# Antecedents and consequences of technostress in online labour markets

# Antecedents and Consequences of Technostress in Online Labour Markets

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*Submitted in fulfilment of the requirements for the degree of Doctor of Philosophy*

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# Abstract

Technology plays a pivotal role in the digitalisation of work practices, and that led to the emergence of new forms of employment, including digital gig work facilitated by online platforms that match employers and workers through online labour markets. Despite the apparent simplicity of joining these platforms, sustaining and thriving in such work environments presents challenges, often impacting worker well-being. Given that platform work is deeply embedded in technology use workers are more prone to technology-induced stress also known as technostress. This thesis investigates the impact of technostress on the well-being of platform workers, highlighting the complexities inherent in this novel work. Platform work is unique in that algorithms control various aspects of work organisation, feedback and evaluation systems, and the probability of participation. Technostress can be exacerbated by factors such as competition, algorithmic control, work intensification, unpredictable schedules, multitasking, surveillance, low wages, and precarious conditions.

This thesis is based on three core articles. The first article discusses the concept of technostress in detail, explores how this phenomenon has evolved with the changing nature of work and identifies the gap in understanding it within the context of platforms. The second article investigates platform-specific technology and job characteristics that can result in technostress creating an impact on worker well-being. The third, article examines the technostress concept through the lens of temporal characteristics and its impact on work outcomes. To investigate the research questions, the thesis develops research models and employs a quantitative survey design, conducted specifically on Amazon Mechanical Turk (MTurk), a widely used online labour market. The surveys are designed following the protocols of conducting behavioural research on MTurk and structural equational modelling partial least square (SEM-PLS) is used to empirically analyse the results of the research models. In doing so, the research adopts both aggregated and disaggregated approaches to examine technostress.

The findings demonstrate that job and temporal characteristics play significant roles in shaping the technostress experience within online labour markets. The research contributes to technostress research by going beyond the notion of technology characteristics solely as environmental antecedents and identifying technostress related outcomes in the unique context of platforms. The results show that technology complexity, feedback and time pressure shape the technostress process in these platforms. The research also contributes by exploring the concept of technostress from a positive perspective, aligning with the call made by many recent studies. The research findings contribute to our understanding of technostress and establish a foundation for future research in the platform context. Furthermore, the findings help in the development of strategies aimed at promoting well-being and mitigating technostress in this novel type of work.

# Dedication

***To my parents***

***My husband***

***My children Mahd, Ehab and Rehan***

# Acknowledgements

My PhD journey has been filled with challenges, yet it has also been an enriching experience of learning and growth. I am deeply grateful to those who offered their support throughout this journey.

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# Declaration

I, the Candidate, certify that the Thesis is all my own work and that I have not obtained a degree in the University of Galway or elsewhere on the basis of any of this work. All research contained herewith is entirely my own and the use of all material from other sources has been properly and fully acknowledged.

Signed Date

# Table of Contents

# List of Figures

# List of Tables

# Chapter 1

## Introduction

*Any sufficiently advanced technology is indistinguishable from magic.*

Arthur C. Clarke

Over the past decades, proliferation of Information and Communication Technologies (ICTs), as well as their increasing accessibility and affordability has transformed the way we live and work (Ayyagari *et al.*, 2011; Panigrahi *et al.*, 2021). Information Technology (IT) now permeates every aspect of individual, organisational, social, and economic activity, signifying a deep integration into our daily lives. These technologies have brought changes that are “usually for better but sometimes for worse” and are often seen playing the role of a double-edged sword (Qi, 2019; Ransbotham *et al.*, 2016, p. 834). Digital technologies give rise to complex sociotechnical systems, emerging from the continuous and evolving interplay of the social (human agency), the symbolic (symbol-based computation in digital technologies), and the material (physical artefacts that interact with computing machines) (Benbya *et al.*, 2020). As emerging technologies solve existing problems, they often give rise to unintended consequences or may generate new issues in the process. The way individuals interact with technology and its related consequences is important. IT use stands as one of the most influential constructs in the information systems (IS) discipline, due to its diverse array of both positive and negative consequences. Therefore, making it a crucial area for both research and practice (Salo *et al.*, 2022).

One fundamental aspect related to technology use is “technostress” which is defined as stress experienced due to the use of IT creating either a positive or negative impact on individual well-being (Tarafdar *et al.*, 2007, 2019) which is the central focus of this thesis. Technostress arises due to a broad range of issues including emerging applications, multitasking, constant connectivity, information overload, uncertainty, pace of change, job insecurity, continual relearning, regular system upgrades, changes in workflows, and even prolonged use of simple work-related technology (Srivastava *et al.*, 2015; Tarafdar *et al.*, 2011, 2020; Wang *et al.*, 2008). In literature, technostress has also been referred to by alternate names such as technophobia, techno-addiction, computer-anxiety or computer stress (Salazar-Concha *et al.*, 2021; Srivastava *et al.*, 2015). The concept has been applied in organisational context within a range of jobs such as IT professionals (Ayyagari *et al.*, 2011), sales personnel (Tarafdar, Pullins, *et al.*, 2015), academics (Whelan *et al.*, 2022), healthcare (Califf *et al.*, 2020) and teleworkers (Suh and Lee, 2017). In a non-organisational context, social media use is most frequently studied (Maier, Laumer, Eckhardt, *et al.*, 2015; Salo *et al.*, 2019; Sun and Lee, 2022). It is important to note that technostress is not limited to professionals or adults; researchers are increasingly investigating its consequences in adolescents as well (Mehtälä *et al.*, 2023). Technostress, being a dynamic process, it is not possible to measure it directly as such. Instead, the presence of technostress is assessed through various variables and relationships that constitute it, including antecedents, technostressors, appraisal and coping responses, and outcome or strain variables (Tarafdar *et al.*, 2019)[1]. The topic attracted interest from IS researchers for two reasons; (1) the positive and negative consequences of IT use on workers' behaviours and attitudes at the workplace (Benlian, 2020; Weil and Rosen, 1997), and (2) the emergence of new digital working environments, which, along with its benefits, impose a threat to workers well-being (Nauwerck and Forssell, 2018). This thesis is centred on addressing aforementioned points.

The remainder of this chapter will discuss the following study elements: context of the study, problem statement, research motivation, and research questions driving the study. Then, it will provide an overview of research design and methodology. Finally, the chapter will conclude with an outline of the thesis and associated publications.

## 1.1 Context of Study

Research developments have progressed through stages of digitisation, digitalisation, and finally, digital transformation since the world became digitally connected. Although the concept of digital transformation may not be entirely new, its importance and intensity for organisations have significantly increased due to ongoing technological advancements that continuously reshape boundaries, operations, and profit expectations (Carroll *et al.*, 2023). As a result of digital transformation *"gig economy"* has recently become a widespread phenomenon along with changing labour norms (Jarrahi and Sutherland, 2019). The diffusion of new digital technologies has opened more opportunities for performing work through diverse platforms often referred to as the 'gig economy,' 'digital work,' 'online work,' 'online labour platforms', 'crowd work', 'gig work', 'platform work', and 'online labour markets' across the globe (Anwar and Graham, 2020). The gig economy[2] includes two main types of work arrangements*:* *Physical gig economy* involves location-bound physical activity managed via online platforms or applications. *Digital gig economy* involves location-independent digitally centred activities performed via online platforms (Heeks *et al.*, 2021). Physical gig work includes activities like food delivery, couriering, transportation, and manual labour. In contrast, digital gig work involves providing various

[1] Details of technostress process and related variables are included in Chapter 2 and Chapter 3 of this thesis to keep the flow of arguments.
[2] Chapter 2 provides detailed insights into the work mechanisms, platform terminology, and the variety of tasks performed within the gig economy.

digital services such as data entry, web-designing, and software programming among others through platforms like Amazon Mechanical Turk (MTurk), Fiverr, and Upwork. Despite considerable attention given to physical gig work, surveys indicate that the digital type constitutes a similar proportion of the gig economy (Wood *et al.*, 2019a). This thesis specifically focuses on the digital gig economy which is also referred to as online labour markets (OLMs)[3].

Platform work emerges as a novel form of employment that is inherently different from traditional employment and telework arrangements due to structural differences in the way of performing work (Möhlmann *et al.*, 2020). A distinguishing characteristic of this environment is the presence of *algorithmic control* which is broadly defined as “the managerial use of intelligent algorithms and advanced digital technology as a means to align worker behaviours with organisational objectives” (Wiener *et al.*, 2023, p. 485). In platform-based settings, algorithms handle operational functions like goal setting, scheduling, and task allocation, as well as managerial responsibilities such as performance evaluation and the distribution of rewards and penalties (Stewart and Mousavi Baygi, 2021; Tarafdar *et al.*, 2023). Algorithmic control is also distinct from conventional forms of control as it can be applied on a continual, real-time basis (Cram *et al.*, 2022). This societal shift has given rise to a new facet of well-being relevant to contemporary work life known as *digital well-being*. As described in recent studies, this concept pertains to the influence of digital technologies on individuals' lives, specifically addressing "what it means to live a life that is beneficial for a human being in an information society" (Rofarello and Russis, 2021, p. 1). Accordingly, the focus of this research is on this novel context to understand workers' technostress and well-being experiences. Figure 1.1 below represents the domain, phenomenon, and context understudy of this thesis.

