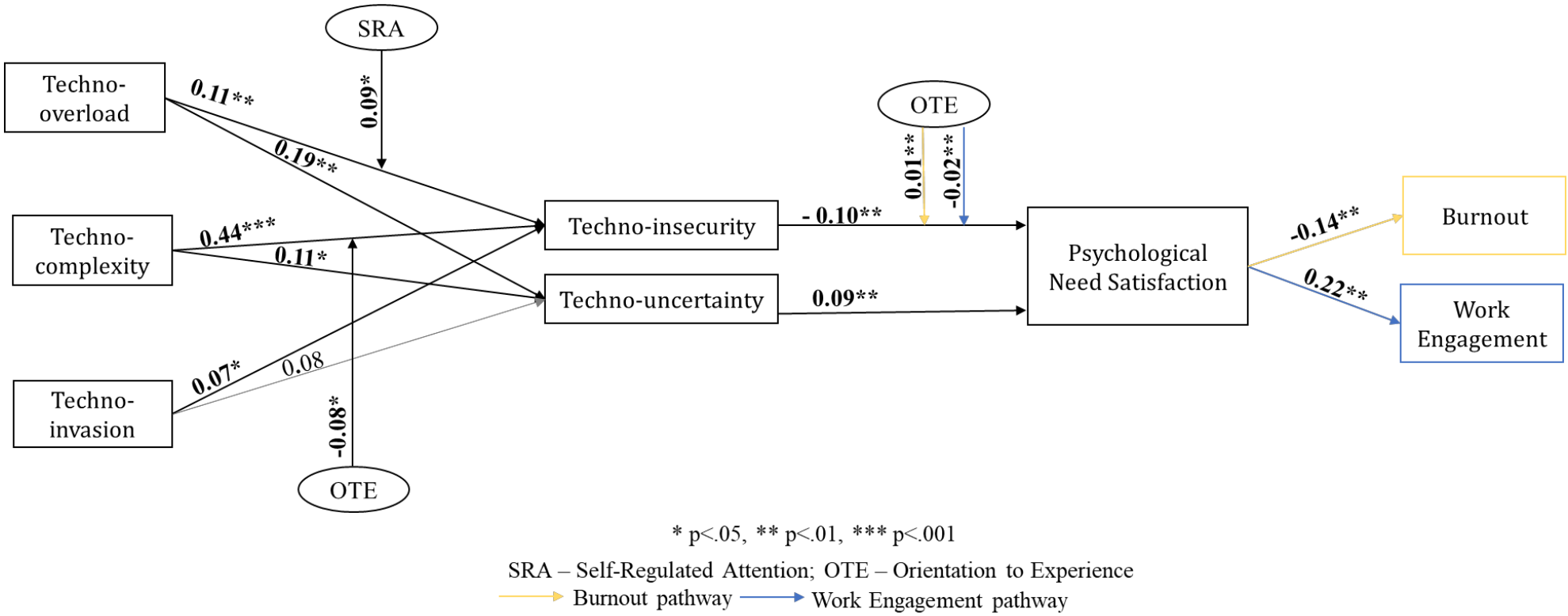

Fig 4. 13 Structural Model - Significant results

4.6 SUPPORT FOR THE NESTED SUB-SYSTEM MODEL OF TECHNOSTRESSORS

The following sections show the results supporting the nested sub-system model of technostressors, i.e., that techno-overload, techno-invasion and techno-complexity positively influence techno-insecurity and techno-uncertainty.

4.6.1 Impact of Techno-Overload, Invasion and Complexity on Techno-Insecurity

The results of the path analysis show that techno-overload, techno-invasion, and techno-complexity significantly influence techno-insecurity (**H1a: $\beta = 0.11$, $p<0.01$; H1b: $\beta = 0.07$, $p<0.05$; H1c: $\beta = 0.44$, $p<0.001$**), thus supporting H1a, H1b and H1c. This implies that the pressure to work more in less time, constant connectivity, and the compulsion to stay updated of complex technological developments lead to the fear of losing one's job to advanced technology or to other colleagues who know more about technology.

Emerging evidence demonstrate that job-related technostress creators are positively associated with techno-insecurity (Chiu et al., 2022). Studies of job-insecurity in other contexts also lend support to this finding. For instance, in the context of organizational downsizing, work overload positively affected job-insecurity (Chipunza & Samuel, 2012). A longitudinal study of job mobility reported that greater job complexity that required upskilling was associated with greater job-insecurities (McGuinness & Wooden, 2009).

Independent of context, job-insecurity was found to negatively impact individuals' work-life balance (Hämmig & Bauer, 2009; Jansen et al., 2003). However, the present study that examines techno-invasion reveals a significant effect in the opposite direction. It may be that when employees do not stay connected or respond to work-

related messages and e-mails outside of work hours, they fear they signal incompetence or unprofessional behaviours (Barber & Santuzzi, 2015), thereby leading to the finding that techno-invasion contributes to higher job insecurity in technology intensive work environments.

4.6.2 Impact of Techno-Overload, Invasion and Complexity on Techno-Uncertainty

The results of the path analysis show that techno-overload and techno-complexity are significantly related to techno-uncertainty (**H2a: $\beta = 0.19$, $p<0.01$; H2c: $\beta = 0.11$, $p<.05$**), thereby supporting H2a and H2c. However, H2b predicting a positive impact of techno-invasion on techno-uncertainty is not supported (H2b: $\beta = 0.08$, $p=0.10$). This implies that the ambiguity and lack of control over one's working environment (techno-uncertainty) results from both the information overload, high computational speed and the perceptions of doing more work in less time characterizing techno-overload, as well as the increased need to learn and upskill characterizing techno-complexity.

Support for the first relationship stems from studies that have shown that when quantitative and qualitative workload increases, employees often report reductions in control over work environment. The view that complexity and uncertainty go hand in hand have informed several studies' concomitant evaluations of the same (Padalkar & Gopinath, 2016). For instance, both technological complexity and technological uncertainty have similar effects on organizational information processing capability (Jilke, 2020) and reflexivity and intuition (Velayudhan & Thomas, 2018). The results of the present study make a unique contribution by unpacking their impacts – i.e., identifying that technological complexity precedes and positively influences technological uncertainty.

4.7 DIRECT IMPACT OF TECHNO-INSECURITY AND TECHNO-UNCERTAINTY ON BURNOUT AND WORK ENGAGEMENT

Techno-insecurity positively impacted burnout (**H3a: β = 0.13, p<0.01)** and negatively impacted work engagement **(H3b: β = - 0.16, p<0.001).** Techno-uncertainty's impact on work engagement received significant support **(H4a: β = 0.18, p<0.001);** however, it's direct impact on burnout was non-significant (H4b: β = -.08, p=0.39).

These findings lend partial support to the expectations of the JD-R theory, especially the challenge-hindrance framework, that not all demands are stressors causing detrimental outcomes for employees (Van den Broeck et al., 2010; Ventura et al., 2015). Indeed, their differentiation as challenge and hindrance demands allow for evaluations of positive relationships to valued outcomes such as work engagement. Lending empirical evidence to this theoretical differentiation, the present study identifies techno-insecurity as a hindrance demand increasing burnout and reducing work engagement, and techno-uncertainty as a challenge demand contributing to work engagement. This is further supported by findings that techno-insecurity negatively influenced and techno-uncertainty positively influenced individual innovativeness among healthcare personnel (Ozer et al., 2021).

Although the direct effect was not significant, the negative value of the β coefficient (-0.08) suggests that techno-uncertainty reduces burnout. Emerging evidence indicate similar non-significant negative effect between techno-uncertainty and burnout among teachers (Califf & Brooks, 2020). Other studies support its potential positive contribution to favourable outcomes like use of healthcare information systems (Lauwers et al., 2021) and commitment to change (Zainun et al., 2020)

The results of the present study confirm the positive and negative impacts of job insecurity (in this study, specifically linked to work-related technology use) on burnout (Blom et al., 2018; Laily et al., 2020) and work engagement (Getahun Asfaw & Chang, 2019; Indriyani et al., 2020) respectively. With regard to job uncertainty, very few studies measure its impact on individual level outcomes. Within these limited studies, uncertainty has not been examined as a stand-alone variable, instead examined as part of entrepreneurial job demands (Dijkhuizen et al., 2016), or role ambiguity (Urien et al., 2017). The present study contributes to the job demands literature by delineating the specific impacts of job-related uncertainty (in this study, specifically linked to work-related technology use) on work engagement. The identified positive relationship between techno-uncertainty and work engagement is all the more salient in the light of emerging evidence that not all uncertainty is harmful, and that management should move from "uncertainty reduction" to "uncertainty regulation" (Griffin & Grote, 2020). Specifically, it may be that uncertainties introduced by technological advancements are perceived by employees as widening their work tool-kit / resources. For example, greater techno-uncertainty was linked to higher perceived usefulness (Lauwers et al., 2021), internal communication (Zainun et al., 2020), and positive emotions (Sarabadani et al., 2020) thereby leading to beneficial outcomes.

In summary, the present study confirms techno-insecurity and techno-uncertainty as a hindrance and challenge demand respectively. This then leads to the question as to what mechanism creates these differential impacts. The following section examines the results pertaining to psychological need satisfaction as the explanatory mechanism.

4.8 MEDIATION THROUGH PSYCHOLOGICAL NEEDS SATISFACTION

With the introduction of psychological need satisfaction as the mediator, significant full mediation effects were found in the relationships between techno-insecurity and techno-uncertainty as predictors, and burnout and work engagement as criterion variables. Specifically, techno-insecurity negatively impacted psychological need satisfaction (**β = -0.10, p<0.01)** while techno-uncertainty positively impacted psychological need satisfaction (**β = 0.09, p<0.01)**; psychological need satisfaction in turn positively influenced burnout (**β = -0.14, p<0.01)** and negatively influenced work engagement (**β = 0.22, p<0.01).** Significant indirect effects were observed for the relationships between techno-insecurity and burnout **(H5a: β = 0.014, p<0.01),** techno-insecurity and work engagement **(H5b: β = -0.023, p<0.01)**, techno-uncertainty and burnout **(H6a: β = -0.012, p<0.01)**, and techno-uncertainty and work engagement **(H6b: β = 0.020, p<0.01)**. Therefore H5a, H5b, H6a and H6b stand supported, with psychological need satisfaction explaining why techno-insecurity and techno-uncertainty influence burnout and work engagement in the differential manner that they do. In the case of H6a, since the direct impact of techno-uncertainty on burnout was not supported, psychological need satisfaction fully mediates this relationship. It partially mediates the other three relationships for H5a, H5b and H6b.

Psychological need satisfaction has been found to mediate the impact of job insecurity on turnover intentions (Urbanaviciute et al., 2018) and organizational citizenship behaviours (Stynen et al., 2015). The present study further extends the expectation that job insecurity regardless of context, reduces employees' need satisfaction consequently leading to increased burnout and reduced work engagement. This study also corroborates emerging evidence that aspects of need satisfaction, such as autonomy

satisfaction is crucial to avoid frustration among employees with intensive ICT use for work (Strunk et al., 2022).

In the case of techno-uncertainty, a counter-intuitive result was found. Within the context of healthcare workers, such as nurses and physicians, presence of psychological need satisfaction increased tolerance for uncertainty (Kamel & Hashish, 2015; Olsen & Mikkelsen, 2021). But in the context of technology intensive work environments, the reverse was found to be true. Techno-uncertainty, through frequent changes to the software, hardware and networks signalled latest and up-to-date tools to perform one's job thereby increasing need satisfaction. The present study provides preliminary empirical evidence towards examining 'uncertainty' in a positive light, while also providing an explanatory mechanism for these positive impacts through mediation by psychological need satisfaction. Other explanations for this finding may also be drawn from the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). According to UTAUT, performance expectancy, effort expectancy and social influence determine individuals' behavioural intention to use technology. Frequent upgrades of one's work-related technology carry social influence as they are seldom implemented without higher management approval. They also promote beliefs of better performance by signalling the availability of latest and superior tools.

4.9 MODERATING EFFECT OF TECHNOSTRESS INHIBITORS WITHIN THE NESTED SUB-SYSTEM MODEL OF TECHNOSTRESSORS

The results of the path analysis indicate that technostress inhibitors did not significantly moderate the positive influence of techno-overload, techno-invasion, and techno-complexity on either techno-insecurity (H7a: $\beta = -0.05$, $p = 0.35$; H7b: $\beta = 0.06$, $p = 0.12$; H7c: $\beta = 0.07$, $p = 0.09$), or on techno-uncertainty (H8a: $\beta = 0.02$, $p = 0.79$; H8b:

$\beta = 0.001$, $p = 0.96$; H8c: $\beta = -0.05$, $p = 0.35$). Therefore, H7 and H8 are not supported.

Recent evidence on the influence of technostress inhibitors on other technostressors indicate that their impacts are not homogenous. For instance, while involvement facilitation and technical support provision negatively influenced techno-overload, techno-complexity and techno-insecurity, literacy facilitation positively influenced them (L. Li & Wang, 2020). Although the present study does not examine each inhibitor individually, the overall results indicate similar non-homogeneous patterns of influence where technostress inhibitors impact techno-insecurity negatively (**$\beta = -0.18$, $p<0.05$)**, and techno-uncertainty positively (**$\beta = 0.30$, $p<0.001$).**

Regarding the moderating effect of technostress inhibitors on outcomes, there is mixed evidence in the literature. Some studies report non-significant moderating effects of technostress inhibitors on job satisfaction (Ragu-Nathan et al., 2008), end-user satisfaction (K. Wang et al., 2008) and job stress (Hung et al., 2011); others report its significant moderating effects between security technostress creators and organizational commitment and compliance intention (Hwang et al., 2021). Conflicting moderating effects are also reported with technostress inhibitors buffering the impact of technostressors on satisfaction and commitment, but augmenting their impact on stress and strain (Pfaffinger et al., 2020). There is also support in the literature for the buffering effect of organizational supports for strengths use that weakened techno-insecurity's negative impact on general health (Goetz & Boehm, 2020). However, the results of the present study do not indicate any significant moderating effects for the organizational resource of technostress inhibitors.

4.9.1 Impact of Technostress Inhibitors as a Moderator of the Mediated Relationship

The path coefficients of the moderated mediation analyses are not significant for the

pathways of techno-insecurity to burnout (H9a: β = 0.001, p = 0.65), techno-insecurity to work engagement (H9b: β = -0.002, p = 0.70), techno-uncertainty to burnout (H9c: β = 0.001, p = 0.88), and techno-uncertainty to work engagement (H9d: β = -0.001, p = 0.93).

To the best of the author's knowledge, this is the first study to examine the moderation effect of technostress inhibitors on the relationship of techno-insecurity, techno-uncertainty, burnout, and work engagement mediated by psychological need satisfaction. Consistently across the literature, technostress inhibitors positively influence desirable outcomes such as work performance (Jena, 2015; L. Li & Wang, 2020), end user satisfaction (Fuglseth & Sorebo, 2014), job satisfaction and organizational commitment (Jena, 2015; Ragu-Nathan et al., 2008). The results of the present study substantiate this body of literature, with technostress inhibitors having a significant negative influence on burnout (**β = -0.11, p<0.05)** and positive influence on work engagement (**β = 0.27, p<0.001)**. However, the moderated mediation effects were not supported.

4.10 MODERATING EFFECTS OF SELF-REGULATED ATTENTION AND ORIENTATION TO EXPERIENCE WITHIN THE NESTED SUB-SYSTEM MODEL OF TECHNOSTRESSORS

Self-regulated attention neither significantly moderated the positive influence of techno-invasion, and techno-complexity on techno-insecurity (H10b: β = -0.02, p = 0.63; H10c: β = -0.06, p = 0.16), nor significantly moderated the positive influence of techno-overload, techno-invasion, and techno-complexity on techno-uncertainty (H11a: β = -0.01, p = 0.81; H11b: β = 0.05, p = 0.26; H11c: β = 0.007, p = 0.72). Effect of techno-overload on techno-insecurity was intensified at higher levels of self-regulated attention (**H10a: β = 0.09, p<.05)**. Therefore, H10a was found significant, however in the direction opposite to expectation.

Orientation to experience did not significantly moderate the positive influence of techno-overload and techno-invasion on techno-insecurity (H12a: $\beta = -0.04$, $p = 0.26$; H12b: $\beta = 0.05$, $p = 0.18$;). Orientation to experience also did not moderate the positive influence of techno-overload, techno-invasion, and techno-complexity on techno-uncertainty (H13a: $\beta = 0.002$, $p = 0.92$; H13b: $\beta = -0.03$, $p = 0.48$; H13c: $\beta = -0.002$, $p= 0.97$). However, effect of techno-complexity on techno-insecurity was buffered by higher levels of orientation to experience (**H12c: $\beta = -0.08$, $p<.05$)**. Therefore, only H12c is supported. From the above results it can be inferred that some parts of dispositional mindfulness, namely observing, describing and non-reactive dimensions increase the pressures from techno-overload to techno-insecurity, whereas other parts such as acting with awareness and non-judgmental dimensions reduce pressures from techno-complexity to techno-insecurity.