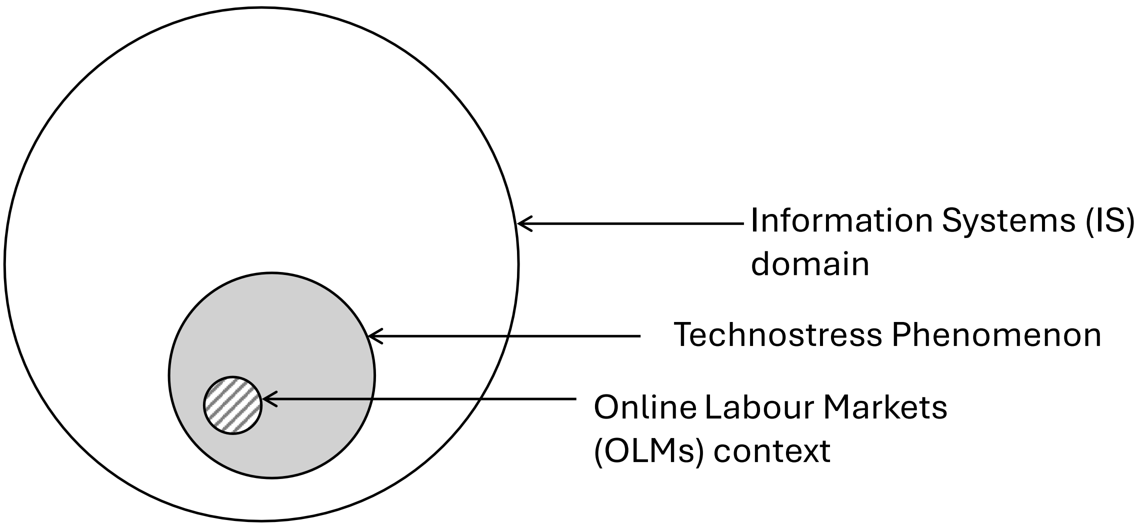


**Figure 1.1: Venn diagram illustrating topics of study in the thesis**

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3 For consistency and easy readability, the term online labour markets (OLMs) are used throughout the thesis.

## 1.2 Problem Statement

The phenomenon of technostress is context-specific and closely tied to the conditions of work, with its manifestations evolving alongside new work environments (Cram *et al.*, 2022). As novel environments present both challenges and opportunities, it becomes imperative to examine the unique sources of technostress that arise within them. OLMs owing to their technology-intensive work environments and the constant requirement for internet access to accomplish tasks are more prone to technostress (Brawley, 2017; Umair *et al.*, 2023). Research substantiates that excessive dependence on technology is associated with conditions of technostress (Califf *et al.*, 2020; Maier, Laumer, Weinert, *et al.*, 2015; Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007; Valta *et al.*, 2024). Although flexibility and autonomy are described as key features of OLMs the way the work is designed and operated limits these features (Keith *et al.*, 2020; Wood *et al.*, 2019a). Therefore, making the so-called flexibility an "illusionary" flexibility (Smith and Leberstein, 2015). While workers may possess significant autonomy in scheduling their work, this freedom is constrained by the availability of tasks and their reliance on them (Lehdonvirta, 2018). In practice, workers often find themselves working long hours and during peak times to maximise earnings and maintain good ratings. Thus, workers frequently feel compelled to accept whichever tasks are presented to them, leaving them with limited options (Duggan *et al.*, 2019). Particularly with the integration of algorithms, both scripted and machine-learning-based, into platform work processes the so-called flexibility is further restricted in various ways (Tarafdar *et al.*, 2023). This limitation, in turn, can lead to the manifestation of technostress. Kellogg *et al.*, (2020) outline six mechanisms, termed the "6 Rs," through which employers use algorithms to control workers: directing workers by *restricting and recommending*, evaluating workers by *recording and rating*, and disciplining workers by *replacing and rewarding*. These interconnected algorithms typically execute tasks, often in real-time, with outputs from one algorithm serving as inputs for others (Tarafdar *et al.*, 2023).

Individuals involved in algorithmic work encounter various challenges, as identified in research (Möhlmann *et al.*, 2020; Tarafdar *et al.*, 2023; Wiener *et al.*, 2023). Specifically, workers may perceive their interactions with algorithms as complex and confusing. Workers may struggle to decide whether to comply with the algorithm's instructions, which tasks to prioritise and the fear of potential repercussions (Tarafdar *et al.*, 2023). In such scenarios, workers may view the algorithms as unfair and inaccurate leading to resistance towards algorithmic work (Kellogg *et al.*, 2020). Moreover, work controlled through algorithms includes constant surveillance and a lack of transparency. Therefore, algorithmic control can be a source of frustration for gig workers, leading them to question the fairness and legitimacy of such practices (Wiener *et al.*, 2023). These situations may result in workers either discontinuing their engagement with a platform or violating the imposed controls (Cram *et al.*, 2022; Möhlmann *et al.*, 2020; Umair *et al.*, 2023).

Early technostress research has established that organisational policies and climate significantly influence technostress (Fischer and Riedl, 2022; Wang *et al.*, 2008). The circumstances in which OLMs operate are particularly vulnerable and precarious. Platform and employers often prioritise their own interests, thereby transferring risks to workers who are deprived of basic work entitlements (Bajwa, Gastaldo, *et al.*, 2018). Overall, these scenarios have a significant impact on worker well-being and contribute to the emergence of technostress. Technostress has become an important indicator of the well-being related effects of IS use among individuals in the workplace context (Cram *et al.*, 2022). Emerging studies call for a deeper understanding of the underlying reasons and mechanisms behind these problematic issues, as well as their associated impacts (Tarafdar *et al.*, 2019, 2023). Thus, traditional concepts and theories need to be investigated, developed and adapted for this new form of work (Brawley, 2017).

## 1.3 Research Motivation

There are several key points that underpin the motivation to pursue this research as discussed below.

1. **Rapid growth of online labour markets (OLMs):** OLMs are experiencing exponential growth, with over 163 million registered workers globally and approximately 2.3 million individuals engaged in full-time work via these platforms (Kässi *et al.*, 2021; Sanz de Miguel *et al.*, 2021). The demand for software development and technology-related tasks is particularly high, with figures escalating from 29% in 2019 to 43% by 2022 (Stephany *et al.*, 2021). Hence, OLMs are creating a significant impact on the overall work environment, work practices and working conditions. As a result, their role in the labour market has become a focal point in both research and policy discussions (Sanz de Miguel *et al.*, 2021).
2. **Opportunities and challenges of OLMs:** OLMs present numerous opportunities, including access to new markets for businesses, additional income-generating avenues, a just-in-time workforce, transcending geographical borders, and offering temporal flexibility (Heeks, 2017; Lehdonvirta, 2018; Wood *et al.*, 2019a). However, they have also brought about significant social, economic, and individual challenges (Bajwa, Gastaldo, *et al.*, 2018). At a broader level, it is argued that OLMs erode labour protections, undermine the standard employment relationship, and promote the casualisation of work due to their precarious nature (Kässi and Lehdonvirta, 2018; De Stefano, 2016). These platforms are not only altering organisational structures and work processes but also, reshaping the relationship between workers and businesses. At the individual level, problems like tedious tasks, constant rejection, low payment, time pressure, and exploitation are prevalent concerns (Bergvall-Kåreborn and Howcroft, 2014; Heeks *et al.*, 2021). The working conditions provided by platforms are subject to intense debate, with some perspectives presenting a favourable view while others offer a more pessimistic outlook (Bajwa, Gastaldo, *et al.*, 2018; Durward *et al.*, 2020; Kuhn and

Maleki, 2017; Mäntymäki *et al.*, 2019). Therefore, by engaging in research on this topic this work aims to contribute to consensus creation by providing clarity on the various perspectives within the debate.

3. **Distinctive nature of OLMs:** One fundamental aspect that distinguishes platform work from traditional forms of employment is the centrality of digital elements. Platform work relies heavily on digital technologies, which are integral to its operations and often involve constant connectivity (Brawley, 2017; Ens *et al.*, 2018). This reliance on digital tools makes platform work more prone to technostress, as workers navigate the demands of digital platforms and the pressures of built-in algorithms. Research indicates that 54% of workers work at very high speeds, 22% feel distressed because of their work and 60% struggle to meet tight deadlines (Wood *et al.*, 2019a). On average, a worker spends 20 minutes extra on unpaid activities for every hour of paid work. The turnover rate within platforms is high, as many individuals find that microtasks do not align with their interests after a period of trial (Berg *et al.*, 2018). All these circumstances necessitate an exploration of workers' technostress experiences within these platforms.
4. **Alignment with Sustainable Development Goals (SDGs):** This research aligns with the SDGs, particularly in promoting good health and well-being and advancing the creation of productive and decent work opportunities for all (United Nations, 2015). Given the digital platform's complexity and global reach, it is essential to understand the consequences of such work on workers' health and experiences (Bajwa, Gastaldo, *et al.*, 2018). Platform work is carried out independently at home using own equipment, which may mean that working conditions are not fully optimised for everyone (Garben, 2017). As precarious environments, platforms result in job instability, increasing the risk of poor job quality with often low salaries violating the conditions necessary for any decent work (Freni-Sterrantino and Salerno, 2021).
5. **Contribution to Knowledge Gap:** Existing research on platform work has primarily focused on managerial aspects such as algorithmic decision-making and work process coordination (Möhlmann *et al.*, 2020; Wiener *et al.*, 2023). Others have focused on reputation mechanisms and pricing systems (Cullen and Farronato, 2021; Kokkodis and Ipeirotis, 2015). Limited research has looked into broader social implications of platform work such as production of speed (Zheng and Wu, 2022). Although, researchers have looked into the experiences of platform workers such as job quality, motivation to join platforms, and platforms as boundaryless careers (Deng and Joshi, 2016; Duggan *et al.*, 2021; Wood *et al.*, 2019a). From an IS perspective, there is a gap in understanding how IT usage impacts well-being within OLMs. Current research on health and well-being effects is in early stages, indicating a need for more extensive research into social implications, particularly with regard to technostress in OLMs (Freni-Sterrantino and Salerno, 2021).