Some evidence exists that mindfulness reduces technostress (Ioannou et al., 2022) and buffers the impact of external pressures, such as of COVID 19 on employees' fears of job loss (H. Chen & Eyoun, 2021). Mindfulness interventions also help individuals cope with employment uncertainty (MacLean et al., 2010). However, these studies report the cumulative impact of mindfulness without differentiating the effects of its sub-dimensions. Specifically, the present study demonstrates that orientation to experience (acting with awareness and being non-judgmental) in the presence of technology related complexity can alleviate its negative impact on techno-insecurity. Since techno-complexity involves learning and upskilling as technology evolves, this finding is corroborated using evidence from learning contexts. Individuals with higher dispositional mindfulness performed significantly better than those with lower dispositional mindfulness on learning novel tasks; the former also reported greater enjoyment while learning (Kee & Liu, 2011).

Further, a contrary finding was observed in the present study - that self-regulated attention (observing, describing, and non-reactivity) intensifies pressures of doing more in less time, i.e., techno-overload on techno-insecurity. Although there is evidence to suggest mindfulness training can improve subjective employee experiences of multi-tasking at work (Kudesia et al., 2022), the results of the present study indicate its use must be motivated keeping in mind the nature of end outcomes. This finding also lends support to the idea that components of mindfulness may not always be beneficial (Britton, 2019). In summary, the results of the present study delineate the moderating effects of specific dimensions of mindfulness on techno-insecurity, i.e., orientation to experience buffers the adverse effects of techno-complexity, whereas self-regulated attention reinforces the adverse effect of techno-overload.

4.10.1 Impact of Self-Regulated Attention Component and Orientation to Experience as a Moderator of the Mediated Relationship

Both the components of self-regulated attention and orientation to experience influence need satisfaction positively (SRA: **$\beta = 0.269$, $p<0.001$;** OTE**: $\beta = 0.083$, $p<.05$**). They also influence work engagement positively (SRA: **$\beta = 0.097$, $p<.05$;** OTE**: $\beta = 0.134$, $p<.001$**). Orientation to experience influences burnout negatively (**$\beta = -0.15$, $p<.01$**). However, in the present study, their indirect effects for the moderated mediation model were only partially supported.

In the techno-insecurity to burnout relationship, the moderated mediation effect for self-regulated attention was not significant (H14a: $\beta = 0.003$, $p = 0.47$), whereas it was significant for orientation to experience (**H15a: $\beta = 0.01$, $p<.01$**). Similarly, in the techno-insecurity to work engagement relationship the moderated mediation was not significant for self-regulated attention (H14b: $\beta = -0.005$, $p = 0.55$), but it was significant for orientation to experience (**H15b: $\beta = -0.02$, $p<.01$**). Therefore, the results

show that the positive effect of techno-insecurity to burnout was reinforced by orientation to experience whereas negative effect of techno-insecurity to work engagement was reduced by orientation to experience. These findings reiterate conclusions of existing studies regarding the moderating influence of mindfulness in relationships between general job insecurity and outcomes such as well-being and innovative work behaviours, mediated via psychological need satisfaction and intrinsic motivation respectively (H. Chen & Eyoun, 2021; Ugwu, 2015).

A spotlight analysis was further conducted to better understand the significant moderated mediation effects. Spotlight analysis "provides an estimate and statistical test of the simple effect of one variable at specified values of another continuous variable" (Spiller et al., 2013, p 278). In the present study, the variable orientation to experience was divided into three groups: one with scores less than -1SD, one with scores between -1SD and +1SD, and one with scores greater than +1SD. It's interaction effect with techno-insecurity and techno-uncertainty on the mediated relationship was

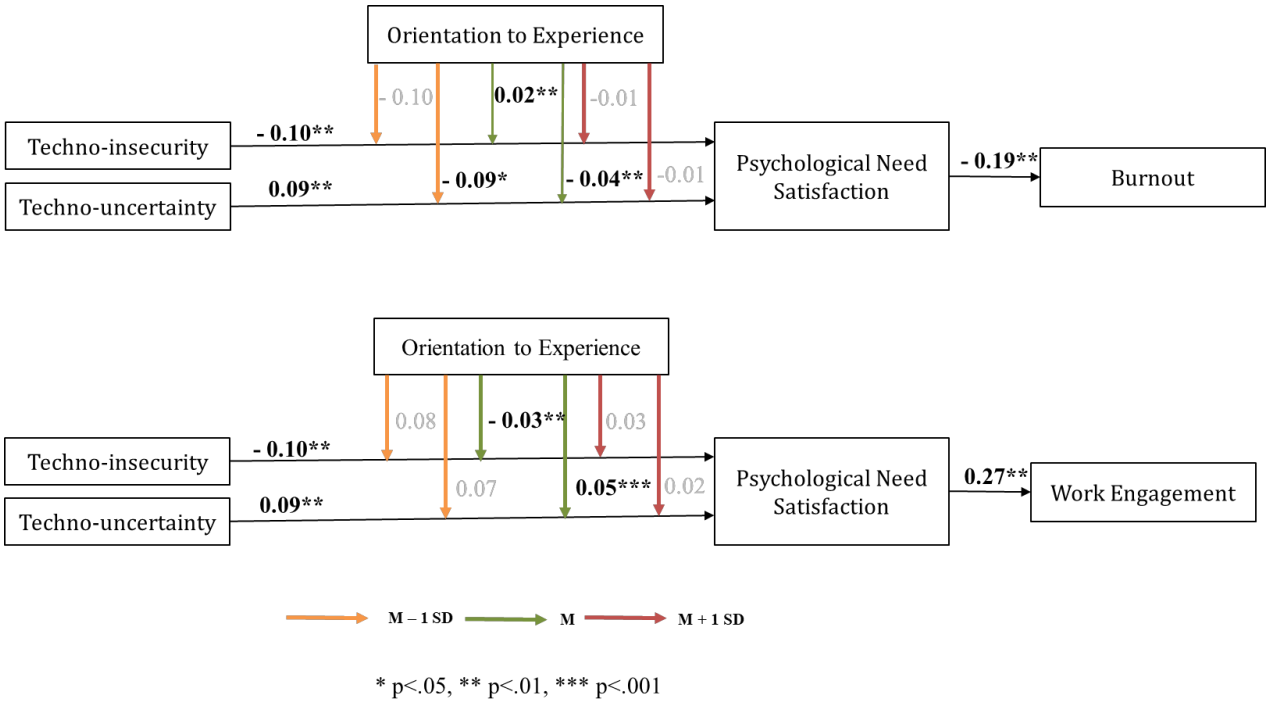

Fig 4.14 Results of the Spotlight Analysis for Differing Values of Orientation to Experience

tested. These results are illustrated in Figure 4.14.

From the significant coefficients in Figure 4.10, it can be seen that when burnout was the dependent variable, orientation to experience was strengthening techno-insecurity's negative influence on psychological need satisfaction, and weakening techno-uncertainty's positive influence on psychological need satisfaction. Conversely, when work engagement was the dependent variable, orientation to experience was weakening techno-insecurity's negative relationship to psychological need satisfaction, and strengthening techno-uncertainty's positive relationship to psychological need satisfaction. These results indicate orientation to experience component of mindfulness is helpful when trying to improve positive outcomes such as work engagement, but not helpful when trying to prevent negative outcomes such as burnout. Thus, the successful application of mindfulness for work-related outcomes is conditional upon the nature of these outcomes. Despite its many benefits, there is a possibility for some components of mindfulness to create detrimental impacts.

The moderated mediation effects of both self-regulated attention and orientation to experience was not significant for the techno-uncertainty to burnout relationship (H14c: β = -0.003, p = 0.37; H15c: β = .004, p = 0.30) and techno-uncertainty to work engagement relationship (H14d: β = 0.006, p = 0.36; H15d: β = -0.007, p = 0.32), mediated by psychological need satisfaction. Although mindfulness reduced uncertainty over technology acceptance (Sun & Fang, 2010), its moderating influence on the impact of techno-uncertainty was not supported in the present study.

4.11 MODERATING EFFECT OF LMX QUALITY WITHIN THE NESTED SUB-SYSTEM MODEL OF TECHNOSTRESSORS

The results of the path analysis indicate that LMX quality did not significantly moderate the positive influence of techno-overload, techno-invasion, and techno-complexity on either techno-insecurity (H16a: $\beta = 0.02$, $p = 0.67$; H16b: $\beta = -0.03$, $p = 0.52$; H16c: $\beta = -0.02$, $p = 0.66$), or techno-uncertainty (H17a: $\beta = 0.03$, $p = 0.47$; H17b: $\beta = 0.005$, $p = 0.99$; H17c: $\beta = -0.09$, $p = 0.09$). Therefore, H16 and H17 are not supported.

High LMX quality is linked to higher attention from the leader, more material and informational resources as well as higher performance expectations (Matta & Van Dyne, 2016). Although few studies indicate a positive impact of LMX quality through reduced job insecurity (Altinay et al., 2019; H. J. Wang et al., 2019) and role overload (Altinay et al., 2019; Tordera et al., 2008), it does not always lead to positive outcomes. For example, in a study of creativity, Zhang and Parker (2019), identified that close relationships with their supervisors reduced employees' creativity because of reductions in vertical task conflicts. LMX quality reduced the positive impact of communication and system feature overload on work-family conflict, but increased the positive impact of information overload on work-family conflict (Harris et al., 2015). Similar to these studies, the present study finds LMX quality intensifying the positive impact of techno-overload on techno-insecurity as well as of techno-invasion and techno-complexity on techno-uncertainty. Although not significant, these results are contrary to expectation, suggesting that LMX quality might serve different functions within technology intensive work environments, which future research could explore.

4.11.1 Impact of LMX Quality as a Moderator of the Mediated Relationship

The path coefficients of the moderated mediation analyses were not significant for the pathways of techno-insecurity to burnout (H18a: $\beta = 0.001$, $p = 0.67$), techno-insecurity

to work engagement (H18b: β = -0.002, p = 0.77), techno-uncertainty to burnout (H18c: β = 0.005, p = 0.29), and techno-uncertainty to work engagement (H18d: β = -0.008, p = 0.32). Therefore hypothesis 18 is not supported.

Very few studies examine the moderation effects of LMX quality on mediated relationships. Among them, some confirm the role of LMX quality in moderating mediated relationships between general job insecurity and outcomes such as physical health (Probst et al., 2016), organizational and interpersonal deviance (Huang et al., 2017) and organizational commitment (Hu & Zuo, 2007). Less variation in LMX quality allows employees to build valuable resources that offset organizational challenges, whereas greater variation in LMX quality forces employees to conserve rather than build their resources (Ellis et al., 2019). However, within the context of techno-insecurity and techno-uncertainty, no such moderated mediation effects were found.

4.12 CHAPTER SUMMARY

This chapter presented the results of the data analysis, along with insights from the literature to explain the findings of the present study. The demographic variables of age, educational qualification, work experience, ICT use frequency and ICT use control were included as control variables in the structural model. Following confirmation that the data satisfied the assumptions of SEM testing, the structural model was tested. Table 4.17 indicates the results for the hypotheses tested. The following chapter discusses the theoretical contributions, practical implications, limitations and future research directions informed by the present work.

Table 4. 17 Hypotheses Summary

Hypotheses	Results
H1: a) Techno-overload, b) Techno-invasion and c) Techno-complexity will be positively related to techno-insecurity	Supported
H2: a) Techno-overload, b) Techno-invasion and c) Techno-complexity will be positively related to techno-uncertainty	a. Supported b. Not supported c. Supported
H3: Techno-insecurity a) positively impacts burnout and b) negatively impacts work engagement	Supported
H4: Techno-uncertainty a) positively impacts burnout and b) positively impacts work engagement	a. Supported b. Not Supported
H5: Psychological need satisfaction mediates: a) The positive relationship between techno-insecurity and burnout b) The negative relationship between techno-insecurity and work engagement	Supported
H6: Psychological need satisfaction mediates: a) The positive relationship between techno-uncertainty and burnout b) The positive relationship between techno-uncertainty and work engagement	Supported
H7: Under conditions of high technostress inhibitors, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened	Not Supported
H8: Under conditions of high technostress inhibitors, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened	Not Supported
H9: Under conditions of high technostress inhibitors, a) The relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker b) The relationship of techno-insecurity mediated by psychological need satisfaction to work engagement will be weaker c) The relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be stronger d) The relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger	Not Supported
H10: Under conditions of high self-regulated attention, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened	a. Supported in the opposite direction
H11: Under conditions of high self-regulated attention, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened	Not Supported

Table 4.17 **(contd.)**

Hypotheses	Results
H12: Under conditions of high orientation to experience, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened	a. Not Supported b. Not Supported c. Supported
H13: Under conditions of high orientation to experience, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened	Not Supported
H14: Under conditions of high self-regulated attention: a) The relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker b) The relationship of techno-insecurity mediated by psychological need satisfaction to work engagement will be weaker c) The relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be stronger d) The relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger	Not Supported
H15: Under conditions of high orientation to experience: a) The relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker b) The relationship of techno-insecurity mediated by psychological need satisfaction to work engagement will be weaker c) The relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be stronger d) The relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger	a. Supported in the opposite direction b. Supported c. Not Supported d. Not Supported
H16: Under conditions of high LMX quality, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-insecurity will be weakened	Not Supported
H17: Under conditions of high LMX quality, the positive relationship between a) techno-overload, b) techno-invasion and c) techno-complexity with techno-uncertainty will be weakened	Not Supported

Table 4.17 **(contd.)**

Hypotheses	Results
H18: Under conditions of high LMX quality, a. The relationship of techno-insecurity mediated by psychological need satisfaction to burnout will be weaker b. The relationship of techno-insecurity mediated by psychological need satisfaction to work engagement will be weaker c. The relationship of techno-uncertainty mediated by psychological need satisfaction to burnout will be stronger d. The relationship of techno-uncertainty mediated by psychological need satisfaction to work engagement will be stronger	Not Supported

CHAPTER 5: SUMMARY, CONTRIBUTIONS AND CONCLUSIONS

This chapter summarizes the research objectives, method of investigation used to meet these objectives and the findings. This is followed by a detailed account of the theoretical contributions and practical implications. The limitations of this study are acknowledged and future research directions are further outlined.

5.1 SUMMARY AND INSIGHTS

In this research study, the interrelationships between technostressors and their distinctive impact on burnout and work engagement, mediated by psychological need satisfaction were examined. An understanding of potential positive impacts of technostressors as well as how they create such positive impacts are pertinent in the face of increasing adoption of ICT for work-related functions (Day et al., 2015; Tarafdar et al., 2019). The scope of resources as potential mitigation strategies at the organizational (e.g., technostress inhibitors), individual (e.g., mindfulness), and leadership level (e.g., LMX quality) were studied (Cascio & Montealegre, 2016; Day et al., 2012, 2021).

Further to a narrative literature review, a conceptual model based on Job Demands-Resources theory was proposed (Figure 2.2, page 51). In order to test the hypothesized relationships in the conceptual model, a survey instrument using established measures to study technostressors, burnout, work engagement, psychological need satisfaction, technostress inhibitors, mindfulness and LMX quality was developed. The instrument was subjected to content and face validation measures and was converted into a self-administered questionnaire on an online survey platform. Employees from the IT / ITES

industry who used ICT as part of their day-to-day work and with a minimum work experience of one year were included to be a part of the sample. A total of 718 responses were received, of which 65 were removed due to incomplete data or unengaged responses, leaving a final sample of 653 participants. There were more men (65.5%) than women in the sample. Respondents were also from different age groups, with a majority of 68.6% being in the 21-30 age group, followed by 31-40 years (25.1%). More than half the sample (63.4%) had work experience in the range of 1-6 years. In terms of educational qualification, approximately equal representation was seen from those who held undergraduate (44.7%) and postgraduate degrees (41.8%). The rest either had a doctoral degree or were diploma holders.

Confirmatory Factor Analysis was conducted on the data using AMOS 22 to verify the factor structure of the observed variables and to validate their relationships with the theoretically distinct latent variables. The measurement model was adequate with the following fit indices: $\chi 2$ = 4029.84, *df* = 2254, $\chi 2/df$ = 1.79, CFI = .90, RMSEA = .04, SRMR = .05, denoting that the theoretical model fit well with the data. Subsequent to confirming the convergent and discriminant validity of the constructs, the hypotheses were tested using a structural equation modelling approach. The assumptions of sampling adequacy, linearity, normal distribution of error terms of endogenous variables, homoscedasticity, and multicollinearity were not violated, thereby permitting tests of the structural model. The demographic variables of age, educational qualification, work experience, ICT use frequency, and ICT control could influence the variables of the study; hence they were included as controls in the final structural model. A good fit for the structural model was found with the following fit indices: $\chi 2$ = 4029.84, *df* = 2254, $\chi 2/df$ = 1.79, CFI = 0.90, GFI = 0.85, RMSEA = 0.04, SRMR = 0.05.

The findings indicated support for a nested sub-system model of technostressors, where techno-overload, techno-invasion and techno-complexity positively influenced techno-insecurity and techno-uncertainty. Examples for the finding that techno-overload, invasion and complexity increased techno-insecurity can be derived from the work experiences of software programmers. They often report that techno-overload can stem from the work queuing systems that organizations use to inform employees of new assignments even before previous ones can be completed. Employees need to keep checking and updating their worklog on these portals, in addition to actually performing the work, else be perceived as less competent than their co-workers with similar or more technology knowledge. Software professionals also report they use weekends and holidays to keep current on new technological trends (techno-invasion) to avoid falling behind during actual office hours (techno-insecurity). Employees may fear that if they do not upskill per latest technological trends, they may not have good performance reviews, promotions or may even lose jobs to contemporaries with more knowledge on the latest technology than themselves. Among data analysts in organizations, higher advancements in open-source software for data analysis (techno-complexity) creates more uncertainty regarding which platform they need to use for work.

Second, specific positive effect was confirmed for the impact of techno-uncertainty on work engagement, and negative effect for impact of techno-insecurity on both burnout and work engagement. Third, psychological need satisfaction was found to mediate the relationships between techno-insecurity and techno-uncertainty on burnout and work engagement. For example, customer support jobs that were traditionally handled by employees are increasingly performed by chatbots or automated text message solutions. Employees in such roles might feel reduced autonomy and competence as

they are trying to prove their worth over machines that need no breaks, and have higher processing speeds. They might also have reduced relationship need satisfaction due to the highly competitive situation created by these automation technologies. Reductions in need satisfaction can create exhaustion, and reduce one's excitement and enthusiasm for one's job.

Fourth, the orientation to experience component of mindfulness moderated the effect of techno-insecurity on work engagement as predicted, but also strengthened its effect on burnout. This suggests that not all aspects of mindfulness will be universally beneficial, and its use must be motivated keeping in mind its influence on desired end outcomes. Lastly, no significant support was obtained for the moderating effects of technostress inhibitors as well as for LMX quality. The literature too is not definite regarding the moderating effect of technostress inhibitors with some studies supporting its moderating function (Tarafdar, Pullins, et al., 2015) while others do not (Fuglseth & Sorebo, 2014). Similarly mixed evidence persists regarding the moderating effect of LMX quality wherein it moderates effects of communication overload and system feature overload on work-family conflict, but fails to do so in the case of information overload on work- family conflict (Harris et al., 2015). These results stand to be further substantiated.

Table 5. 1 Summary of Research Objectives and Findings from the Study

S. No	Research Objectives	Findings
1.	To examine **the inter-relationships between the five technostressors**, namely techno-overload, techno-invasion, techno-complexity, techno-insecurity and techno-uncertainty	Techno-overload increased both techno-insecurity and techno-uncertainty Techno-invasion increased techno-insecurity Techno-complexity increased both techno-insecurity and techno-uncertainty
2.	To demonstrate the **differential impact of the technostressors** on outcome variables of **burnout** and **work engagement**	Techno-insecurity increased burnout and reduced work engagement Techno-uncertainty increased work engagement
3.	To analyze the role of **psychological need satisfaction** as a **mediator** in the relationship between techno-stressors and outcome variables	Techno-insecurity reduced psychological need satisfaction, which further led to increases in burnout and reductions in work engagement Techno-uncertainty increased psychological need satisfaction, which led to further reductions in burnout and increases in work engagement
4.	To study the **moderating impact of technostress inhibitors** in the relationship between techno-stressors and outcome variables	Technostress inhibitors did not have a moderating influence within the nested sub-system as well as in the mediated relationships
5.	To evaluate the **moderating impact of mindfulness** in the relationship between techno-stressors and outcome variables	Higher self-regulated attention intensified the effect of techno-overload on techno-insecurity Higher orientation to experience buffered the effect of techno-complexity on techno-insecurity Orientation to Experience strengthened techno-insecurity's harmful impact on burnout, mediated via psychological need satisfaction Orientation to Experience weakened techno-insecurity's detrimental impact on work engagement, mediated via psychological need satisfaction
6.	To assess the **moderating impact of LMX quality** in the relationship between techno-stressors and outcome variables	LMX quality did not have a moderating influence within the nested sub-system as well as in the mediated relationships

5.2 CONTRIBUTION: THEORETICAL SIGNIFICANCE OF THE STUDY

The present work overcomes the predominant negative bias in current technostress research and makes interdisciplinary contributions by extending the role of psychological mechanisms such as psychological need satisfaction and personal resources such as mindfulness in contemporary technostress research. The novel contributions of this study are discussed in detail below:

First, this study contributes to technostress literature by examining how the five technostressors relate to each other. Extant research operationalizes them as one singular construct (Chandra et al., 2016; Jena, 2015; Marchiori et al., 2018; Ragu-Nathan et al., 2008; Tarafdar et al., 2007), without an understanding of how each may contribute to differential outcomes. Such a homogeneous conceptualization prevents examination of possible positive outcomes that result from these aspects of ICT intensive work environments. By establishing the interrelationships between the technostressors, i.e., that techno-overload, techno-invasion and techno-complexity positively influence techno-insecurity and techno-uncertainty, this study contributes to the further understanding and refinement of the technostress construct.

The second contribution to the technostress literature is the discovery that some technostressors can indeed result in positive outcomes. Extant research conceives technostressors from a stress perspective, i.e., view these aspects of ICT intensive work environments as ‘stressors’ which imply an inherent negative perception of what may, in fact be neutral work characteristics. In order to adopt a more neutral conceptualization of technostressors, they are conceptualized as job demands (Day et al., 2012), characteristics of the work environment that necessitate employees to expend effort in dealing with them. This study uses the JD-R framework as the theoretical lens

and delineates technostressors as challenges or hindrances based on their ability to promote growth and development on the job (Crawford et al., 2010). An understanding of which technology aspects create positive growth or lead to decrements in mental health and performance is crucial to shape employee attitudes and engagement with technology-mediated work. This theoretical framework enabled hypothesizing that certain technostressors, such as techno-uncertainty act like challenge demands, whereby they lead to favourable outcomes such as work engagement; and others, such as techno-insecurity act like hindrance demands, reducing positive outcomes namely work engagement. The results supported these differential impacts of techno-insecurity and techno-uncertainty on outcomes, some of which run counter to the existing empirical evidence.

This finding is also a noteworthy contribution to the job demands literature, specifically with regard to demands imposed by technology intensive work environments. While job uncertainty caused by mergers and acquisitions, takeovers, or macroeconomic factors, as formulated in the general job demands literature has been categorically classified as a hindrance demand, i.e. one that inhibits the pursuit of learning and growth opportunities (Cavanaugh et al., 2000; Crawford et al., 2010), techno-uncertainty caused by frequent changes in software, hardware or networks that employees use on a daily basis to carry out their work function, on the other hand, works like a challenge demand. This is evidenced by its positive relationships to work engagement. Thus, an important theoretical contribution is made to the job demands literature by showing that not all forms of uncertainty have negative impacts on employees. Some, such as techno-uncertainty, prevalent in technology intensive work environments, do promote satisfaction of autonomy, competence and relatedness needs, and consequently work engagement, thereby serving as a challenge demand. This is quite different from

existing conceptualizations that view techno-uncertainty as a 'stressor', leading to only negative outcomes.

Third, this study makes a multidisciplinary contribution to both ICT and organizational behaviour literature by establishing psychological need satisfaction, an individual-level mechanism, as the mediator in the technostressors-outcomes relationship. This provides a useful starting point in understanding why some users find technology-intensive work enabling while others find it detrimental. To the best of the researcher's knowledge, this is the first conceptualization of technostressors as challenge and hindrance demands as well as the first to consider psychological need satisfaction as a mediator in technostressor-outcomes relationships.

Fourth, the work investigates mindfulness as a personal resource in managing technostressors at the workplace. While some studies have confirmed the benefits of personal resources such as self-efficacy and self-esteem (Heuven et al., 2006; Tims et al., 2011), others have failed to demonstrate their significance in reducing job demands (Grover et al., 2018). This could possibly be due to the fact that the personal resources currently studied (psychological capital variables) are evaluative states that stem from mindful attention and awareness. This claim is supported by studies that show increases in mindfulness is accompanied by increases in resilience (Bajaj & Pande, 2016), self-esteem, positive affect and optimism (Bajaj et al., 2016; Randal et al., 2015), and self-efficacy (Malinowski & Lim, 2015). However, evidence is also emerging that some elements of mindfulness may contribute to less-than-ideal outcomes depending on the circumstance. For example, mindfulness was found to amplify both transformational supervision's positive impact on well-being as well as abusive supervision's negative impact on well-being (Walsh & Arnold, 2020). In other words, mindfulness appears to

make the good better and the bad worse, and therefore has to be addressed with caution. This study plugs into the emerging specific effects of mindfulness that is dependent upon context by establishing the reinforcing moderating effect for the negative impact of techno-insecurity on burnout and the positive impact of techno-insecurity on work engagement. Thus, the present study adds to the body of knowledge investigating potential risks of mindfulness in the workplace.

5.3 CONTRIBUTION: PRACTICAL IMPLICATIONS

The results of the study have implications for HR departments, functional managers and individual employees in organizations. First, specific interventions can be developed to minimize those aspects of overload, invasion and complexity that contribute to techno-insecurity, instead of a generic mitigation strategy that does not account for the interrelationships among these variables. Techno-overload, created by working faster, having tighter work schedules and handling more work than one can handle can be alleviated if all stakeholders, i.e., the HR departments, functional managers and employees collaboratively decide on work targets, timelines for work delivery and the technology medium that one should use for work. Further, this can instil a sense of autonomy for employees when they perceive control of manner, method and timing of work delivery. Techno-invasion, created by blurred boundaries between work and home can be mitigated at several levels. Organization-wide policies of 'no-contact after work hours', and training managers to emphasize productivity and quality versus quantity of time spent on work can lessen feelings of techno-invasion. The findings of the study encourage such policies that are already in place in countries like France, Spain, and Portugal (Mishra, 2021; The Economic Times, 2019), as well as in

companies like Volkswagen and Daimler in Germany, and Amazon in India (Peermohamed, 2018).

The greater techno-insecurities and uncertainties faced by employees during times of exogenous shocks, such as the ongoing COVID-19 pandemic, may, in part be attributable to the overload, invasion and complexity they face during this time. The onset of the pandemic forced employees to abruptly change their ways of working and compounded an already high reliance on technology for work. Studies specific to the COVID-19 context identified that psychological need satisfaction reduced distress among frontline workers (Van Der Goot et al., 2021), increased positive emotions and active learning behaviours of students (Holzer et al., 2021) and that technostress increased loneliness, preventing social connectedness (Taser et al., 2022). This study too identified the crucial role of psychological need satisfaction in explaining the beneficial and detrimental impacts of technostressors. Particularly, lower need satisfaction led to negative effects stemming from techno-insecurity and higher need satisfaction led to benefits stemming from techno-uncertainty. Therefore, organizations could consider strengthening employees' need satisfaction by channelizing resources to support the same. These measures include increasing opportunities for flexi-work to support autonomy needs; networking and collaboration to support relatedness needs; and training programs to support competence needs.

Techno-complexity which fuels the need to stay updated or fear being considered outdated can be reduced if HR systems along with line managers set aside specific hours in a week or month dedicated to learning new advancements and skills. Promoting cultures that encourage 'buddy-systems' or where highly skilled members of the team train the others can reduce insecurities stemming from techno-complexity.

Since techno-uncertainty was found to have positive impacts on work engagement, HR systems of organizations can configure work design practices in a manner that would increase the availability of such challenge technostressors while reducing the presence of other technostressors. For example, HR systems could create awareness campaigns on why frequent hardware, software, and network changes are made, while also emphasizing their benefits to the individual employee as well as the organization. This in turn will help reduce burnout and improve work engagement of the employees.

With regard to mindfulness, practices specifically aimed at cultivating the Orientation to Experience component can be provided to mitigate negative impacts of techno-complexity and techno-insecurity. Mindfulness has often been offered as a 'cure-all' solution for performance and wellness in organizations. Per the results of this study, the benefits from mindfulness practice depend on both the problem being addressed and the components of mindfulness being used. In particular, Orientation to Experience component of mindfulness, comprising non-judging of experience and acting with awareness can be cultivated through specific practices (Quaglia et al., 2015). These short exercises do not target long term attitude / behaviour change, but are informal, 'on-the-go' practices that can alleviate symptomatic pressures. Some techniques include the five senses perception exercise, one-minute mindful breaks, mindful walking and 3-minute breathing spaces.

5.4 LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

This study is limited to a cross-sectional design that uses a single survey method. Future research may consider supplementing these findings with other methods, such as interviews. In addition to employee perceptions, objective measures such as performance metrics may be incorporated in future research. While conducting studies

within a single context increases the validity of the findings for that context, it may be useful to replicate this model across other industry sectors such as manufacturing, hospitality, health care etc.

Irrespective of the nature of the industry and type of technology used, it is the individual perceptions of technostressors that impact outcomes. For example, two employees (e.g., managers vs. non-managers) in the same industry with identical norms and type of technology used might report completely different perceptions of technostress (Stadin et al., 2020). Such individual perceptions are shaped by demographic variables such as age, gender, and professional experience, whose effects show mixed evidence (Jena & Mahanti, 2014; Marchiori et al., 2018). It was beyond the scope of this study to examine in detail the effects of these demographic variables. While the present study is limited to including gender, age and work experience as only control variables, future studies may incorporate them within the tested models, either as predictors or as boundary conditions to uncover their specific effects.

While some initial evidence points to the role of individual differences such as the big-five personality traits influencing the technostressor-job outcomes relationships (Srivastava et al., 2015), future research may consider other trait-like individual factors such as a proactive personality, the dark triad of personality, personal and work values, role of virtues and vices, positive-negative affectivity and sources of work motivation that could influence the nested sub-system model. The effect of attitudes such as job satisfaction, organizational commitment, and organizational citizenship behaviours may also be studied within the nested sub-system model. Future work may also explore to what extent these individual traits impact the technostressors-outcomes relationships at differing levels of organizational support.

Such directions in future research may help develop and substantiate Organizational Development interventions for increased employee participation, well-being, and productivity in the workplace.

Since this study did not test any mindfulness interventions, future research may incorporate interventions aimed at increasing Orientation to Experience to test whether its systematic cultivation has similar impacts for technostressors and their relationship to psychological need satisfaction, burnout and work engagement. There is an increasing focus on using the technology interface itself to create positive states of mind (Brivio et al., 2018). For instance, systems designed in a manner that prevents e-mail alerts after hours or systems that allow self-paced learning during upgrades can greatly promote positive psychological states of work-life balance and competence. Future studies can devote attention to the design, simulation and testing of such systems designed to nudge employees to mindfully use them.

Current evidence for the impact of leaders on technostress are mixed. For instance, Fieseler et al. (2014) indicate that leadership serves a protective role in the presence of technology induced stress, whereas Harris et al. (2015) show that higher leader-member exchange quality exacerbated the negative impact of information overload on subordinates' work-family conflict. However, the present work did not demonstrate significant findings regarding LMX quality. Given that social relations function as resources depending on their capacity to stimulate the preservation of other valued resources (Hobfoll, 1989), their role within the context of technology use might benefit from further inquiry. Such an examination of the interplay of personal and social resources would lead to a richer conceptualization of technostress mitigation mechanisms.