6. **Timeliness of Technostress Research:** Technostress phenomenon is context-specific, and exploration of OLMs unique context will offer valuable insights. Workers face uncertainty not only about how digital platforms and algorithms affect their work but also about the subsequent effects on their well-being (Cram *et al.*, 2022). Exploring both the negative and positive consequences of technostress is essential for understanding how workers navigate digital environments and leverage technology for greater flexibility and innovation. While the technostress literature establishes some concepts and relationships, it does not explain how demands from the technology environment can be perceived as both challenging and motivating, potentially resulting in positive outcomes (Tarafdar *et al.*, 2019). Hence, research on technostress is timely and crucial in understanding and addressing the evolving positive and negative technostressors in the new work environments.

## 1.4 Research Objectives and Questions

Building upon the research motivation outlined above, this thesis offers insights into the experiences of technostress and its implications on worker well-being in online labour markets (OLMs). It has been more than a decade since the publication of seminal works that shaped our understanding of technostress (Ayyagari *et al.*, 2011; Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007). Since then, a plethora of broader studies on the topic have become available. The latest studies underline the need for new developments in the field, as researchers raise questions about whether the present concept of technostress is still up to date due to ongoing sociotechnical changes. Technostress is an evolving phenomenon so new contexts demand new technostressors (Becker, 2021; Fischer *et al.*, 2019, 2021). As a starting step, it is essential to apply technostress in new contexts to identify the differences between traditional work and other virtual work so unique findings can be highlighted. Moreover, the recent updates to the technostress framework call for studying the phenomenon from a positive perspective rather than solely focusing on the negative perspective (Tarafdar *et al.*, 2019). Therefore, it is crucial to examine how different work environments, different types of workers and different modalities affect technostress and how these changes are perceived (Salazar-Concha *et al.*, 2021). This understanding is essential for designing appropriate prevention and coping measures tailored to novel work environments such as OLMs. Below, are the two key research objectives (RO) serving as the foundation in this thesis, upon which further research questions (RQ) were developed.

*RO1: Explore the state-of-the-art research on technostress, worker well-being and its relevance in the context of online labour markets.*

*RO2: Identify key antecedents and consequences of technostress and how they influence worker well-being in online labour markets.*

Each specific research objective has been addressed in three distinct research articles. Below, is a brief description of each article along with its corresponding research question.

## 1.5 Research Articles

Article 1 is a review paper that provides a detailed synthesis of the literature on the topic of technostress in context of three forms of work i.e., traditional work, telework and platform work. The aim is to provide a holistic review of previous studies to understand how the phenomenon of technostress has transformed within the last ten years. The review uses a four-step model to identify the antecedents and consequences of technostress emerged so far including the potential positive effects of technostress. Therefore, addressing the following research question.

*RQ1: How have the antecedents and consequences of technostress evolved with the changing nature of work?*

Article 2 is an empirical research paper that develops and tests a research model relevant to a new form of work conducted through platforms. The study expands the current research on technostress by integrating job characteristics as new antecedents and demonstrating its impact on different types of subjective well-being and discontinuous intention. In addition, platform-specific technology characteristics and their relationship with technostressors are analysed. While examining the impact of technostressors on outcomes, a disaggregated approach is used to capture the subtlety involved in understanding technostressors' unique relationships with outcomes. Hence, addresses the following research question.

*RQ2: Do the technology and job characteristics of online labour markets influence strain, and is this relationship mediated by technology-induced stressors?*

**Article 3**

Article 3 is an empirical research paper that extends the prior technostress research by theorising and validating the importance of temporal characteristics in the technostress process. Specifically, the research model considers time pressure as a key environmental antecedent in platforms that relate to challenge and hindrance technostressors. Further, the study shows how technostressors create an impact on unique work outcomes such as time distortion and meaningfulness of work in platforms. While assessing the technostressors the study uses an aggregated approach and highlights the role of positive technostress. Thus, the article addresses the following research question.

*RQ3: How does time pressure affect challenge and hindrance technostressors subsequently creating an impact on work outcomes in online labour markets?*

Additionally, strategies and best practices are recommended for promoting positive work experiences and overall well-being in OLMs in subsections of article 2 and article 3. Table 1.1 summarises the article title, research question, theoretical perspective and constructs of the study.

**Table 1.1: Summary of articles, research questions and key constructs**

| Article Title | Research Question | Theoretical Perspective | Study Constructs and Variables |
|---|---|---|---|
| *Article 1: Technostress and changing nature of work: A review of Information Systems Research* | How have the antecedents and consequences of technostress evolved with the changing nature of work? | Transactional theory of stress | Holistic technostress process: Environmental antecedents, technostressors, strain and outcomes |
| *Article 2: Examining technostress and its impact on worker well-being in the digital gig economy* | Do the technology and job characteristics of online labour markets (OLMs) influence strain, and is this relationship mediated by technology-induced stressors? | Person-environment (P-E) fit theory and job characteristics theory | Environmental antecedents include technology characteristics (IT complexity and IT presenteeism) and job characteristics (autonomy and feedback), technostressors (work overload, job insecurity), strain, outcomes (subjective well-being and discontinuous intention) |
| *Article 3: Examining the role of time pressure on technostress and work outcomes in the digital gig economy* | How does time pressure affect challenge and hindrance technostressors subsequently creating an impact on work outcomes in online labour markets (OLMs)? | Transactional theory of stress | Environmental antecedent (time pressure), challenge technostressors, hindrance technostressors and outcomes (time distortion, meaningful work) |

## 1.6 Research Methodology

The present thesis predominantly adopts a quantitative research design. Quantitative research designs, also known as quantitative hypothesis-testing, involve statistically assessing the effects of an intervention on dependent variables (Kaplan and Duchon, 1988). Such approaches are well-established in the IS field. The primary focus of this approach is conducting research with an emphasis on collecting quantitative data to serve as scientific evidence. Recker (2021) explains that quantitative research designs typically adhere to a specific approach to scientific inquiry known as the *hypothetico-deductive model of science*. In this model, a central concept is deduction, which plays a key role in theory evaluation. Deduction is a form of logical reasoning that involves arguments as logical consequences of a set of more general premises. It involves deducing a conclusion from a general premise (i.e., a known theory) to a specific instance (i.e., an observation). The hypothetico-deductive model typically involves six steps, as illustrated in Figure 1.2. In this thesis, a positivist perspective is adopted, and the developed model is deductively tested in each quantitative study.

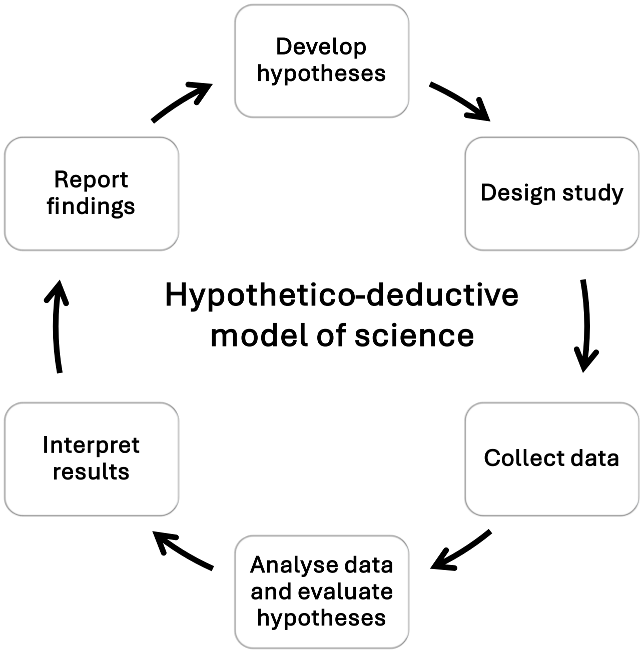


**Figure 1.2: Hypothetico-deductive model**

IS research, being a dynamic and ever-changing field, is characterised by the emergence, evolution, and ongoing development of novel technologies and trends over the years (Boudreau *et al.*, 2001). Scholars in technostress research have primarily conducted cross-sectional studies, used self-administered surveys and employed structural equation modelling techniques to validate their models and test hypotheses. The use of this technique began to increase around 2007, with even greater frequency observed from 2011 onwards (Salazar-Concha *et al.*, 2021). Based on field history, this thesis adopts a cross-sectional survey design, reflecting the steady and continuous popularity of such studies. While there has been substantial growth in research methods, quantitative research still predominates when examining the phenomenon of technostress in the IS discipline (Califf *et al.*, 2020; Orlikowski and Baroudi, 1991; Tarafdar *et al.*, 2019). However, there has been an increasing number of qualitative research papers and mixed-method designs in recent years (Califf *et al.*, 2020; Salo *et al.*, 2019).

For data analysis, structural equation modelling using partial least squares (SEM-PLS) is employed, when the primary aim is predicting key target constructs or identifying key "driver" constructs. SEM-PLS is particularly effective with small sample sizes and complex models, as it makes minimal assumptions about the underlying data (Hair *et al.*, 2022). Given that the data is collected through a widely used online platform i.e., MTurk, several protocols and procedures specific to the platform were adopted, as indicated in the research, distinguishing it from typical online surveys (Aguinis *et al.*, 2021; Hunt and Scheetz, 2019). While researchers have raised concerns regarding data collected through MTurk, its utility ultimately depends on decisions made during the initial study design, the structure of data collection, and the chosen data analytic approach. There are several factors that researchers should consider both during the initial study design phase and post-data collection phase (Bauer *et al.*, 2020; Jia *et al.*, 2017). Therefore, by following the right guidelines MTurk samples generally provide higher-quality data (Kennedy *et al.*, 2020) and are seen as a valid, reputable source for data collection (Lowry *et al.*, 2016; Mousavi Baygi and Stewart, 2019). More details of such procedures are available in chapter 3 and chapter 4 of this thesis. Table 1.2 summarises data collection, design methodology and approach to study technostress for each article.

**Table 1.2: Summary of data collection, design and methodology**

| **Article Title** | **Data Collection** | **Design and Methodology** | **Approach to study Technostress** |
|---|---|---|---|
| *Article 1: Technostress and changing nature of work: A review of Information Systems Research* | Database: Web of Science<br><br>Query run: February 2024 | Concept-centric approach as suggested by Webster and Watson (2002) | Four-step holistic technostress process |
| *Article 2: Examining technostress and its impact on worker well-being in the digital gig economy* | Platform: MTurk<br><br>Pilot test: $n$=30<br>June 2018<br><br>Final sample: $n$=366<br>May to June 2020 | Quantitative research<br>Cross-sectional survey design<br>Structural equation modelling (SEM) using partial least squares (PLS) | Disaggregated approach (technostressors studied at individual level) |
| *Article 3: Examining the role of time pressure on technostress and work outcomes in the digital gig economy* | Platform: MTurk<br><br>Pilot test: $n$=30<br>October 2023<br><br>Final sample: $n$=354<br>October 2023 | Quantitative research<br>Cross-sectional survey design<br>Structural equation modelling (SEM) using partial least squares (PLS) | Aggregated approach (technostressors studied at combined level) |

# 1.7 Thesis Outline

The remaining thesis is structured as follows:

**Chapter 2** – Background

This chapter provides an overview of technostress process, technostressors, and various approaches to studying this phenomenon. Additionally, it provides insights into theories of stress that underpin technostress research. Furthermore, the chapter provides a view into how work is conducted on OLMs and the topic of well-being.

**Chapter 3 –** Technostress and changing nature of work: A review of Information Systems Research (Article 1)

This chapter offers an overview of the research literature on technostress across three forms of work. It conducts a conceptual analysis of how technostress has evolved with new forms of work and discusses the key differences among these forms. Additionally, it highlights a knowledge gap in the literature concerning technostress in OLMs. The original article content is divided and incorporated into two chapters: the literature review and the conclusion.

**Chapter 4** – Examining technostress and its impact on worker well-being in the digital gig economy (Article 2)

This chapter presents article 2 which shows how OLMs technology and job characteristics can create an impact on technostressors, strain and well-being outcomes. The article has been slightly modified to fit the thesis format.

**Chapter 5** – Examining the role of time pressure on technostress and work outcomes in the digital gig economy (Article 3)

This chapter presents article 3 which shows how temporal characteristics shape technostress, especially by representing how time pressure in OLMs can create an impact on challenge and hindrance technostressors and work outcomes.

**Chapter 6** – Conclusion

This chapter concludes the thesis with a discussion of the primary contributions and limitations. Additionally, it provides a roadmap to guide future research.

## 1.8 Associated Publications

Different aspects of this thesis have been published in the following peer-reviewed publications.

- Umair, A., Conboy, K. and Whelan, E. (2019), "Understanding the influence of technostress on workers' job satisfaction in gig-economy: an exploratory investigation", in Brocke J.V., Gregor, S. and Muller, O. (Eds), Proceedings of the 27th European Conference on Information Systems (ECIS), Association of Information Systems, pp. 1-12
- Umair, A., Conboy, K. and Whelan, E. (2023), "Examining technostress and its impact on worker well-being in the digital gig economy", Internet Research, Vol. 33 No. 7, pp. 206–242.

The following articles are ready for submission to journals.

- Article 1: Technostress and changing nature of work: A review of Information Systems Research
- Article 3: Examining the role of time pressure on technostress and work outcomes in the digital gig economy.

# Chapter 2

# Theoretical Background

The purpose of this chapter is to offer conceptual clarity and discuss basic definitions related to various concepts. It addresses overlapping terms or alternate viewpoints that exist and helps in understanding the concepts utilised within this thesis. Additionally, it discusses the theoretical underpinnings that support this thesis.

## 2.1 Technostress Concept and Process

The theories and concepts surrounding stress provide the initial foundation for understanding technostress. Essentially, technostress phenomenon applies to how the stress process is activated due to the use of IS which includes a number of variables and their relationships (Tarafdar *et al.*, 2019). Therefore, in IS literature technostress is presented as a *holistic stress process* that includes environmental conditions, technostressors, psychological responses and outcomes. Each of these stages is connected through one of the evaluation processes such as the appraisal process, the decision process, and the performance process (Califf *et al.*, 2020). To simplify and in alternate terms, the process can also be summarised as including the presence of environmental conditions; technostressors, coping responses, and primary and secondary appraisals (Tarafdar *et al.*, 2019). Tarafdar *et al.*,(2019) describe coping responses are cognitive and behavioural efforts to tackle a stressful situation. Primary appraisal involves the individual's assessment of the level of demand and influences the relationship between environmental conditions and technostressors. Secondary appraisal focuses on the individual's evaluation of available options and resources to respond to the stressful situation, affecting the relationship between technostressors and coping response. Table 2.1 below briefly describes these technostress process-related concepts (Ayyagari et al., 2011; Califf et al., 2020; Tarafdar et al., 2019).

The technostress process seems to be linear, but it is a complex and recursive process with an individual moving back and forth several times (Cram *et al.*, 2022; Lazarus and Folkman, 1987; Tarafdar *et al.*, 2019). It is crucial to recognise that technostressors are inherently neutral and defined by how individuals appraise them within their work context. Hence, individuals may appraise the same technostressors differently, and these technostressors can also vary across different contexts. Technostress has recently been re-conceptualised to encompass both positive and negative technostressors, alongside psychological responses and outcomes (Benlian, 2020; Califf, 2022; Califf *et al.*, 2020; Tarafdar *et al.*, 2019). According to Tarafdar *et al.*, (2019), technostress involves two distinct stress processes within the overarching process of technostress: techno-eustress and techno-distress. Techno-eustress relates to the positive aspects of technostress, while techno-distress pertains to its negative aspects.

In this thesis, the focus is not directed towards the subprocesses associated with secondary appraisal and coping. This choice is made in accordance with the common practice in research by focusing on specific elements within the process for simplicity (Cram *et al.*, 2022). The thesis focuses on antecedents and consequences, hence the terms employed to describe the process within this thesis are environmental antecedents, technostressors, strain, and outcomes. In Chapter 3 literature review, a comprehensive understanding of these terms within the process is provided, supported by examples. Furthermore, the chapter discusses the initial definitions of technostress and examines their evolution over time.

**Table 2.1: Technostress process and related concepts**

| **Concept/Term** | **Description** |
|---|---|
| Stress | The overall transaction process |
| Environmental conditions | Characteristics that have the potential to create a demand in the individual or represent potential sources of stressful situations |
| Technostressors | Technostressors are technology-induced stimuli or demands appraised by individuals as threatening |
| Psychological responses | The response to technostressors also known as strain |
| Outcomes | The consequence of the actions of an individual in reaction to the psychological response |
| Appraisal process | An intrapersonal process through which individuals appraise the environmental conditions that give rise to a particular technostressor |
| Decision process | An intrapersonal process through which individuals decide how to respond to appraised stressor |
| Performance process | An intrapersonal process through which individuals decide how to act on earlier responses |

### *2.1.1 Technostressors*

When the term “technostress" is mentioned, the immediate association is often taken in the context of its commonly represented five laden technostressors which are widely used in research (Califf, 2022). The five technostressors include techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Ragu-Nathan et al., 2008; Tarafdar et al., 2007). Table 2.2 defines each technostressor.

These definitions provided above guided the initial IS research on technostress which is based on the (dark) negative side of technostress (Califf, 2022). The same technostressors were termed as technostress creators by Ragu-Nathan *et al.*, (2008). Ayyagari *et al.*, (2011) based on job-stress literature identified stressors that have a pronounced effect in the presence of technology which overlaps with common technostressors. These technostressors are work overload, role ambiguity, invasion of privacy, job insecurity, and work-home conflict. Table 2.3 defines these technostressors.