5.5 CONCLUSION

Technology intensive work is the ‘new-normal’ and is increasingly pervading contemporary work-life. The ability to stay resilient and adapt continuously as technology evolves will be a defining aspect of the future workforce. Perceiving technostressors as only strain-inducing is detrimental to employee adaptation to and adoption of technology at the workplace. In an attempt to change this perspective, this work examined technostressors from the challenge-hindrance demand framework and confirmed the complex interrelationships between them as well as positive work-related impacts of techno-uncertainty. After overcoming the negative bias inherent in previous research, this thesis offered an opportunity for discussion regarding psychological variables such as psychological need satisfaction and potential for mitigating resources such as mindfulness. Given that technology intensive work is the ‘new-normal’ and is increasingly pervading the twenty-first century workplace, the ability to stay resilient and adapt continuously as technology evolves will be a defining aspect of the future workforce. After all, it is not the technology itself, regardless of its nature or type which is the pressing issue, but rather individuals’ understanding, use and adaption to technologically-driven workplaces. To that effect, this thesis is a step towards enabling employees to adopt constructive perspectives of ICT use at work, while also identifying positive outcomes and ameliorating mechanisms in the process.

APPENDIX A: FACTOR LOADINGS OF TEST ITEMS

Second Order factor	First Order Factors	Item Code	Factor Loading
Technostressors	Techno- Overload	ts_1	0.72
		ts_2	0.813
		ts_3	0.688
	Techno- Invasion	ts_6	0.65
		ts_7	0.685
		ts_9	0.712
	Techno- Complexity	ts_10	0.676
		ts_11	0.751
		ts_14	0.788
Technostressors	Techno- Insecurity	ts_15	0.744
		ts_17	0.698
		ts_18	0.627
	Techno-Uncertainty	ts_21	0.692
		ts_22	0.838
		ts_23	0.844
Burnout	Emotional Exhaustion	bo_5	0.521
		bo_14	0.64
		bo_16	0.709
	Disengagement	bo_1	0.544
		bo_3r	0.511
		bo_7	0.671
		bo_15	0.641
Work Engagement	Vigour	eng_1	0.528
		eng_2	0.705
		eng_3	0.725
	Dedication	eng_4	0.805
		eng_5	0.845
		eng_6	0.811
Work Engagement	Absorption	eng_7	0.851
		eng_8	0.751
		eng_9	0.431
Psychological Need Satisfaction	Need for autonomy	pns_1	0.598
		pns_4	0.576
		pns_5	0.63
	Need for competence	pns_7	0.632
		pns_8	0.664
		pns_9	0.711
	Need for relatedness	pns_12	0.242
		pns_14	0.168
		pns_16	0.238

Second Order factor	First Order Factors	Item Code	Factor Loading
Technostress Inhibitors	Literacy facilitation	ti_1	0.61
		ti_2	0.671
		ti_3	0.753
		ti_4	0.685
	Technical support provision	ti_5	0.709
		ti_6	0.725
		ti_7	0.698
Technostress Inhibitors	Involvement facilitation	ti_8	0.519
		ti_9	0.511
		ti_10	0.596
Self- Regulated Attention	Observing	mf_10	0.562
		mf_15	0.66
		mf_20	0.657
	Describing	mf_1	0.806
		mf_2r	0.783
		mf_16	0.441
	Nonreactivity to inner experience	mf_13	0.623
		mf_18	0.53
		mf_21	0.58
Orientation to Experience	Acting with awareness	mf_12	0.619
		mf_22r	0.775
		mf_23r	0.776
	Nonjudging of inner experience	mf_4r	0.525
		mf_14r	0.615
		mf_19r	0.626
LMX Quality	-	lmx_2	0.697
		lmx_3	0.764
		lmx_4	0.7
		lmx_6	0.709
		lmx_7	0.767

APPENDIX B: POST-HOC TESTS OF UNIVARIATE ANALYSES OF DEMOGRAPHIC VARIABLES

TABLE B.1 TUKEY-KRAMER POST HOC FOR AGE

Variable	Age		Mean Difference	Sig.
Burnout	Less than 21 Years	21-30 Years	0.96	0.66
		31-40 Years	1.26	0.40
		41-50 Years	1.21	0.46
		Over 51 Years	0.72	0.94
	21-30 Years	Less than 21 Years	-0.96	0.66
		31-40 Years	0.29	**0.01**
		41-50 Years	0.24	0.63
		Over 51 Years	-0.25	0.99
	31-40 Years	Less than 21 Years	-1.26	0.40
		21-30 Years	-0.29	**0.01**
		41-50 Years	-0.05	1.00
		Over 51 Years	-0.54	0.89
	41-50 Years	Less than 21 Years	-1.21	0.46
		21-30 Years	-0.24	0.63
		31-40 Years	0.05	1.00
		Over 51 Years	-0.49	0.93
	Over 51 Years	Less than 21 Years	-0.72	0.94
		21-30 Years	0.25	0.99
		31-40 Years	0.54	0.89
		41-50 Years	0.49	0.93
Work Engagement	Less than 21 Years	21-30 Years	0.53	0.95
		31-40 Years	0.30	0.99
		41-50 Years	0.03	1.00
		Over 51 Years	0.20	1.00
	21-30 Years	Less than 21 Years	-0.53	0.95
		31-40 Years	-0.22	0.10
		41-50 Years	-0.50	**0.03**
		Over 51 Years	-0.33	0.98
	31-40 Years	Less than 21 Years	-0.30	0.99
		21-30 Years	0.22	0.10
		41-50 Years	-0.27	0.57
		Over 51 Years	-0.10	1.00
	41-50 Years	Less than 21 Years	-0.03	1.00
		21-30 Years	0.50	**0.03**
		31-40 Years	0.27	0.57
		Over 51 Years	0.17	1.00
	Over 51 Years	Less than 21 Years	-0.20	1.00
		21-30 Years	0.33	0.98

		31-40 Years	0.10	1.00
		41-50 Years	-0.17	1.00

* The mean difference is significant at the 0.05 level.

TABLE B.2: GAMES-HOWELL POST HOC FOR EDUCATIONAL QUALIFICATION

Variable	Educational Qualification		Mean Difference	Sig.
Techno-overload	Diploma	UG Degree	0.37	**0.02**
		PG Degree	0.42	**0.01**
		Doctoral Degree	0.03	1
		Other	0.6	0.28
	UG Degree	Diploma	-0.37	**0.02**
		PG Degree	0.05	0.99
		Doctoral Degree	-0.33	0.95
		Other	0.23	0.95
	PG Degree	Diploma	-0.42	**0.01**
		UG Degree	-0.05	0.99
		Doctoral Degree	-0.39	0.91
		Other	0.18	0.98
	Doctoral Degree	Diploma	-0.03	1
		UG Degree	0.33	0.95
		PG Degree	0.39	0.91
		Other	0.57	0.83
	Other	Diploma	-0.6	0.28
		UG Degree	-0.23	0.95
		PG Degree	-0.18	0.98
		Doctoral Degree	-0.57	0.83
Techno-uncertainty	Diploma	UG Degree	0.01	1
		PG Degree	0.12	0.95
		Doctoral Degree	0.49	0.05
		Other	0.26	0.86
	UG Degree	Diploma	-0.01	1
		PG Degree	0.11	0.78
		Doctoral Degree	0.48	**0.04**
		Other	0.25	0.8
	PG Degree	Diploma	-0.12	0.95
		UG Degree	-0.11	0.78
		Doctoral Degree	0.37	0.1
		Other	0.14	0.98
		Diploma	-0.49	0.05
		UG Degree	-0.48	**0.04**
		PG Degree	-0.37	0.1
		Other	-0.23	0.87
	Other	Diploma	-0.26	0.86
		UG Degree	-0.25	0.8
		PG Degree	-0.14	0.98
		Doctoral Degree	0.23	0.87
Technostress Inhibitors	Diploma	UG Degree	-0.03	1
		PG Degree	0.16	0.88
		Doctoral Degree	-0.2	0.86
		Other	-0.06	1
	UG Degree	Diploma	0.03	1

		PG Degree	0.19	0.23
		Doctoral Degree	-0.17	0.79
		Other	-0.03	1
	PG Degree	Diploma	-0.16	0.88
		UG Degree	-0.19	0.23
		Doctoral Degree	-0.35	0.22
		Other	-0.22	0.97
	Doctoral Degree	Diploma	0.2	0.86
		UG Degree	0.17	0.79
		PG Degree	0.35	0.22
		Other	0.13	1
	Other	Diploma	0.06	1
		UG Degree	0.03	1
		PG Degree	0.22	0.97
		Doctoral Degree	-0.13	1
Burnout	Diploma	UG Degree	0.53	**0**
		PG Degree	0.4	**0.04**
		Doctoral Degree	0.07	1
		Other	0.5	0.43
	UG Degree	Diploma	-0.53	**0**
		PG Degree	-0.12	0.65
		Doctoral Degree	-0.45	0.56
		Other	-0.02	1
	PG Degree	Diploma	-0.4	**0.04**
		UG Degree	0.12	0.65
		Doctoral Degree	-0.33	0.77
		Other	0.1	1
	Doctoral Degree	Diploma	-0.07	1
		UG Degree	0.45	0.56
		PG Degree	0.33	0.77
		Other	0.43	0.81
	Other	Diploma	-0.5	0.43
		UG Degree	0.02	1
		PG Degree	-0.1	1
		Doctoral Degree	-0.43	0.81
Work Engagement	Diploma	UG Degree	-0.18	0.9
		PG Degree	-0.13	0.97
		Doctoral Degree	0.7	0.9
		Other	-0.57	0.36
	UG Degree	Diploma	0.18	0.9
		PG Degree	0.05	0.99
		Doctoral Degree	0.89	0.79
		Other	-0.39	0.59
	PG Degree	Diploma	0.13	0.97
		UG Degree	-0.05	0.99
		Doctoral Degree	0.84	0.82
		Other	-0.44	0.47
	Doctoral Degree	Diploma	-0.7	0.9
		UG Degree	-0.89	0.79
		PG Degree	-0.84	0.82
		Other	-1.28	0.58
	Other	Diploma	0.57	0.36
		UG Degree	0.39	0.59

		PG Degree	0.44	0.47
		Doctoral Degree	1.28	0.58

* The mean difference is significant at the 0.05 level.

TABLE B.3: GAMES-HOWELL POST HOC FOR WORK EXPERIENCE

Variable	Work Experience		Mean Difference	Sig.
Techno-overload	1-3 Years	4-6 Years	-0.11	0.81
		7-10 Years	-0.18	0.54
		10-14 Years	-0.40	**0.03**
		Over 14 Years	-0.01	1.00
	4-6 Years	1-3 Years	0.11	0.81
		7-10 Years	-0.07	0.98
		10-14 Years	-0.28	0.26
		Over 14 Years	0.10	0.97
	7-10 Years	1-3 Years	0.18	0.54
		4-6 Years	0.07	0.98
		10-14 Years	-0.22	0.62
		Over 14 Years	0.17	0.86
	10-14 Years	1-3 Years	0.40	**0.03**
		4-6 Years	0.28	0.26
		7-10 Years	0.22	0.62
		Over 14 Years	0.39	0.23
	Over 14 Years	1-3 Years	0.01	1.00
		4-6 Years	-0.10	0.97
		7-10 Years	-0.17	0.86
		10-14 Years	-0.39	0.23
Orientation to Experience	1-3 Years	4-6 Years	0.23	0.14
		7-10 Years	0.21	0.42
		10-14 Years	0.20	0.67
		Over 14 Years	-0.16	0.74
	4-6 Years	1-3 Years	-0.23	0.14
		7-10 Years	-0.02	1.00
		10-14 Years	-0.02	1.00
		Over 14 Years	-0.39	**0.04**
	7-10 Years	1-3 Years	-0.21	0.42
		4-6 Years	0.02	1.00
		10-14 Years	-0.01	1.00
		Over 14 Years	-0.37	0.12
	10-14 Years	1-3 Years	-0.20	0.67
		4-6 Years	0.02	1.00
		7-10 Years	0.01	1.00
		Over 14 Years	-0.36	0.26
	Over 14 Years	1-3 Years	0.16	0.74
		4-6 Years	0.39	**0.04**
		7-10 Years	0.37	0.12
		10-14 Years	0.36	0.26
Psychological Need Satisfaction	1-3 Years	4-6 Years	-0.26	**0.055**
		7-10 Years	-0.16	0.75
		10-14 Years	-0.29	0.24
		Over 14 Years	-0.38	0.15
	4-6 Years	1-3 Years	0.26	**0.055**
		7-10 Years	0.10	0.94

		10-14 Years	-0.03	1.00
		Over 14 Years	-0.12	0.94
	7-10 Years	1-3 Years	0.16	0.75
		4-6 Years	-0.10	0.94
		10-14 Years	-0.13	0.93
		Over 14 Years	-0.22	0.75
	10-14 Years	1-3 Years	0.29	0.24
		4-6 Years	0.03	1.00
		7-10 Years	0.13	0.93
		Over 14 Years	-0.09	0.99
	Over 14 Years	1-3 Years	0.38	0.15
		4-6 Years	0.12	0.94
		7-10 Years	0.22	0.75
		10-14 Years	0.09	0.99
Work Engagement	1-3 Years	4-6 Years	0.07	0.96
		7-10 Years	-0.07	0.97
		10-14 Years	-0.20	0.68
		Over 14 Years	-0.56	**0.00**
	4-6 Years	1-3 Years	-0.07	0.96
		7-10 Years	-0.15	0.78
		10-14 Years	-0.27	0.41
		Over 14 Years	-0.63	**0.00**
	7-10 Years	1-3 Years	0.07	0.97
		4-6 Years	0.15	0.78
		10-14 Years	-0.12	0.95
		Over 14 Years	-0.49	**0.00**
	10-14 Years	1-3 Years	0.20	0.68
		4-6 Years	0.27	0.41
		7-10 Years	0.12	0.95
		Over 14 Years	-0.36	0.17
	Over 14 Years	1-3 Years	0.56	**0.00**
		4-6 Years	0.63	**0.00**
		7-10 Years	0.49	**0.00**
		10-14 Years	0.36	0.17

TABLE B.4 GAMES-HOWELL POST HOC FOR ICT USE FREQUENCY

Variable	ICT Use Frequency		Mean Difference	Sig.
Techno-complexity	Very rare use	Rare use	-0.29	0.71
		Occasional use	-0.29	0.62
		Frequent use	-0.02	1.00
		Very frequent use	0.25	0.73
	Rare use	Very rare use	0.29	0.71
		Occasional use	-0.01	1.00
		Frequent use	0.27	0.29
		Very frequent use	0.54	**0.00**
	Occasional use	Very rare use	0.29	0.62
		Rare use	0.01	1.00
		Frequent use	0.27	0.06
		Very frequent use	0.55	**0.00**
	Frequent use	Very rare use	0.02	1.00
		Rare use	-0.27	0.29
		Occasional use	-0.27	0.06
		Very frequent use	0.27	**0.04**
	Very frequent use	Very rare use	-0.25	0.73
		Rare use	-0.54	**0.00**
		Occasional use	-0.55	**0.00**
		Frequent use	-0.27	**0.04**
Techno-insecurity	Very rare use	Rare use	-0.20	0.91
		Occasional use	-0.12	0.98
		Frequent use	0.11	0.99
		Very frequent use	0.32	0.59
	Rare use	Very rare use	0.20	0.91
		Occasional use	0.08	0.98
		Frequent use	0.31	0.20
		Very frequent use	0.52	**0.01**
	Occasional use	Very rare use	0.12	0.98
		Rare use	-0.08	0.98
		Frequent use	0.23	0.18
		Very frequent use	0.44	**0.00**
	Frequent use	Very rare use	-0.11	0.99
		Rare use	-0.31	0.20
		Occasional use	-0.23	0.18
		Very frequent use	0.21	0.18
	Very frequent use	Very rare use	-0.32	0.59
		Rare use	-0.52	**0.01**
		Occasional use	-0.44	**0.00**
		Frequent use	-0.21	0.18
Techno-uncertainty	Very rare use	Rare use	-0.52	0.17
		Occasional use	-0.21	0.87
		Frequent use	-0.47	0.19
		Very frequent use	-0.37	0.45
	Rare use	Very rare use	0.52	0.17
		Occasional use	0.31	0.16
		Frequent use	0.05	1.00
		Very frequent use	0.15	0.78
	Occasional use	Very rare use	0.21	0.87
		Rare use	-0.31	0.16