**Table 2.2: Technostressors defined by (Tarafdar *et al.*, 2011; Valta *et al.*, 2024)**

| Technostressor | Definition |
|---|---|
| Techno-overload<br>*"Too much"* | Digital technologies force employees to work faster and longer or process more information simultaneously |
| Techno-invasion<br>*"Always connected"* | Digital technologies' invasive effect in situations where employees can be reached anytime and anywhere and feel the need to be constantly connected which blurs the line between personal and work-related matters |
| Techno-complexity<br>*"Difficult"* | Digital technologies' complexity leads to feelings of lacking adequate skills and the need to invest time and effort in learning and understanding digital technologies |
| Techno-insecurity<br>*"Uncomfortable"* | Digital technologies' automation or other employees' better understanding of digital technologies makes employees feel threatened about losing their jobs |
| Techno-uncertainty<br>*"Too often and unfamiliar"* | Digital technologies' continuous changes and upgrades result in employees' uncertainty as they are constantly forced to adapt and educate themselves about new digital technologies |

**Table 2.3: Technostressors defined by (Ayyagari *et al.*, 2011)**

| Technostressor | Definition |
|---|---|
| Work overload | Perception that assigned work exceeds an individual's capability or skill level |
| Role ambiguity | Unpredictability of the consequences of one's role performance and lack of information needed to perform the role |
| Invasion of privacy | Perception that individual's privacy has been compromised |
| Job insecurity | An individual's perception of threat of job loss |
| Work-home conflict | An individual's perceived conflict between the demands of work and family |

With the recent emphasis on studying the positive side of technostress the idea draws upon challenge–hindrance stressor framework to discuss technostress in terms of challenge and hindrance technostressors. Tarafdar *et al.*, (2019) in their conceptual paper describe challenge technostressors perceived as opportunities or options for change, learning, achievement, and reward. Individuals experience challenge technostressors when the characteristics of IS are perceived to offer opportunities for improving their skills, tasks, and work life. Individuals are motivated to tackle these challenge stressors because they believe doing so is within their "wherewithal" and will lead to personal improvement (Tarafdar *et al.*, 2019, p. 17). In contrast, hindrance technostressors embody the negative stress that individuals face in their use of IS, presenting pressures beyond their ability to handle and are conceptualised as threat technostressors mentioned previously in Table 2.2. Benlian (2020) extending the general challenge–hindrance framework to the IS domain, introduces a more balanced conceptualisation of technostressors, also referred to as technology-driven challenge and hindrance stressors. He highlights a theoretical distinction between technology-driven challenge and hindrance stressors that cooccur at work yet produce differential (i.e., detrimental, or beneficial) responses.

### *2.1.2 Technostress Technology Characteristics*

One of the prominent works in technostress literature is by Ayyagari *et al.*, (2011) which makes the technology characteristics explicit in explaining technostress. Their work identified that technology has its own determinants that are related to technostressors, which can be categorised into three types of usability features, dynamic features, and intrusive features. Table 2.4 explains these types and further classification.

**Table 2.4: Technology characteristics defined by (Ayyagari *et al.*, 2011)**

| **Technology Characteristics** | | **Definition** |
|---|---|---|
| Usability features | Usefulness | The degree to which characteristics of technology enhance job performance |
| | Complexity | The degree to which use of technology is free of effort |
| | Reliability | The degree to which features and capabilities provided by the technology are dependable |
| Dynamic features | Pace of change | The degree to which an individual perceives technological changes to be rapid |
| Intrusive features | Presenteeism | The degree to which technologies enable individuals to be reachable |
| | Anonymity | The degree to which exact use of technology could be identifiable |

These characteristics are well acknowledged and studies have integrated them into their research as they serve as key environmental antecedents (Benlian *et al.*, 2020; Ma *et al.*, 2023; Suh and Lee, 2017; Tarafdar *et al.*, 2019; Umair *et al.*, 2023; Zhu *et al.*, 2023). While other researchers have included IS related situations such as system breakdown, technology interruptions and mobility into environmental antecedents (Galluch *et al.*, 2015; Tarafdar *et al.*, 2019). More details related to these environmental antecedents are in Chapter 3.

### *2.1.3 Technostress and Other Variables*

Technostress process also involves other variables that play a role in this process. Technostress inhibitors represent the situational variables or organisational mechanisms that have the potential to reduce the effects of technostress such as literacy facilitation, technical support provision, and involvement facilitation (Ragu-Nathan *et al.*, 2008). Other commonly studied variables are coping behaviours which include proactive and reactive coping (Pirkkalainen *et al.*, 2019). Proactive coping behaviours refer to an individual's willingness to address ongoing stressful situations through personal growth and resource accumulation, including actions such as gaining control over IT or adopting positive reinterpretation strategies. Reactive coping behaviours are responses to stressors that occur instinctively when experiencing stress, aimed at dealing with them. These behaviours may include venting distress or distancing oneself from IT. The literature also presents them as problem-focused coping behaviours, which aim to master the stressful demand and solve the problem, while emotion-focused coping behaviours target altering how individuals interpret the situation and regulating negative emotions (Pirkkalainen *et al.*, 2019). These coping behaviours can be theorised as mediators and moderators in technostressor-outcome relationship (Zhao *et al.*, 2020). Research shows many other variables such as gender, age, computer-self efficacy, time management and personality orientations as well that moderate the relationship between technostressors and outcomes (Srivastava *et al.*, 2015; Tarafdar *et al.*, 2011, 2019; Yener *et al.*, 2021).

### *2.1.4 Empirical Approaches to Study Technostress*

Though technostress research has gained momentum empirical and conceptual inconsistencies exist in technostress studies (Nastjuk *et al.*, 2023; Salazar-Concha *et al.*, 2021; Sarabadani *et al.*, 2018; Tarafdar *et al.*, 2019). Nastjuk *et al.*,(2023) in their meta-analysis explain these inconsistencies in detail as empirical research has employed two different approaches for studying technostress or technostress creators. Consistent with the original approach (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007), the majority of studies have conceptualised technostress as a multidimensional, second-order superordinate construct built upon five reflective first-order dimensions that influence outcomes at an aggregate level (Pflügner, Maier and Weitzel, 2021; Srivastava *et al.*, 2015; Tarafdar, Pullins, *et al.*, 2015; Yener *et al.*, 2021) as shown in Figure 2.1.

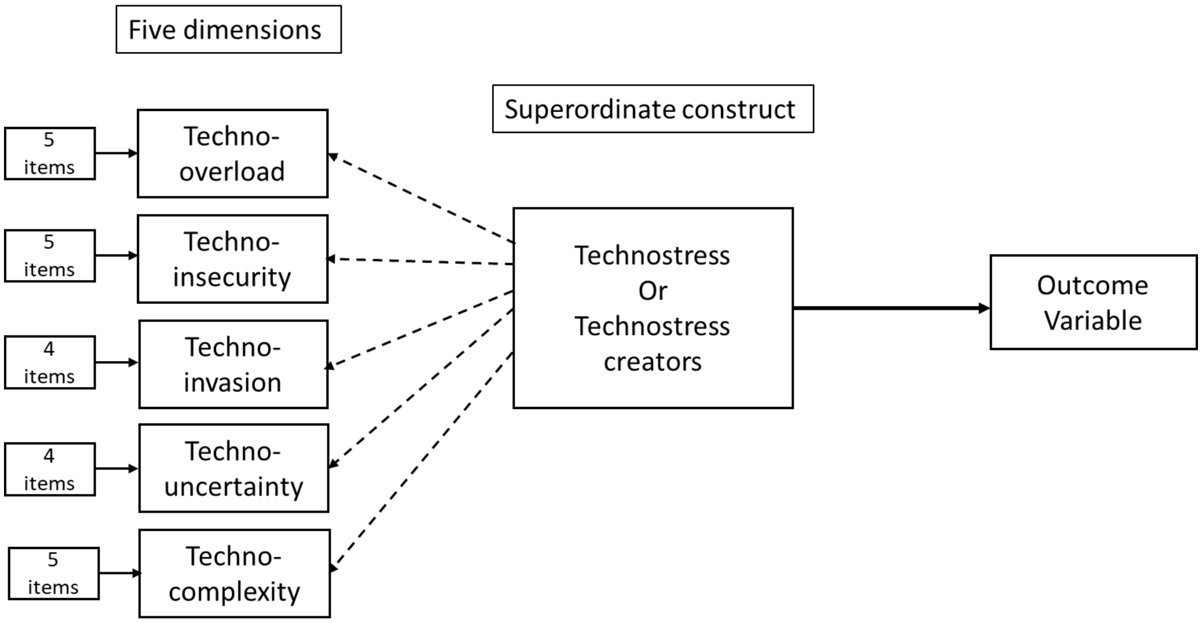


**Figure 2.1: Aggregated approach to study technostress**

Other studies have investigated the impact of technostressors at the individual (disaggregated) level (Califf *et al.*, 2020; Maier, Laumer, Weinert, *et al.*, 2015; Suh and Lee, 2017) shown in Figure 2.2.

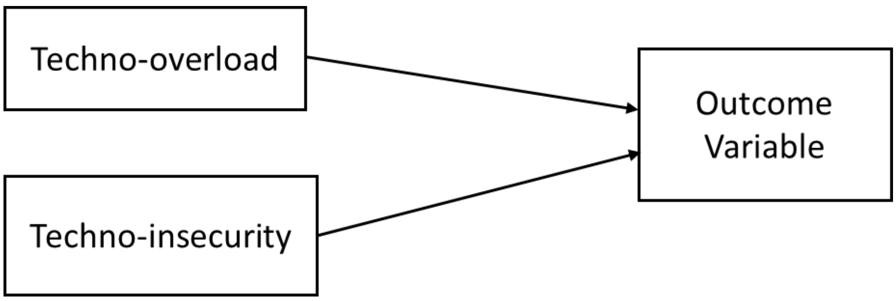


**Figure 2.2: Disaggregated approach to study technostress**

Each perspective has its merits, with the aggregated formulation of technostressors aligning with the principles of parsimony and generalisation, they reduce both empirical and nomological complexity. On the other hand, the disaggregated approach provides a more nuanced perspective on the individual roles of technostress creators (Nastjuk *et al.*, 2023; Sarabadani *et al.*, 2018).