		Frequent use	-0.26	0.08
		Very frequent use	-0.16	0.64
	Frequent use	Very rare use	0.47	0.19
		Rare use	-0.05	1.00
		Occasional use	0.26	0.08
		Very frequent use	0.11	0.83
	Very frequent use	Very rare use	0.37	0.45
		Rare use	-0.15	0.78
		Occasional use	0.16	0.64
		Frequent use	-0.11	0.83
Technostress Inhibitors	Very rare use	Rare use	-0.73	0.15
		Occasional use	-0.75	0.12
		Frequent use	-0.90	**0.04**
		Very frequent use	-0.94	**0.03**
	Rare use	Very rare use	0.73	0.15
		Occasional use	-0.02	1.00
		Frequent use	-0.17	0.66
		Very frequent use	-0.21	0.51
	Occasional use	Very rare use	0.75	0.12
		Rare use	0.02	1.00
		Frequent use	-0.15	0.54
		Very frequent use	-0.19	0.39
	Frequent use	Very rare use	0.90	**0.04**
		Rare use	0.17	0.66
		Occasional use	0.15	0.54
		Very frequent use	-0.04	0.99
	Very frequent use	Very rare use	0.94	**0.03**
		Rare use	0.21	0.51
		Occasional use	0.19	0.39
		Frequent use	0.04	0.99
Self Regulated Attention	Very rare use	Rare use	0.01	1.00
		Occasional use	-0.29	0.79
		Frequent use	-0.54	0.23
		Very frequent use	-0.51	0.30
	Rare use	Very rare use	-0.01	1.00
		Occasional use	-0.30	0.33
		Frequent use	-0.55	**0.00**
		Very frequent use	-0.51	**0.01**
	Occasional use	Very rare use	0.29	0.79
		Rare use	0.30	0.33
		Frequent use	-0.25	0.14
		Very frequent use	-0.21	0.33
	Frequent use	Very rare use	0.54	0.23
		Rare use	0.55	**0.00**
		Occasional use	0.25	0.14
		Very frequent use	0.03	1.00
	Very frequent use	Very rare use	0.51	0.30
		Rare use	0.51	**0.01**
		Occasional use	0.21	0.33
		Frequent use	-0.03	1.00
Leader-Member Exchange Quality	Very rare use	Rare use	-0.37	0.63
		Occasional use	-0.26	0.85
		Frequent use	-0.64	0.10

		Very frequent use	-0.86	**0.02**
	Rare use	Very rare use	0.37	0.63
		Occasional use	0.11	0.93
		Frequent use	-0.27	0.21
		Very frequent use	-0.49	**0.00**
	Occasional use	Very rare use	0.26	0.85
		Rare use	-0.11	0.93
		Frequent use	-0.38	**0.00**
		Very frequent use	-0.60	**0.00**
	Frequent use	Very rare use	0.64	0.10
		Rare use	0.27	0.21
		Occasional use	0.38	**0.00**
		Very frequent use	-0.22	0.15
	Very frequent use	Very rare use	0.86	**0.02**
		Rare use	0.49	**0.00**
		Occasional use	0.60	**0.00**
		Frequent use	0.22	0.15
Psychological Need Satisfaction	Very rare use	Rare use	-0.37	0.74
		Occasional use	-0.24	0.92
		Frequent use	-0.56	0.33
		Very frequent use	-0.69	0.15
	Rare use	Very rare use	0.37	0.74
		Occasional use	0.13	0.87
		Frequent use	-0.19	0.56
		Very frequent use	-0.32	0.11
	Occasional use	Very rare use	0.24	0.92
		Rare use	-0.13	0.87
		Frequent use	-0.31	**0.02**
		Very frequent use	-0.45	**0.00**
	Frequent use	Very rare use	0.56	0.33
		Rare use	0.19	0.56
		Occasional use	0.31	**0.02**
		Very frequent use	-0.13	0.65
	Very frequent use	Very rare use	0.69	0.15
		Rare use	0.32	0.11
		Occasional use	0.45	**0.00**
		Frequent use	0.13	0.65
Burnout	Very rare use	Rare use	0.42	0.69
		Occasional use	0.57	0.35
		Frequent use	0.65	0.22
		Very frequent use	0.75	0.12
	Rare use	Very rare use	-0.42	0.69
		Occasional use	0.15	0.84
		Frequent use	0.23	0.47
		Very frequent use	0.33	0.18
	Occasional use	Very rare use	-0.57	0.35
		Rare use	-0.15	0.84
		Frequent use	0.08	0.93
		Very frequent use	0.18	0.49
	Frequent use	Very rare use	-0.65	0.22
		Rare use	-0.23	0.47
		Occasional use	-0.08	0.93
		Very frequent use	0.10	0.84

	Very frequent use	Very rare use	-0.75	0.12
		Rare use	-0.33	0.18
		Occasional use	-0.18	0.49
		Frequent use	-0.10	0.84

* The mean difference is significant at the 0.05 level.

TABLE B.5 GAMES-HOWELL POST HOC FOR ICT CONTROL

Variable	ICT Control		Mean Difference	Sig.
Techno-complexity	Very low control	Low control	0.03	1.00
		Avg control	-0.11	1.00
		High control	0.26	0.88
		Very high control	0.49	0.50
	Low control	Very low control	-0.03	1.00
		Avg control	-0.14	0.94
		High control	0.23	0.65
		Very high control	0.46	0.18
	Avg control	Very low control	0.11	1.00
		Low control	0.14	0.94
		High control	0.37	**0.00**
		Very high control	0.60	**0.00**
	High control	Very low control	-0.26	0.88
		Low control	-0.23	0.65
		Avg control	-0.37	**0.00**
		Very high control	0.23	0.45
	Very high control	Very low control	-0.49	0.50
		Low control	-0.46	0.18
		Avg control	-0.60	**0.00**
		High control	-0.23	0.45
Techno-insecurity	Very low control	Low control	-0.43	0.73
		Avg control	-0.58	0.41
		High control	-0.18	0.98
		Very high control	0.09	1.00
	Low control	Very low control	0.43	0.73
		Avg control	-0.15	0.91
		High control	0.25	0.54
		Very high control	0.52	0.07
	Avg control	Very low control	0.58	0.41
		Low control	0.15	0.91
		High control	0.40	**0.00**
		Very high control	0.67	**0.00**
	High control	Very low control	0.18	0.98
		Low control	-0.25	0.54
		Avg control	-0.40	**0.00**
		Very high control	0.27	0.24

	Very high control	Very low control	-0.09	1.00
		Low control	-0.52	0.07
		Avg control	-0.67	**0.00**
		High control	-0.27	0.24
Technostress Inhibitors	Very low control	Low control	-0.44	0.90
		Avg control	-0.92	0.33
		High control	-1.12	0.17
		Very high control	-1.13	0.19
	Low control	Very low control	0.44	0.90
		Avg control	-0.47	0.17
		High control	-0.67	**0.02**
		Very high control	-0.68	0.05
	Avg control	Very low control	0.92	0.33
		Low control	0.47	0.17
		High control	-0.20	0.10
		Very high control	-0.21	0.67
	High control	Very low control	1.12	0.17
		Low control	0.67	**0.02**
		Avg control	0.20	0.10
		Very high control	-0.01	1.00
	Very high control	Very low control	1.13	0.19
		Low control	0.68	0.05
		Avg control	0.21	0.67
		High control	0.01	1.00
Self Regulated Attention	Very low control	Low control	-0.08	1.00
		Avg control	-0.15	1.00
		High control	-0.64	0.64
		Very high control	-0.66	0.63
	Low control	Very low control	0.08	1.00
		Avg control	-0.07	1.00
		High control	-0.56	**0.02**
		Very high control	-0.58	**0.03**
	Avg control	Very low control	0.15	1.00
		Low control	0.07	1.00
		High control	-0.49	**0.00**
		Very high control	-0.51	**0.00**
	High control	Very low control	0.64	0.64
		Low control	0.56	**0.02**
		Avg control	0.49	**0.00**
		Very high control	-0.02	1.00
	Very high control	Very low control	0.66	0.63
		Low control	0.58	**0.03**
		Avg control	0.51	**0.00**

		High control	0.02	1.00
Leader-Member Exchange Quality	Very low control	Low control	-0.76	0.56
		Avg control	-0.64	0.67
		High control	-0.84	0.43
		Very high control	-1.11	0.21
	Low control	Very low control	0.76	0.56
		Avg control	0.12	0.96
		High control	-0.08	0.99
		Very high control	-0.35	0.37
	Avg control	Very low control	0.64	0.67
		Low control	-0.12	0.96
		High control	-0.20	0.25
		Very high control	-0.47	**0.01**
	High control	Very low control	0.84	0.43
		Low control	0.08	0.99
		Avg control	0.20	0.25
		Very high control	-0.27	0.17
	Very high control	Very low control	1.11	0.21
		Low control	0.35	0.37
		Avg control	0.47	**0.01**
		High control	0.27	0.17
Psychological Need Satisfaction	Very low control	Low control	0.00	1.00
		Avg control	-0.08	1.00
		High control	-0.37	0.97
		Very high control	-0.77	0.73
	Low control	Very low control	0.00	1.00
		Avg control	-0.08	0.99
		High control	-0.37	0.18
		Very high control	-0.78	**0.00**
	Avg control	Very low control	0.08	1.00
		Low control	0.08	0.99
		High control	-0.29	**0.02**
		Very high control	-0.70	**0.00**
	High control	Very low control	0.37	0.97
		Low control	0.37	0.18
		Avg control	0.29	**0.02**
		Very high control	-0.40	**0.03**
	Very high control	Very low control	0.77	0.73
		Low control	0.78	**0.00**
		Avg control	0.70	**0.00**
		High control	0.40	**0.03**
Work Engagement	Very low control	Low control	0.34	0.94
		Avg control	-0.06	1.00

		High control	-0.39	0.88
		Very high control	-0.52	0.75
	Low control	Very low control	-0.34	0.94
		Avg control	-0.40	0.23
		High control	-0.73	**0.00**
		Very high control	-0.86	**0.00**
	Avg control	Very low control	0.06	1.00
		Low control	0.40	0.23
		High control	-0.32	**0.02**
		Very high control	-0.45	**0.01**
	High control	Very low control	0.39	0.88
		Low control	0.73	**0.00**
		Avg control	0.32	**0.02**
		Very high control	-0.13	0.76
	Very high control	Very low control	0.52	0.75
		Low control	0.86	**0.00**
		Avg control	0.45	**0.01**
		High control	0.13	0.76

* The mean difference is significant at the 0.05 level.