## 2.2 Theoretical Background

In the early days of scholarly research, 'stress' was often seen either as a 'response' or as a 'stimulus' (Tarafdar *et al.*, 2019). Selye (1936) was the pioneer of stress response theory who described stress as a general bodily response to any demand. It defines the biological or physiological perspective. Selye's concept of the general adaptation syndrome establishes a link between stress and diseases of adaptation. Therefore, he describes stress as a set of specific responses that have many potential causes and is referred to as a response-based approach to stress. The latter conceptualisation of stress is consistent with that of engineering and physical sciences. Here, stress is viewed as a force or deformation applied to an object or system where external loads may lead to overloading, resulting in irreversible yielding (Bheer and Newman, 1978).

McLean (1974) concluded that stress is neither a stimulus, response, nor intervening variable. Instead, it represents an area of study that deals with any demands that tax the system, regardless of the nature of that system—be it physiological, social, or psychological—and includes the responses of that system to these taxing demands. To capture these realities, theories examining psychological stress have embraced a process-oriented approach. In this view, stress is conceptualised as a dynamic process involving transactions between individuals and their environments. Stress is not solely inherent within the individual (i.e., the response) or solely within the environment (i.e., the force), but rather an ongoing interaction where individuals continuously engage with their surroundings (Tarafdar *et al.*, 2019). Thus, theories of organisational stress, which articulate stress in terms of its different components, serve as the foundation and provide the framework for technostress research (Cooper *et al.*, 2001; Fischer and Riedl, 2015).

The response-based approach perceives technostress as a dependent variable, such as a reaction to a threatening stimulus like a computer breakdown or an IT error. This perspective relies on neurophysiological measurements, such as assessing cortisol levels (known as the stress hormone) or heart rate variability (Riedl *et al.*, 2012; Tams *et al.*, 2014). The stimulus-based approach centres on identifying potential sources of technostress, such as information overload or blurred work-life boundaries (Galluch *et al.*, 2015; Sarabadani *et al.*, 2018). While, the processual approach that is based on the interplay between person and environment described within the overarching theoretical framework of the transactional theory of stress is mostly applied in technostress research (Ragu-Nathan *et al.*, 2008; Raluca and Hanne, 2020; Tarafdar *et al.*, 2019).

### *2.2.1 Transactional Theory of Stress*

The transactional theory views stress as neither solely arising from the individual nor the environment, but as a phenomenological process manifested in the interaction between the two. The premise of the theory is that stress occurs when an individual perceives that the demands imposed by the environment tax an individual's resources, thereby impacting their well-being (Ayyagari *et al.*, 2011; Lazarus and

Folkman, 1987). In this way, it represents an ongoing process wherein individuals continually assess stressful situations, interpret them, and seek out the necessary coping resources (Raluca and Hanne, 2020). This definition of stress involves themes that capture the transactional nature of stress and emphasise the processes that best explain these transactions (Dewe *et al.*, 2012). The four key points related to these themes (Dewe *et al.*, 2012; Lazarus, 1990) are: First, stress is a result of the transaction between the individual and the environment. Second, the power of the transaction lies in the process of appraisal, which binds the individual and the environment giving it a "relational meaning" which forms the essence of the stress process. The terms "transaction" and "relationship" are interchangeable, although "transaction" emphasises a more dynamic interplay of variables, while "relationship" emphasises their confluence (Lazarus and Folkman, 1987). Third, the process involves two types of appraisals—primary and secondary. Through these appraisals, the focus shifts to what individuals think and do in a stressful encounter, embodying a process-oriented approach. This reflects "the changing person–environment relationship," providing valuable insight into the nature of the stress process itself through constant feedback from ongoing events. Fourth, it is the appraisal process that provides a causal pathway—a bridge to those discrete emotions experienced during and immediately after the encounter that best express the nature of the stress experience. Throughout its inception, technostress has been conceptualised within the transactional theory of stress, emphasising its complexity and multivariate nature, a notion that has been validated through numerous studies (Pflügner, Maier and Weitzel, 2021; Salo *et al.*, 2019; Tarafdar *et al.*, 2019; Zhao *et al.*, 2020).

### *2.2.2 Person-Environment Fit Theory*

The person-environment (P–E) fit theory asserts that stress arises from the lack of equilibrium or misfit between the person and the environment (Cooper *et al.*, 2001; Edwards and Cooper, 1990). Fundamental to this (mis)fit conceptualisation are two distinct approaches: demands–ability (D–A) fit and supplies–values (S–V) fit. First, demands–ability fit relates to the degree of match between the demands individuals confront at work and their abilities to meet those demands. Demands encompass quantitative and qualitative job requirements, role expectations, and organisational norms. Abilities include aptitudes, skills, training, time, and energy that individuals may harness to meet those demands. Second, supplies–values fit relates to the degree of match between the values of an individual and the supplies available at work. Supplies encompass both extrinsic and intrinsic resources and rewards that may satisfy an individual's needs, such as food, shelter, money, social involvement, and opportunities for achievement. Values typically represent conscious desires held by an individual and include preferences and interests (Edwards *et al.*, 1998). In particular, the concept that optimal fit between the individual and their environment is necessary for effective human functioning and well-being, and any misperception on either the individual or environmental side of this relationship is a major cause of stress (Dewe *et al.*, 2012).

So far, many different theories, models and frameworks have emerged that share the understanding that stress results from an interplay of the individual and his/her environment which is the basic notion of P–E fit theory. Some of these models include McGrath's stress cycle, job-demands control model, conservation of resource theory, effort-reward imbalance, and cybernetics theory (Dewe *et al.*, 2012; Fischer and Riedl, 2015). Each of these frameworks emphasises different aspects that must be identified to comprehend the source and potential remedy for stressors and strains. Some models focus on resources, while others highlight the interaction between the individual and the environment, and still others underline the role of the individual in the workplace (Galzer and Liu 2017). It is important to note that P–E fit theory involves the subjective evaluation of stressful encounters i.e., how an individual perceives the situation. Implicit in the notion of misfit is the individual's ability to manage an encounter, and elements such as values, supplies, demands, and abilities—all of which contribute to determining the perceived misfit which could be described as representing aspects of a transactional process (Cooper *et al.*, 2001). Therefore, P–E fit theory is embedded in the transactional theory of stress. Many studies in technostress literature have applied P-E fit theory as well (Ayyagari *et al.*, 2011; Stich *et al.*, 2019a; Wang *et al.*, 2020; Yan *et al.*, 2013).

### *2.2.3 Job Characteristics Theory*

Job characteristics theory is one of the popular theories that focus on job design, originally developed with the idea of presenting the opportunities and constraints structured into assigned tasks and responsibilities that influence how an individual accomplishes and experiences work. With advancements, the definitions of job design have expanded to include broader aspects, such as "encapsulating the processes and outcomes of how work is structured, organised, experienced, and enacted" (Bakker and Demerouti, 2014; Grant and Fried, 2011). A somewhat different, but nonetheless complementary approach to work design is proposed by Karasek, which emphasises the element of job control (Cooper *et al.*, 2001; Karasek, 1979). On the other hand, Bheer and Newman (1978) also discuss several facets contributing to understanding potential elements of job design and stress. Hackman (1976) developed job characteristics theory to examine the relationship between job characteristics and individual responses to work. The theory defines the core job characteristics as skill variety, task significance, task identity, feedback, and autonomy. Each of these is discussed in Table 2.5 below.

**Table 2.5: Job characteristics and definitions (Hackman and Oldham, 1976)**

| Job Characteristics | Definition |
|---|---|
| Skill Variety | The breadth of skills used at work |
| Task significance | The impact that the work has on the lives or work of others |
| Task identity | The opportunity to complete an entire piece of work |
| Feedback | The amount of information provided about effectiveness of job performance |
| Autonomy | The degree to which the job provides substantial freedom, independence, and discretion in determining goal-directed behaviour at work |

The model also sheds light on three psychological states: the experienced meaningfulness of the work, experienced responsibility for outcomes, and knowledge of the results of work activities. Most research has recognised these psychological states, yet it tends to prioritise the direct impact of core job characteristics on outcomes (Bakker and Demerouti, 2014). Job characteristics theory takes into account three perspectives: the personal characteristics perspective, which centres on individual traits believed to influence work and health outcomes; the environmental characteristics perspective, which considers external elements as the triggers for work stress issues; and the person-environment interaction perspective, which views work stress-health phenomena as a result of the interplay between individual characteristics and their surroundings. Implicit in this perspective is the concept of person-environment fit, or misfit as well (Bheer and Newman, 1978). Thus, job characteristics theory offers a theoretical framework for comprehending how job attributes shape workers' attitudes and behaviours (Suh and Lee, 2017). With work redesign gaining prominence as a strategy to enhance both productivity and the quality of the work experience in contemporary organisations, this theory receives widespread acknowledgement (Hackman and Oldham, 1976; Liu *et al.*, 2023).

### *2.2.4 Rationale for Theory Selection*

This research has primarily employed the transactional theory of stress as a theoretical framework (Article 1 and Article 3), along with theories such as person-environment fit and job characteristics theory that are relevant to the particular study context (Article 2). The transactional theory of stress was chosen because it is widely used in understanding the technostress phenomenon and addresses shortcomings present in earlier approaches to stress (Cooper *et al.*, 2001; Lazarus and Folkman, 1987; Tarafdar *et al.*, 2019). First, utilising a processual approach to transactional theory helps in comprehending the relationships, revealing how and why one factor leads to another. This approach transcends the taxonomic nature of merely providing a list of responses and stimuli, allowing for a deeper understanding of the dynamics at play (Cooper *et al.*, 2001). Second, it acknowledges the significance of the individual and individual differences in the perceptual and cognitive processes that underlie these relationships. Third, it emphasises the subjectivity of the process, acknowledging that individuals react differently to various situations, experience different forms of disturbances, and exhibit diverse manifestations of their stress experience (Tarafdar *et al.*, 2019). Fourth, these theories form the core understanding of human stress perceptions and offer a critical lens to examine whether and how stress impairs health and well-being. Studies based on these theories typically operate under the assumption that optimal fit reduces stress and enhances well-being (Edwards, 1996). Most importantly, transactional theory possesses an evolutionary quality, enabling researchers to continually explore the nature of stress and evaluate specific characteristics in terms of their relevance to contemporary work experience (Dewe *et al.*, 2012).

## 2.3 Overview of the Gig Economy

The Gig economy is a diverse concept that lacks a precise definition. Various classifications and presentations of the gig economy exist, often leading to blurred distinctions among them. Heeks (2017) describe the gig economy as a superset with subsets including the digital gig economy and the physical gig economy. Huws (2017) excluded the latter from the gig work because the work organisation is digitised in them not the work itself. While, the work of Schmidt (2017) provides a classification of gig work in terms of transport, accommodation and delivery services which are provided physically to a location also referred to as "on-demand work" and categorises microtask work such as MTurk or online freelance work such as Upwork under "cloud work". Others in literature treat them jointly and argue that gig work can take many forms and operates in several key sectors and includes all companies from ride sharing such as Uber, Lyft; cleaning and repairing services such as Taskrabbit; computer-based crowd work such as MTurk and online staffing platforms because these companies may differ slightly but they all are alike as they shift risk to workers and accumulate wealth for themselves as owners of online platforms (Smith and Leberstein, 2015). Grouping these two distinct parts of the gig economy in a common analysis can be challenging (De Stefano, 2016). Though both the digital gig work and physical gig work run on common principles as discussed above each of them has characteristics that differentiate the two types of work which is highlighted by various authors such as execution of task, intermediary, types of tasks, payment, selection of workers (Codagnone *et al.*, 2016; Teodoro *et al.*, 2014).

Overall, both types of work share some common characteristics as defined by Horton (2010) three essential characteristics of such work include: First, labour services are exchanged for money. Second, the matching of employer and workers is done digitally "over a wire" though labour services can be provided electronically or physically. Third, the allocation of labour and money is determined by employers and workers operating within a price system (that are platforms which act as intermediaries). Added to this definition Codagnone *et al.,* (2016) suggest that (1) these marketplaces are for non-standard and contingent work (2) the labour services produced don't include selling goods or renting property or a car.

In this thesis, the classification given by Heeks (2017) is applied where he describes the digital gig economy in detail and as a separate division of the gig economy. He analysed various terminologies that are used in the digital gig economy and suggested that from a work and labour perspective, the term used best to explain it is "online labour". Heeks defined online labour by combining definitions from authors Horton (2010), Lehdonvirta *et al*., (2014) and Graham *et al* (2017) as "contingent (task-or project-based) intangible work delivered digitally and done for money, organised via online outsourcing platforms that are marketplaces bringing together buyers and sellers". Therefore, the term online labour market(s) is derived which has been used in this thesis.

## 2.4 Work Mechanism in Online Labour Markets

Platforms are built on a socio-technical system constituted through a set of relationships that connect organisations, individuals, technologies and work activities (Kittur *et al.*, 2013). The operational structure of OLMs relies on a tripartite structure, comprising three key stakeholders: platforms, employers, and workers. Platforms serve as intermediaries, providing the infrastructure that facilitates interactions between workers and employers. In this capacity, platforms act as facilitators, mediating the relationship between workers and employers at a technical level by providing software and other necessary tools (Dedema and Rosenbaum, 2024). The software behind commercial platforms operates within rented data centres, often referred to as "the cloud," and typically features three sides of access. Users are segmented into two distinct groups representing supply and demand, each interacting with tailored, limited front-ends of the platform—providing only glimpses into the data and processes of the system. However, platform providers possess access to a back-end interface, affording them a comprehensive big-data perspective of all interactions between these user groups. Moreover, they wield the authority to influence exchanges between the two parties, potentially in real-time (Schmidt, 2017). The platform providers exercise control over user visibility, interaction possibilities, and conditions through technical algorithms, legal mechanisms, and interface design. This control extends beyond mere infrastructure provision; platforms actively regulate interactions between the other two parties by participating in quality control, shaping hiring mechanisms, and managing feedback systems. As such, the platform's role transcends that of a mere facilitator to become a pivotal arbiter of the dynamics between workers and employers (Kellogg *et al.*, 2020; De Stefano, 2016).

## 2.5 Overview of Amazon Mechanical Turk

Amazon Mechanical Turk (MTurk) was the first digital platform for the trading of micro-tasks and is now one of the most widely used platforms. It was presented as a new technology of 'humans-as-a-service' as opposed to 'software-as-a-service' and as a new form of 'artificial intelligence' (Codagnone *et al.*, 2016; Irani, 2015). MTurk operates as an online labour market where employers (called requesters) recruit employees (called workers) to complete various Human Intelligence Tasks (HITs) for remuneration (called a reward) (Hunt and Scheetz, 2019). The MTurk website[4] lists a variety of tasks for completion, categorised into *four major groups*: *image or video processing* (e.g., classifying or identifying objects to improve search or advertising targeting), *data verification and cleanup* (e.g., identifying incomplete or duplicate product listings in a catalogue, converting unstructured data about locations into well-formed addresses), *information gathering* (e.g., surveys and writing content), and *data processing* (e.g., audio or video transcribing, language translation).

[4] https://www.mturk.com/worker

Requesters have the flexibility to post a single task or in batches at predetermined prices, while workers can browse and select tasks of interest. Amazon facilitates this process by providing technical infrastructure and payment transfer services, streamlining the exchange of funds and task completion between requester and workers. Requesters and workers are identified solely by alphanumeric IDs, thus maintaining their invisibility from each other (Brawley and Pury, 2016). Requesters establish criteria that potential workers must meet to access tasks, including the worker's approval rating (reflecting the percentage of tasks previously approved by requesters, geographic location, and specific skill qualifications. Upon task completion, requesters retain the discretion to decide whether to compensate workers for their submissions, allowing them to reject work that does not meet their standards. Requesters utilise algorithms to distinguish between "good" and "bad" work, as well as to identify reliable workers from less reliable ones. The management process is semi-automated, with labour relations primarily conducted through routine programming tasks (Irani, 2015; Xie *et al.*, 2024).

MTurk workers, much like other professionals in information work, utilise a diverse array of tools, both physical and digital, to enhance their productivity. Community platforms play a crucial role in assisting workers by enabling them to evaluate potential HITs through integration with various platforms. Williams *et al.,* (2019), in their study, categorise the multitude of tools utilised by workers during their tasks under an overarching framework termed the "MTurk Suite." This suite encompasses five primary categories of tools, as described below.

- *HIT finding tools* play a crucial role in automating the process of finding available work. These tools facilitate tasks such as scraping and filtering MTurk to capture specific HITs by their unique ID. They also enable the automatic acceptance of HITs based on predetermined criteria like pay. Examples of such tools include HIT Finder, PandaCrazy, and TurkMaster.
- *Cognitive tools* serve to enhance cognition tasks with tools that assist in directing focus toward specific HITs, managing the visual aspects of HIT browser windows, and interacting with a HIT's Browser user interface. Examples of cognitive tools include AquaSnap and The Great Suspender.
- *Social tools* are designed to facilitate community engagement among MTurk workers. These tools support activities such as reviewing HITs, participating in discussions about HITs within online groups or forums (e.g., seeking assistance), and sharing HITs with fellow workers. Popular examples of social tools include TurkerView, Reddit, and Discord.
- *Administrative tools* are essential for managing HIT history and status effectively. These tools enable workers to log completed HITs to maintain a comprehensive work history and track active or ongoing HITs. Examples of administrative tools include HIT tracker and various private tools tailored to individual needs.
- *Mobility tools* empower workers to engage in tasks while on the go, ensuring flexibility and convenience. These tools enable workers to monitor HITs in their queue, find HITs to complete

or save for later, and complete tasks seamlessly. Examples of mobility tools include Distill and PandaCrazy.

## 2.6 Overview of Well-being at Work

The concept of well-being has been the focus of research for decades, attracting considerable attention from researchers. The expanding literature on well-being has resulted in the emergence of broad definitions, sometimes encompassing various aspects (Keyes *et al.*, 2002). Well-being is recognised as a complex and multifaceted construct, with definitions varying across different studies and disciplines (Ryan and Deci, 2001). Work and employment hold a central position in the lives of most individuals, significantly influencing their overall well-being. Employment stands out as one of the most crucial determinants of well-being (Krekel *et al.*, 2018). The concept of well-being in the workplace encompasses various life and non-work satisfactions individuals experience, their work and job-related satisfactions, and their general health (Simone, 2014).