APPENDIX C: PARTIAL REGRESSION PLOTS

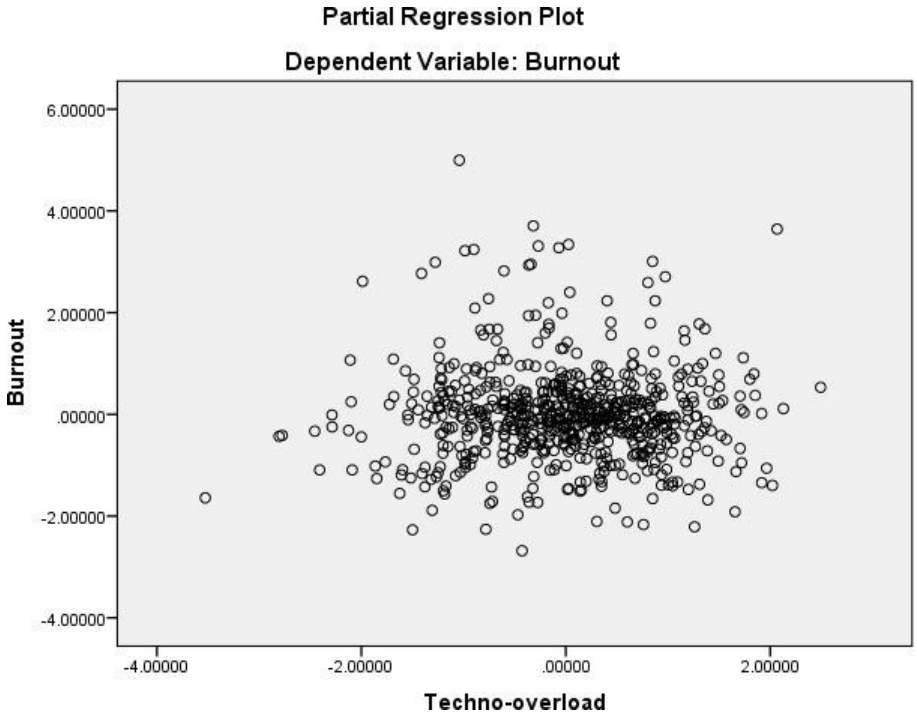

Fig C.1 Partial Regression Plot: Techno-overload and Burnout

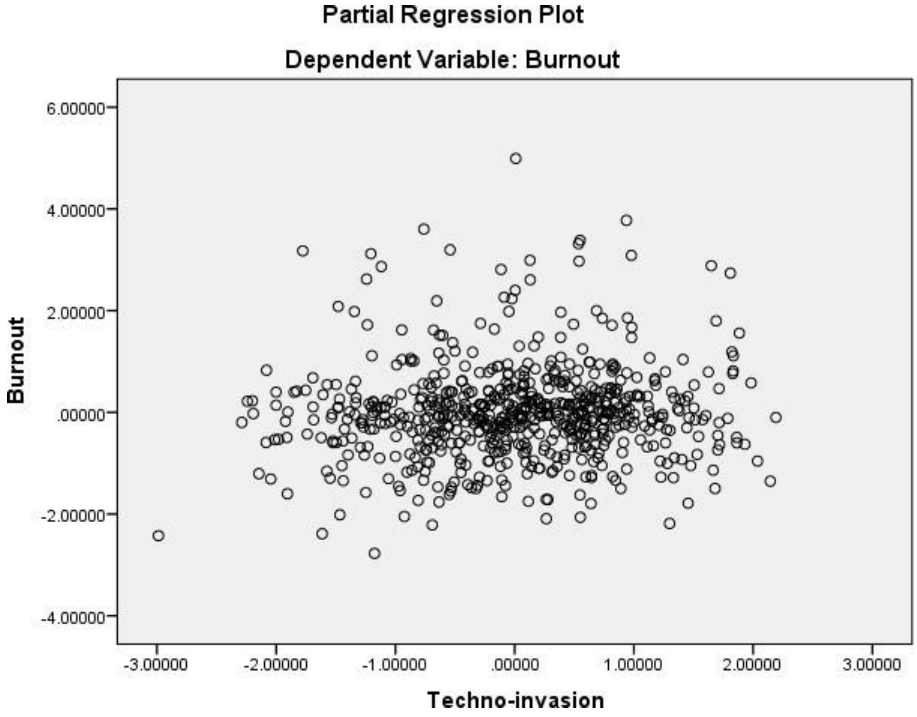

Fig C.2 Partial Regression Plot: Techno-invasion and Burnout

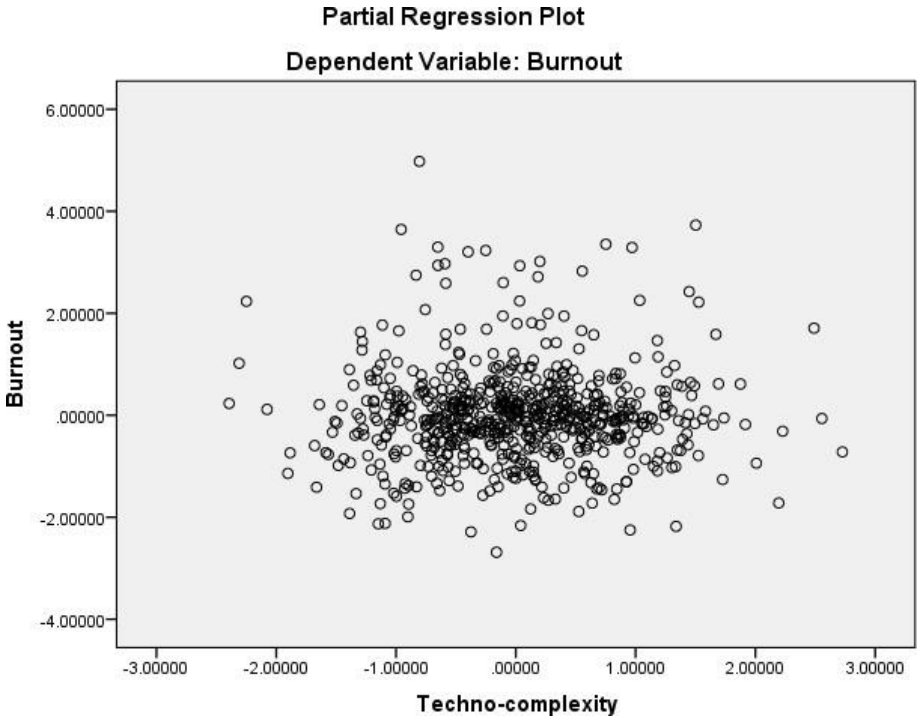

Fig C.3 Partial Regression Plot: Techno-complexity and Burnout

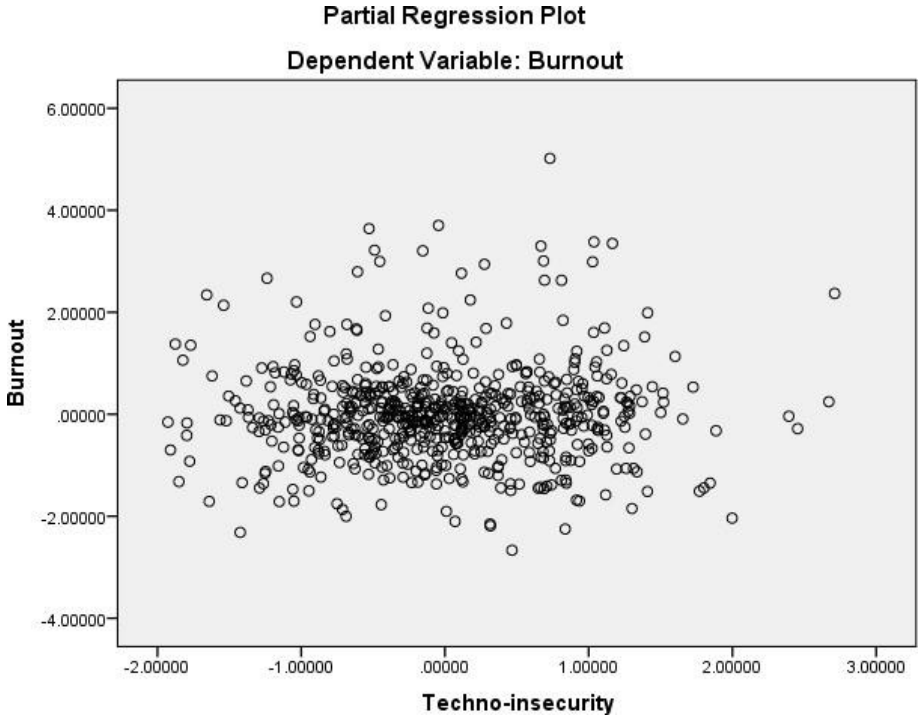

Fig C.4 Partial Regression Plot: Techno-insecurity and Burnout

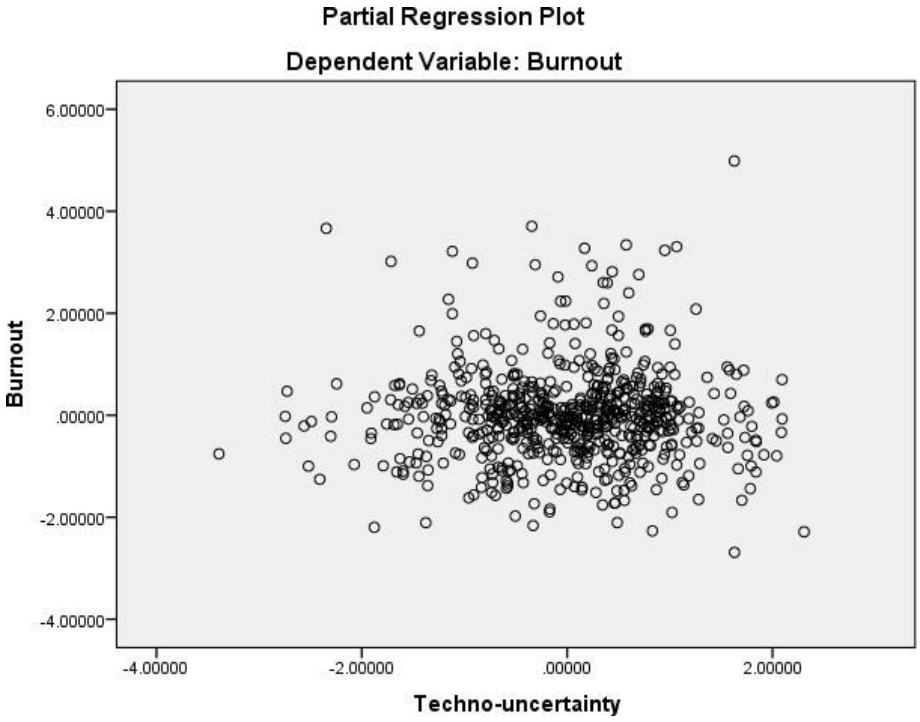

Fig C.5 Partial Regression Plot: Techno-uncertainty and Burnout

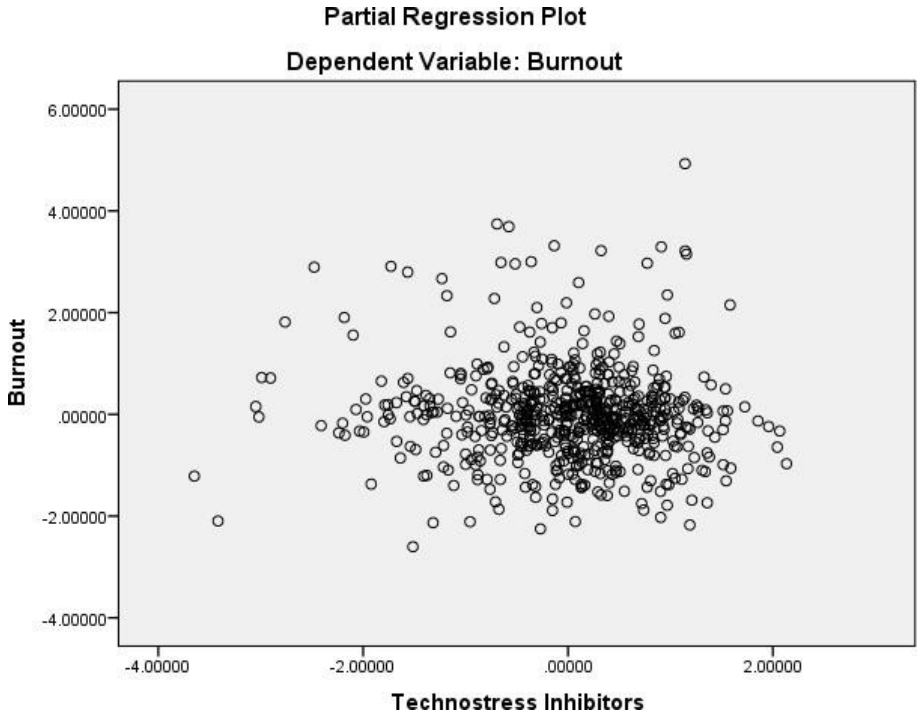

Fig C.6 Partial Regression Plot: Technostress Inhibitors and Burnout

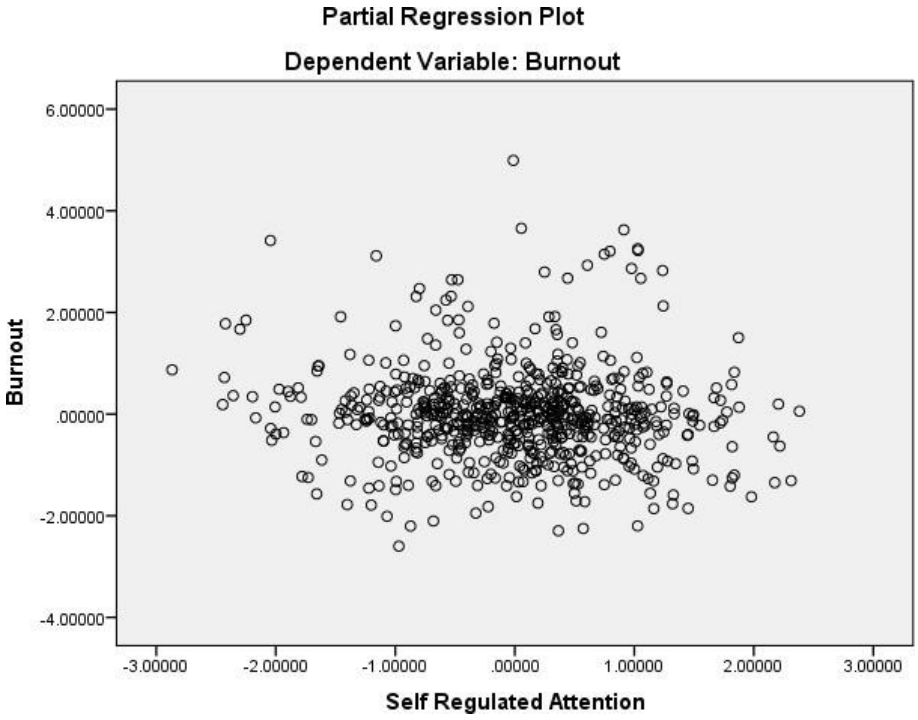

Fig C.7 Partial Regression Plot: Self-Regulated Attention and Burnout

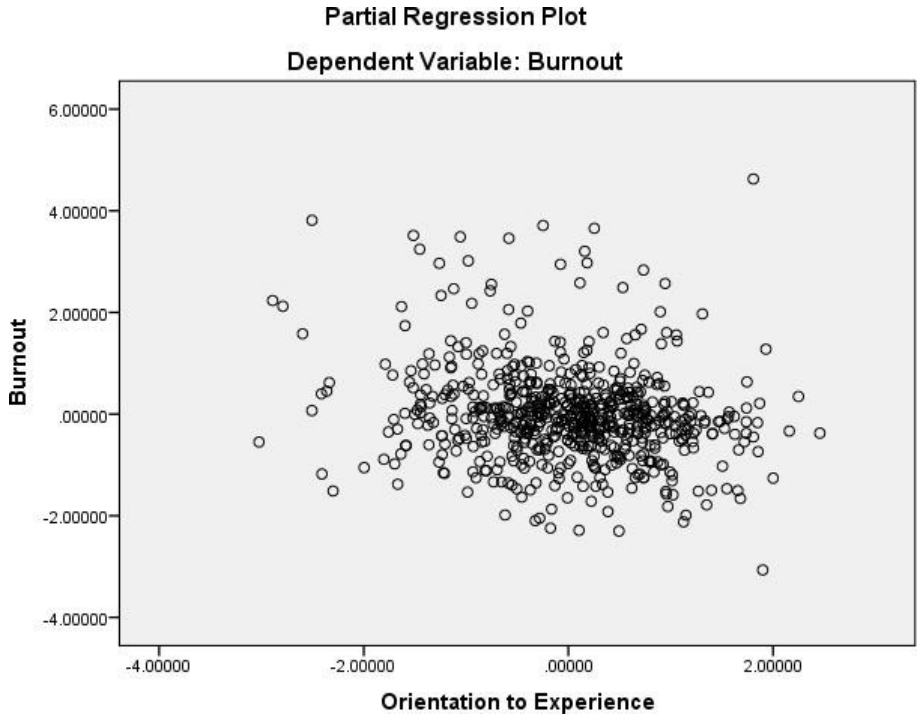

Fig C.8 Partial Regression Plot: Orientation to Experience and Burnout

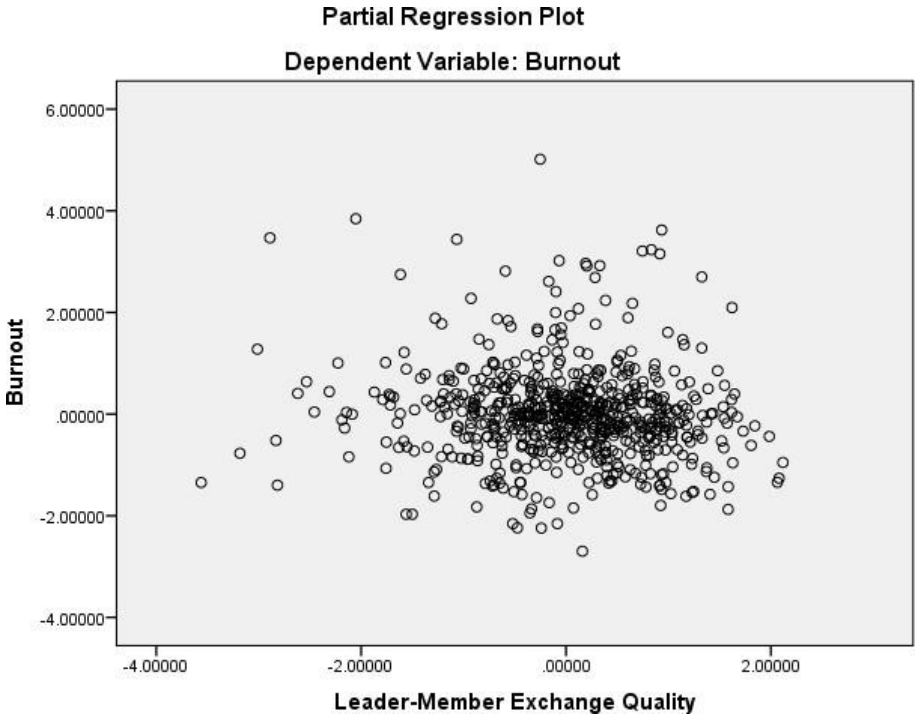

Fig C.9 Partial Regression Plot: Orientation to Experience and Burnout

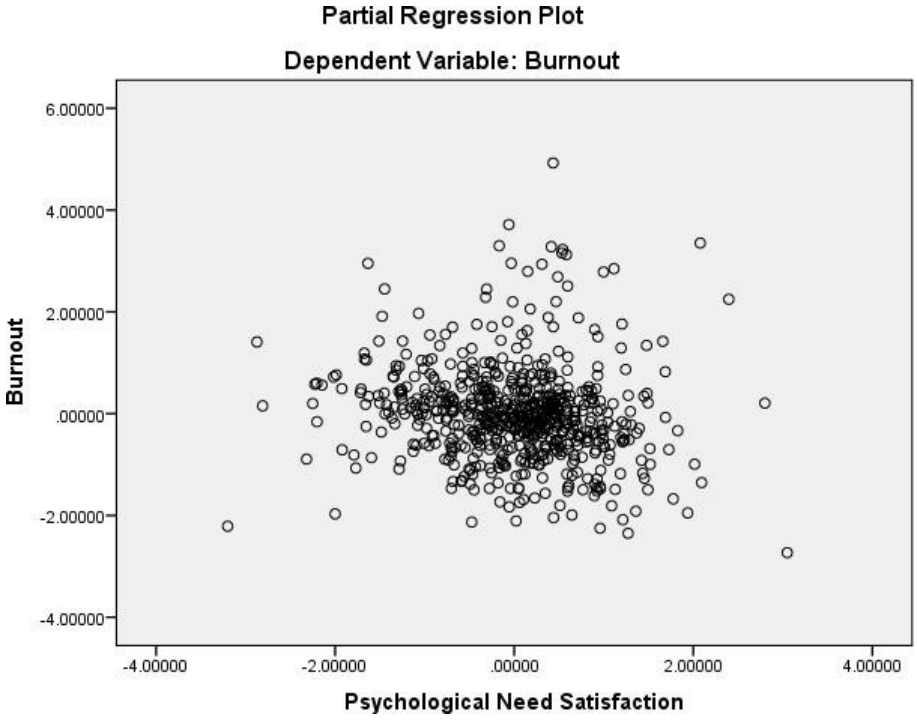

Fig C.10 Partial Regression Plot: Psychological Need Satisfaction and Burnout

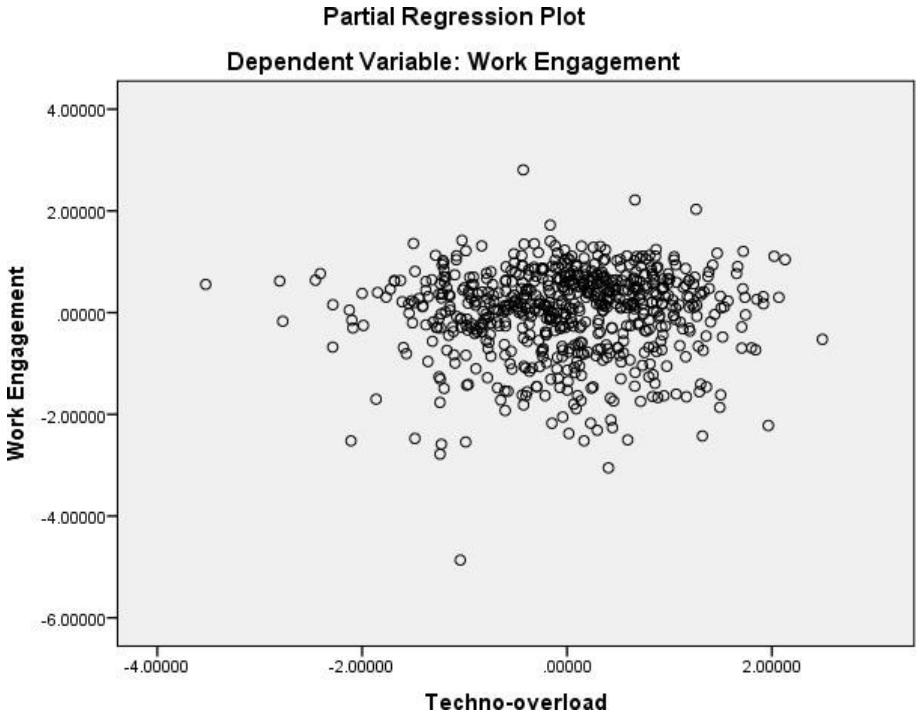

Fig C.11 Partial Regression Plot: Techno-overload and Work Engagement

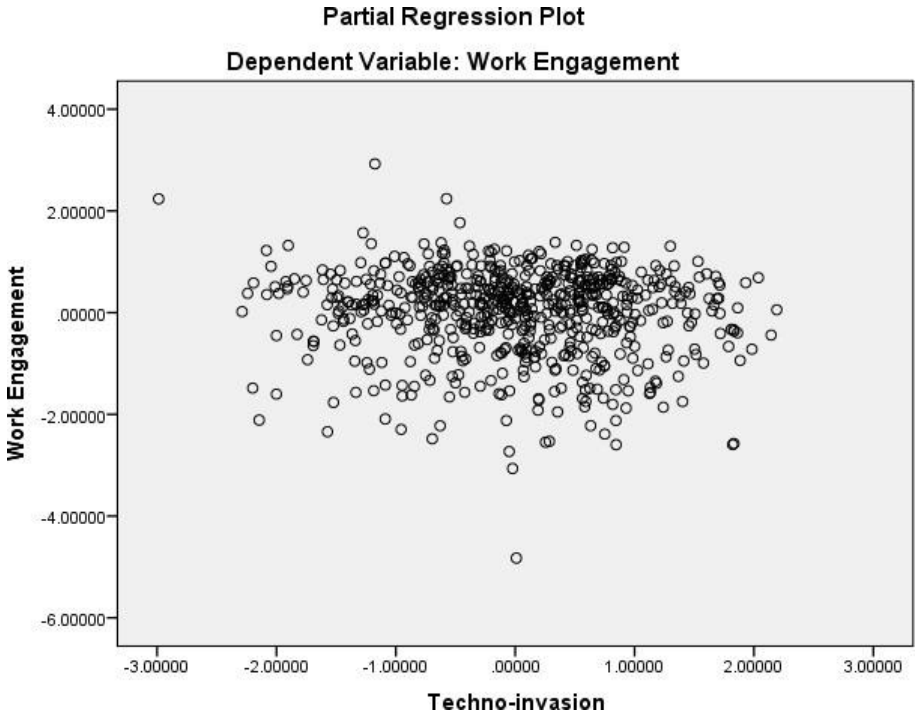

Fig C.12 Partial Regression Plot: Techno-invasion and Work Engagement

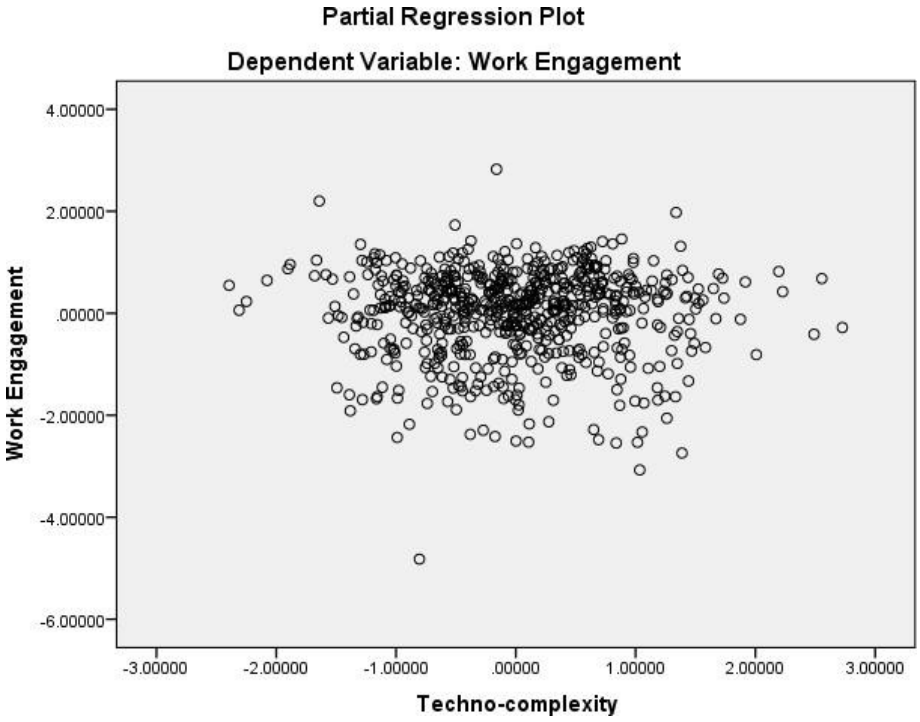

Fig C.13 Partial Regression Plot: Techno-complexity and Work Engagement

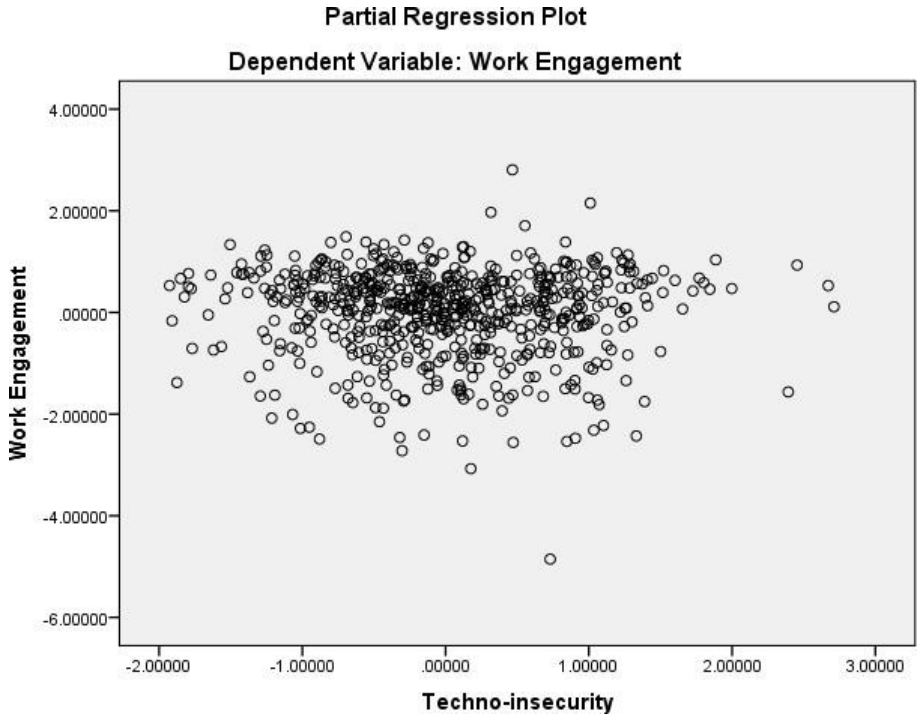

Fig C.14 Partial Regression Plot: Techno-insecurity and Work Engagement

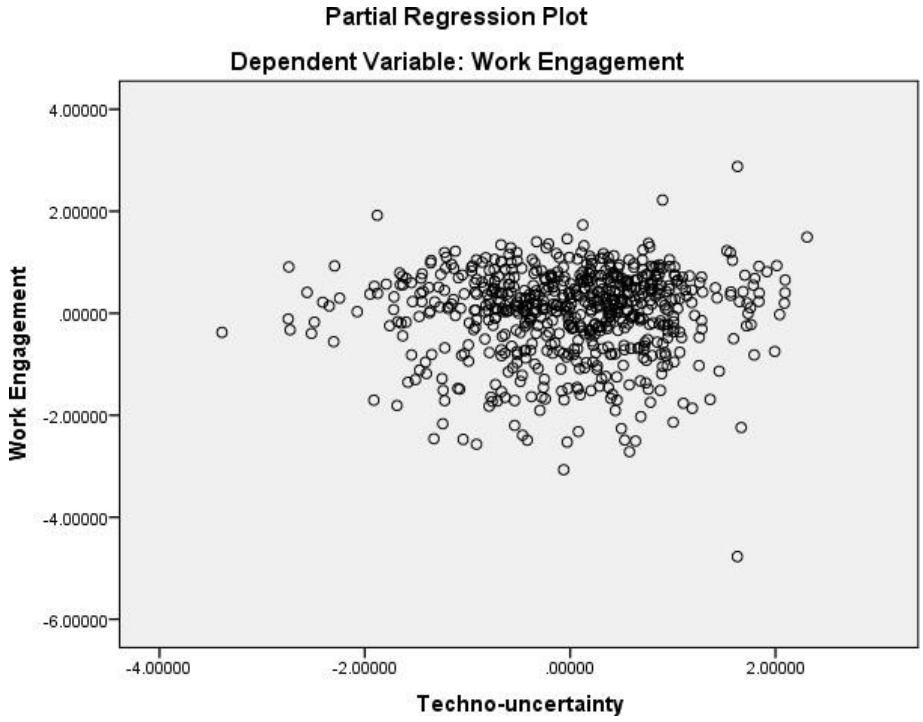

Fig C.15 Partial Regression Plot: Techno-uncertainty and Work Engagement

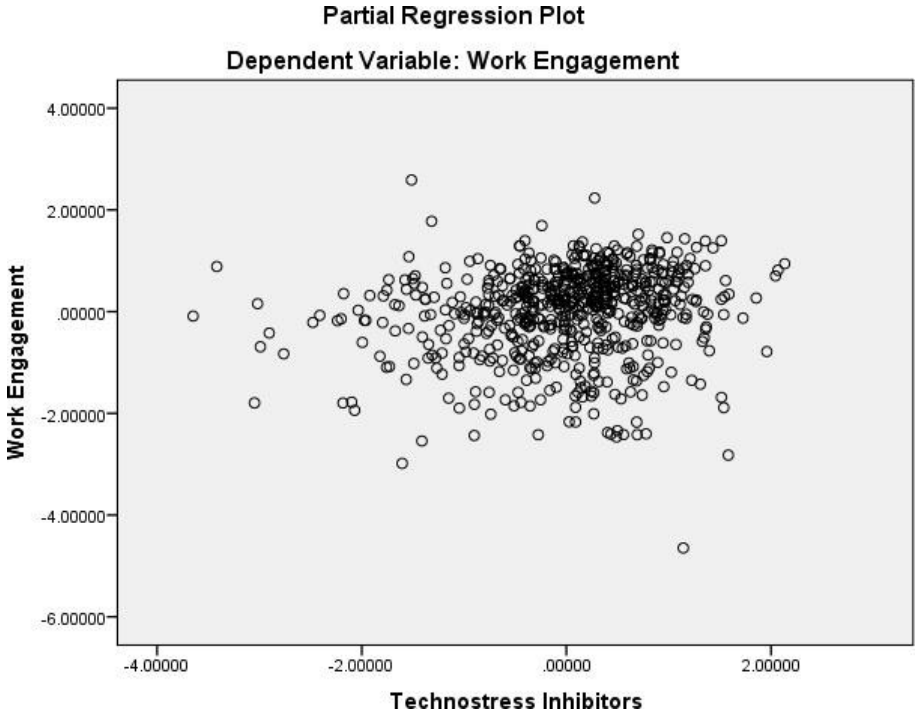

Fig C.16 Partial Regression Plot: Technostress Inhibitors and Work Engagement

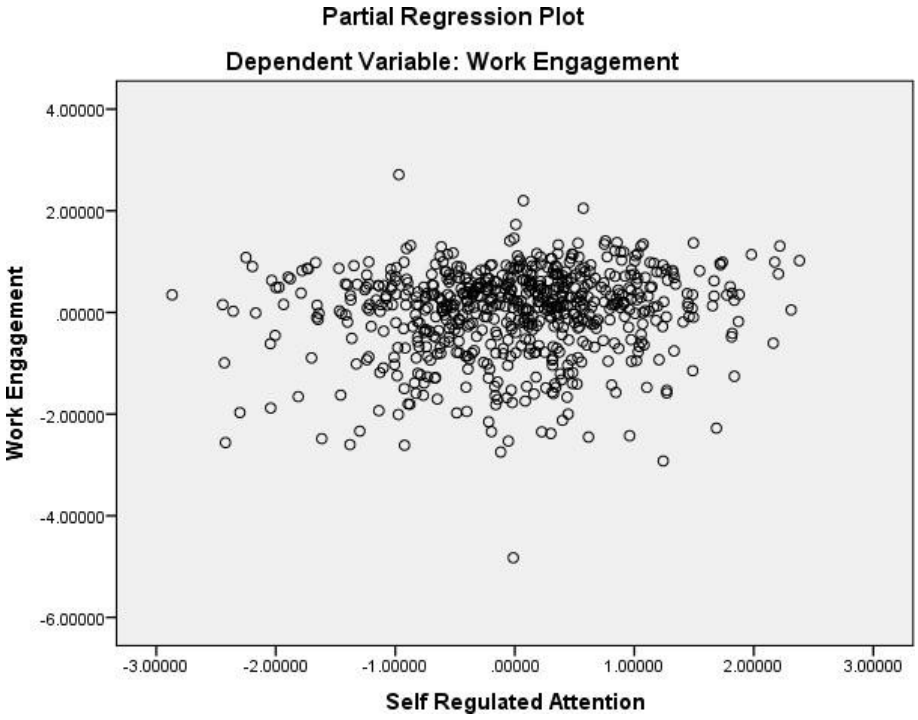

Fig C.17 Partial Regression Plot: Self-Regulated Attention and Work Engagement

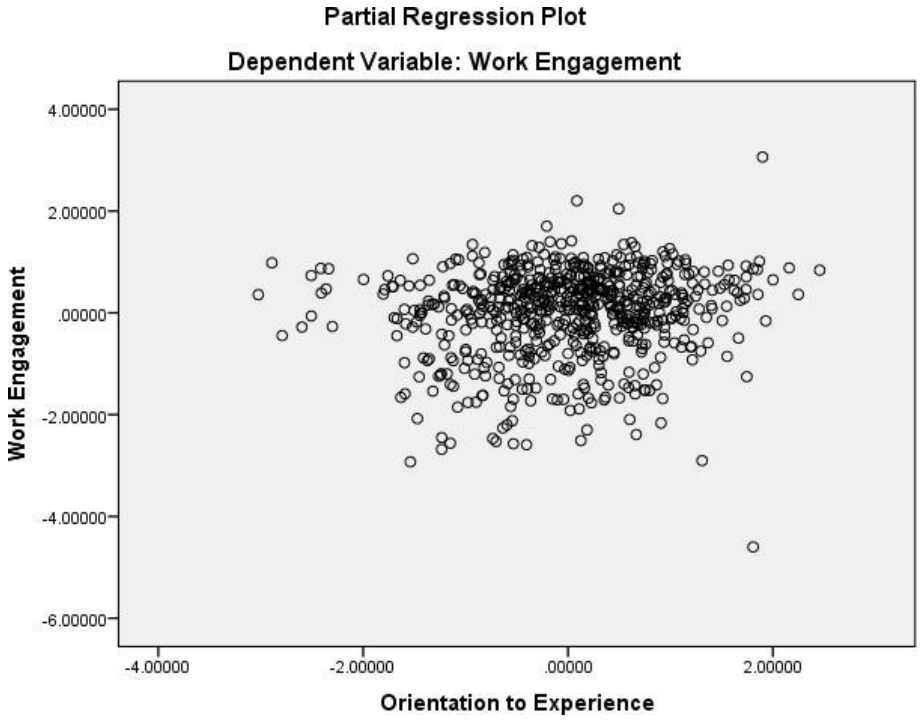

Fig C.18 Partial Regression Plot: Orientation to Experience and Work Engagement

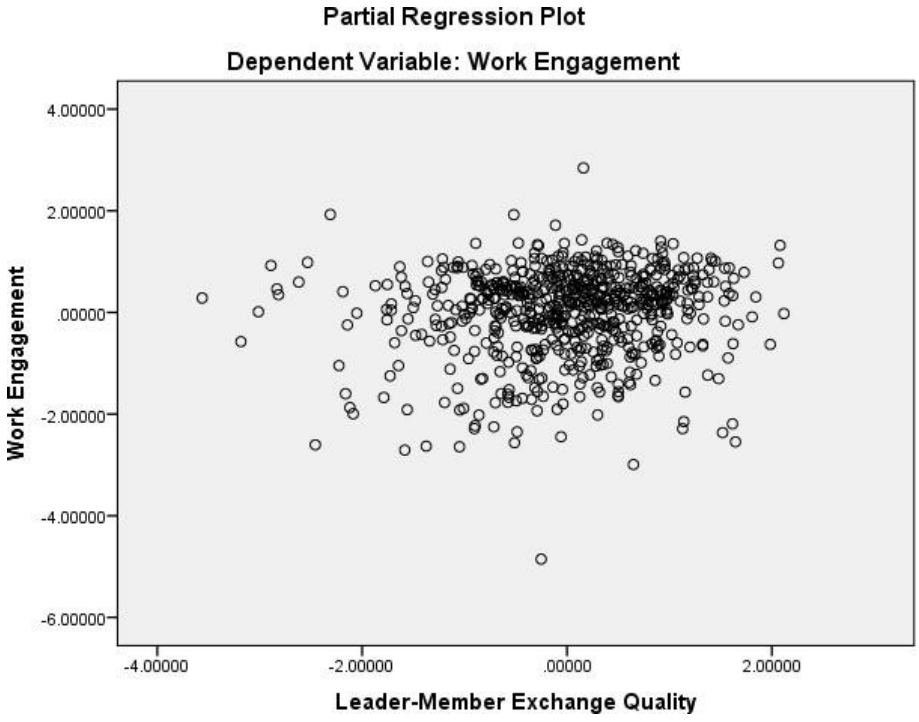

Fig C.19 Partial Regression Plot: Leader-Member Exchange Quality and Work Engagement

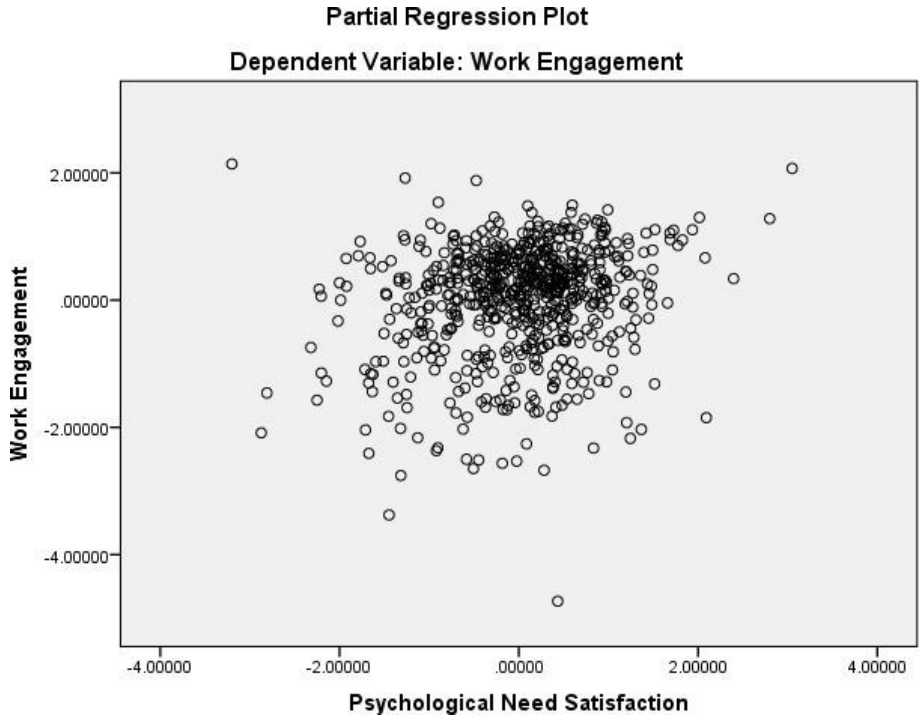

Fig C.20 Partial Regression Plot: Psychological Need Satisfaction and Work Engagement

APPENDIX D: QUESTIONNAIRE

Dear Sir/Madam

The purpose of this survey is to gain insights on the impact of work-related Information and Communication Technology (ICT) use on employees' well-being and engagement.

Throughout this survey, we ask questions about how using technology (short for Information and Communication Technologies) for work related purposes impact you.

Your responses are anonymous; so, your identity will not be revealed. Therefore, we request you to kindly provide frank and honest responses

There are no right or wrong answers. The survey is divided into 12 small sub-sections and should take approximately 20-30 minutes of your time to complete.

Your valuable inputs are very important for your employer to make informed decisions related to your well-being and engagement!

Therefore, we kindly request you to contribute by sharing your thoughts with us.

If you would like further information about this project this can be found here Participant information and consent form

Thank you for time

Best Regards

Rofia Ramesh
Joint PhD Scholar
Department of Management Studies, IIT Madras and Curtin Business School, Curtin University, Australia

ICT Employees Use

On an average day, to what extent do you use the following technology for work-related purposes? Please rate on a scale of 0 (never) to 100 (always).

	0	10	20	30	40	50	60	70	80	90	100
Communication technology (e.g., e-mails, Whatsapp, SMS, Teleconferencing, etc)											
Technology that supports your main work function (e.g., SAP for billing, project management software, timesheet applications etc)											
Core technology (eg. programming/coding etc											

Please mention some of the ICT that you use on an average day in the comment box given below:

Section 1:

Keeping in mind the technology you use for work related purposes (such as the ones you have mentioned at the start), indicate the degree to which you agree to the following:

1 = STRONGLY DISAGREE 2 = DISAGREE 3 = UNCERTAIN 4 = AGREE 5 = STRONGLY AGREE

S.NO	STATEMENT	1	2	3	4	5
1.	I feel I need to work much faster due to availability of technology					
2.	I feel I need to do more work than I can handle due to availability of technology					
3.	Due to the availability of technology I feel I need to work with very tight time schedules					
4.	When technology changes, I feel I need to also change my work habits to adapt to them					
5.	I have a higher workload because of increased technology complexity					
6.	I spend less time with my family due to availability of technology					
7.	I have to be in touch with my work even during holidays due to presence of technology					
8.	I use my vacation and weekend time to keep current on new technology					
9.	I feel my personal life is being invaded by availability of technology					
10.	I do not know enough about latest technologies to handle my job satisfactorily					
11.	I need a long time to understand and use new technologies					
12.	I do not find enough time to study and upgrade my technology skills					

Section 2:

Keeping in mind the technology you use for work related purposes (such as the ones you have mentioned at the start), indicate the degree to which you agree to the following:

1 = STRONGLY DISAGREE 2 = DISAGREE 3 = UNCERTAIN 4 = AGREE 5 = STRONGLY AGREE

S.NO	STATEMENT	1	2	3	4	5
13.	I find new recruits to this organization know more about computer technology than I do.					
14.	I often find it too complex for me to understand and use new technologies					
15.	I feel constant threat to my job security due to new technologies					
16.	I have to constantly update my skills to avoid being replaced					
17.	I am threatened by coworkers with newer technology skills					
18.	I do not share my knowledge with my coworkers for fear of being replaced					
19.	I feel there is less sharing of knowledge among co-workers for fear of being replaced					
20.	There are always new developments in the technologies we use in our organization					
21.	There are frequent upgrades in computer software in our organization					
22.	There are frequent upgrades in computer hardware in our organization					
23.	There are frequent upgrades in computer networks in our organization					

Section 3:

The following statements **measure your level of agreement with the support systems provided by your organization to you.** Keeping in mind the technology you use for work related purposes, indicate the degree to which you agree to the following

1 = STRONGLY DISAGREE 2 = DISAGREE 3 = UNCERTAIN 4 = AGREE 5 = STRONGLY AGREE

S.NO	STATEMENT	1	2	3	4	5	N/A
1.	Our organization emphasizes teamwork in dealing with new technology-related problems						
2.	Our organization provides employee training before the introduction of new technology						
3.	Our organization fosters a good relationship between IT department and employees						
4.	Our organization provides clear documentation to end users on using new technologies						
5.	Our employee IT help desk is well staffed by knowledgeable individuals						
6.	Our employee IT help desk is easily accessible						
7.	Our employee IT help desk is responsive to employee requests						
8.	Our employees are rewarded for using new technologies						
9.	Our employees are consulted before introduction of new technology						
10.	Our employees are involved in technology change and/or implementation						

Section 4:

Kindly read the given statements and indicate the response that best describes **your own opinion of what is generally true for you. There are no right or wrong answers. Be frank and honest while answering.**

1 = NEVER/VERY RARELY TRUE 2 = RARELY TRUE 3 =SOMETIMES TRUE 4 = OFTEN TRUE 5 = VERY OFTEN/ALWAYS TRUE

S.NO	STATEMENT	1	2	3	4	5
1.	I'm good at finding words to describe my feelings					
2.	I can easily put my beliefs, opinions, and expectations into words					
3.	I watch my feelings without getting carried away by them					
4.	I tell myself I shouldn't be feeling the way I'm feeling					
5.	It's hard for me to find the words to describe what I'm thinking					
6.	I pay attention to physical experiences, such as the wind in my hair or sun on my face					
7.	I make judgments about whether my thoughts are good or bad					
8.	I find it difficult to stay focused on what's happening in the present moment					
9.	When I have distressing thoughts or images, I don't let myself be carried away by them					
10.	Generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing					
11.	When I feel something in my body, it's hard for me to find the right words to describe it					
12.	It seems I am "running on automatic" without much awareness of what I'm doing					

Section 5:

Kindly read the given statements and indicate the response that best describes **your own opinion of what is generally true for you. There areno right or wrong answers. Be frank and honest while answering.**

1 = NEVER/VERY RARELY TRUE | 2 = RARELY TRUE | 3 =SOMETIMES TRUE | 4 = OFTEN TRUE | 5 = VERY OFTEN/ALWAYS TRUE

S.NO	STATEMENT	1	2	3	4	5
13.	When I have distressing thoughts or images, I feel calm soon after					
14.	I tell myself that I shouldn't be thinking the way I'm thinking					
15.	I notice the smells and aromas of things					
16.	Even when I'm feeling terribly upset, I can find a way to put it into words					
17.	I rush through activities without being really attentive to them					
18.	Usually when I have distressing thoughts or images I can just observe them without reacting					
19.	I think some of my emotions are bad or inappropriate and I shouldn't feel them					
20.	I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow					
21.	When I have distressing thoughts or images, I just notice them and let them go					
22.	I do jobs or tasks automatically without being aware of what I'm doing					
23.	I find myself doing things without paying attention					
24.	I disapprove of myself when I have illogical ideas					

Section 6:

The following questions ask about your relationship with your immediate supervisor (could be your project lead or manager), i.e., the person you report to. Kindly read the given statements and indicate your response using the key given with each question.

1. Do you usually know how satisfied your immediate supervisor is with what you do?

(1)	(2)	(3)	(4)	(5)
Rarely	Occasionally	Sometimes	Fairly often	Very often

2. How well does your immediate supervisor understand your job problems and needs?

(1)	(2)	(3)	(4)	(5)
Not a bit	A little	A fair amount	Quite a bit	A great deal

3. How well does your supervisor recognize your potential?

(1)	(2)	(3)	(4)	(5)
Not at all	A little	Moderately	Mostly	Fully

4. What are the chances that your supervisor will use their position to help you solve problems in your work?

(1)	(2)	(3)	(4)	(5)
None	Small	Moderate	High	Very high

5. What are the chances that your supervisor will "help you out," even if it will cost them something (like time, effort, money or any other resource) to do so?

(1)	(2)	(3)	(4)	(5)
None	Small	Moderate	High	Very high

6. I have enough confidence in my immediate supervisor that I would defend and justify their decisions if they were not present to do so

(1)	(2)	(3)	(4)	(5)
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

7. How would you characterize your working relationship with your immediate supervisor?

(1)	(2)	(3)	(4)	(5)
Extremely ineffective	Worse than average	Average	Better than average	Extremely effective

Section 7:

Indicate the degree to which your job allows you to feel /do the following:

1 = TOTALLY DISAGREE 2 = DISAGREE 3 = UNCERTAIN 4 = AGREE 5 = TOTALLY AGREE

S.NO	STATEMENT	1	2	3	4	5
1.	I feel like I can be myself at my job					
2.	At work, I often feel like I have to follow other people's commands					
3.	If I could choose, I would do things at work differently					
4.	The tasks I have to do at work are in line with what I really want to do					
5.	I feel free to do my job the way I think it could best be done					
6.	In my job, I feel forced to do things I do not want to do					
7.	I really master my tasks at my job					
8.	I feel competent at my job					

Section 8:

Indicate the degree to which your job allows you to feel /do the following:

1 = TOTALLY DISAGREE 2 = DISAGREE 3 = UNCERTAIN 4 = AGREE 5 = TOTALLY AGREE

S.NO	STATEMENT	1	2	3	4	5
9.	I am good at the things I do in my job					
10.	I have the feeling that I can even accomplish the most difficult tasks at work					
11.	I don't really feel connected with other people at my job					
12.	At work, I feel part of a group					
13.	I don't really mix with other people at my job					
14.	At work, I can talk with people about things that really matter to me					
15.	I often feel alone when I am with my colleagues					
16.	Some people I work with are close friends of mine					

Section 9:

HOW OFTEN do you feel this way about your work**?**

0 = NEVER
1 = ALMOST NEVER (A FEW TIMES A YEAR OR LESS)
2 =RARELY (ONCE A MONTH OR LESS)
3 = SOMETIMES (A FEW TIMES A MONTH)
4 = OFTEN (ONCE A WEEK)
5 = VERY OFTEN (A FEW TIMES A WEEK)
6 = ALWAYS (EVERYDAY)

S.NO	STATEMENT	0	1	2	3	4	5	6
1.	At my work, I feel bursting with energy							
2.	At my job, I feel strong and vigorous							
3.	When I get up in the morning, I feel like going to work							
4.	I am enthusiastic about my job							
5.	My job inspires me							
6.	I am proud of the work that I do							
7.	I feel happy when I am working intensely							
8.	I am immersed in my work							
9.	I get carried away when I am working							

Section 10:

Indicate the extent to which using technology (like the ones you mentioned at the start) makes you feel the following at work.

1 = STRONGLY DISAGREE 2 = DISAGREE 3 = AGREE 4 = STRONGLY AGREE

S.NO	STATEMENT	1	2	3	4
1.	I always find new and interesting aspects in my work				
2.	There are days when I feel tired before I arrive at work				
3.	It happens more and more often that I talk about my work in a negative way				
4.	After work, I tend to need more time than in the past in order to relax and feel better				
5.	I can tolerate the pressure of my work very well				
6.	Lately, I tend to think less at work and do my job almost mechanically				
7.	I find my work to be a positive challenge				
8.	During my work, I often feel emotionally drained				

Section 11:

Indicate the extent to which using technology (like the ones you mentioned at the start) makes you feel the following at work.

1 = STRONGLY DISAGREE 2 = DISAGREE 3 = AGREE 4 = STRONGLY AGREE

S.NO	STATEMENT	1	2	3	4
9.	Over time, one can become disconnected from this type of work				
10.	After working, I have enough energy for my leisure activities				
11.	Sometimes I feel sickened by my work tasks				
12.	After my work, I usually feel worn out and weary				
13.	This is the only type of work that I can imagine myself doing				
14.	Usually, I can manage the amount of my work well				
15.	I feel more and more engaged in my work				
16.	When I work, I usually feel energized				

Section 12:

DEMOGRAPHIC DATA

1) Age: 21-30 years / 31-40 years / 41-50 years / 51-60 years / Above 60 years
2) Gender: Male/ Female / Do not want to specify
3) Marital Status: Single / Married
4) Highest Educational Qualification: Diploma / Undergraduate Degree / Postgraduate Degree / Doctoral Degree / Other:_____
5) No of YEARS of work experience in current organization (Please round off to the nearest whole number): ____
6) Total work experience (Please round off to the nearest whole number): _____
7) How often do you use computers or software as part of your day- to-day work?
   5 – very frequently / 4 – frequently / 3 - occasionally / 2 – rarely / 1 - very rarely

8) How strongly do you agree to the following statement:

   "I feel in complete control over how I use ICT to support my work tasks"
   5 – strongly agree / 4 – agree / 3 – uncertain / 2 – disagree / 1 – strongly disagree

9) Do you practice some form of meditation? Yes / No
10) A. If yes, for how many years or months have you been practicing meditation?_____
10) B. On average how long (in minutes / hours) do you meditate in a week?

Thank you for taking the time and effort to participate in this survey ☺ Really grateful for your participation!

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