Research on well-being at work is generally approached from two broad perspectives: hedonic and eudaimonic (Ryan and Deci, 2001). The hedonic view focuses on the preferences and experiences related to what makes life pleasant and unpleasant. It highlights that well-being primarily involves subjective happiness and the experience of pleasure versus displeasure, including judgments about various aspects of life's good and bad elements. In the work context, the hedonic view concerns the types of affective feelings experienced, including the extent to which an individual's job induces positive or negative emotions, and the adequacy of one's affective feelings towards different aspects of the job, such as satisfaction with the work or with one's pay (Simone, 2014). The most widely recognised conceptualisation of the hedonic view is Diener's *et al.,* (1999) tripartite model of subjective well-being which is used to measure employee well-being, which comprises three components: life satisfaction, and the balance between positive and negative affect (Disabato *et al.*, 2015). In contrast, the eudaimonic approach focuses on distinct aspects of human actualisation, revolving around the pursuit of meaning in life and the realisation of individual potential. The conceptualisation of Ryff's (1989) six distinct aspects of human actualisation: autonomy, personal growth, self-acceptance, life purpose, mastery, and positive relatedness is a well-known eudaimonic view. These dimensions apply to the workplace to foster well-being, (e.g., sense of purpose at work, positive relations at work, work meaningfulness etc.). Overall, well-being at work is referred to as "optimal psychological experience and functioning" and is presented as an idea of exploration of an individual to evaluate themselves (Ryan and Deci, 2001).

Kalleberg (2009) defines precarious employment as employment characterised by uncertainty, unpredictability, and risk from the perspective of the worker, which has a significant impact on workers' well-being. Worker well-being is crucial across three key levels: individual, organisational, and policy. It enables workers to effectively navigate challenges and attain their desired life outcomes. Despite the popularity of OLMs, the implications of worker well-being within such platforms have sparked substantial controversy (Bajwa, Gastaldo, *et al.*, 2018; Kuhn and Maleki, 2017), as evidenced by the challenges previously discussed in Chapter 1.

Due to the overconsumption of digital technology in the workplace, employees frequently find themselves engaged in constant and often unnecessary IT use. This difficulty in disengaging from technology, whether required or not, results in blurred work boundaries and contributes to technostress and various physiological inconveniences (Benlian, 2020; Gui *et al.*, 2017; Srivastava *et al.*, 2015; Tarafdar *et al.*, 2019). The qualities that make IT valuable, such as reliability, mobility, and connectivity, also have unintended consequences, undermining individual productivity and well-being (Tarafdar, D'Arcy, *et al.*, 2015). Digital well-being refers to "a state where subjective well-being is maintained in an environment characterised by digital communication overabundance". Digital well-being requires that individuals can manage and direct their use of IT towards fostering feelings of comfort, safety, satisfaction, and fulfilment. Consequently, "digital well-being" is emerging as a significant contributor to an individual's overall well-being, encompassing both its hedonic and eudaimonic dimensions (Gui *et al.*, 2017). Therefore, it is mandatory to understand the implications of work in OLMs from both individual worker and societal perspectives to understand how these platforms are contributing towards the future of work both in terms of potentially beneficial and detrimental effects.

# Chapter 3

# Literature Review

## 3.1 Introduction

Over the span of several decades, there has been a gradual transition in work practices driven by the increasing use of digital technologies. Since, then many new forms of work have emerged introducing remote working practices and alternative work options diverging from the traditional nine-to-five organisational structure (Eurofound, 2020). However, the onset of the global pandemic in 2020 accelerated such work practices making digital work an indispensable norm, called the "new normal" (De *et al.*, 2020). Before the pandemic, around 5% of full-time office employees primarily worked from home. However, in the new normal, this percentage is between 20 to 30 per cent, with variations depending on the occupation and industry (Levanon, 2020). Similarly, telework, a practice established for decades, experienced a significant surge from a mere 8% participation rate in 2008 to 22% by 2021 in the wake of the pandemic (Eurofound, 2022).

Research within the information systems (IS) literature has long been focused on telework and virtual teams, aiming to understand various aspects of modern work dynamics (De *et al.*, 2020). One of the intriguing developments in the global economy over recent years is the rise of platform-mediated gig work as a significant form of work, often referred to as online labour markets (OLMs) (Dedema and Rosenbaum, 2024; Möhlmann *et al.*, 2020; Stephany *et al.*, 2021). Platform work now in Europe constitutes approximately 1.4% of the total employment, which is equivalent to roughly 4.7 million workers (Eurofound, 2023). While the exact definition of this type of work remains debated, the platform-mediated gig work can be described as a network of socio-technical systems characterised by complex technical infrastructures where independent contractors and freelancers fill temporary and part-time positions across a wide array of industries, spanning from knowledge-based work to shared transportation and food delivery services (Dedema and Rosenbaum, 2024). Researchers are interested in examining temporal, spatial, and psychological aspects of these new forms of work, as well as the technological infrastructure required to support such arrangements. Especially, there has been considerable interest in exploring the design and support systems necessary for these evolving work environments (De *et al.*, 2020).

Information technology (IT) is pivotal in shaping how organisations adapt and transform their operations to align with emerging work practices with its implications on “behavioural, temporal, societal, and organisational” aspects (Carroll and Conboy, 2020). While technology offers significant benefits, it is also recognised for its myriad unintended negative consequences such as technology-related stress commonly referred to as "technostress". Technostress defined as stress experienced by the use of information communication and technologies (ICTs) represents one of the major "dark sides" of IT use that encroaches upon the well-being of individuals, organisations, and societies (Marsh *et al.*, 2022; Tarafdar *et al.*, 2019). As IT and particularly the internet, will remain central to work practices where innovations will drive the surge in use (De *et al.*, 2020). Therefore, it is important to understand such IT driven phenomena so that optimal work practices can be achieved. While acknowledgement for the potential positive impact of technostress is received, how they are associated, and interplay is so far less clear.

The phenomenon of technostress has received a substantial amount of scholarly interest in recent years to advance our understanding of the formation of technostress. The existing literature review in IS on technostress provides important insights into the breadth of methods, perspectives, and theories underpinning technostress literature (Tarafdar *et al.*, 2019). While, the recent meta-analysis focuses on the aggregated and disaggregated treatment of technostress creators (Nastjuk *et al.*, 2023; Yuan *et al.*, 2023). A knowledge gap exists concerning the advancement of technostress alongside the changing nature of work. The rise of significant empirical studies in this field presents a prime opportunity for the foundation of a formal review (Yuan *et al.*, 2023). Hence, this research presents three significant contributions. Firstly, it integrates the findings from previous studies concerning three forms of work—traditional work, telework, and platform work—to identify relative antecedents and consequences in each work environment. Secondly, a comprehensive four-step model is employed considering environmental antecedents, technostressors, strain, and outcomes to delineate and consolidate the findings. Thirdly, a synthesis of the emerging literature is provided emphasising the potential positive effects of technostress that have been overlooked in literature reviews until now. Therefore, the aim of this study is to answer the following research question.

*How have the antecedents and consequences of technostress evolved with the changing nature of work?*

The findings of this research offer valuable insights for both academics and organisations to identify the drivers of technostress within different work contexts. This information can help to develop strategies to mitigate technostress and encourage new working environments. The structure of the remainder of this article is as follows: the article commences with an overview of technostress and key concepts related to technostress process. Following that, two distinct forms of work: telework and platform work are discussed. Utilising a four-step model grounded in the transactional theory of stress, a critical review of literature on technostress within these three work contexts is presented. Finally, the implications for both research and practice are discussed while acknowledging the study's limitations.

## 3.2 Background

### *3.2.1 Technostress*

The term technostress, originally coined by Craig Brod, refers to "a modern disease of adaptation caused by an inability to cope with new computer technologies in a healthy manner" (1984, p. 16). Over the years, various authors have expanded upon this definition and debated whether the term "disease" accurately characterises technostress. Weil and Rosen (1997), for instance, defined it as any adverse effects on attitudes, thoughts, behaviours, or psychological well-being arising directly or indirectly from technology. Similarly, Lei and Ngai (2014) describe it as mental or physiological stimulation caused by technology often attributed to factors such as increasing work overload, accelerated tempo, and erosion of personal time.

From an IS perspective, technostress relates to the stress encountered by end users when interacting with ICTs requiring a physical, social, and cognitive response to deal with them (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007). Further, the transactional view of stress has provided the theoretical foundation for technostress research in IS literature which defines stress as "a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding [their] resources and endangering [their] well-being" (Braamt *et al.*, 2021; Lazarus and Folkman, 1984, p. 19). This definition guided initial IS research on technostress, framing it as a negative domain (Califf, 2022). Given that technostress is a dynamic process, directly measuring its presence in isolation is challenging. Instead, researchers assess the existence of technostress by examining various related factors, sub-processes and their interrelationships (Tarafdar *et al.*, 2019). Therefore, it is represented as a *holistic process including environmental antecedents, technostressors, strain and outcomes* (Ayyagari *et al.*, 2011; Califf *et al.*, 2020; Umair *et al.*, 2023). In this study, this four-step model is used for analysis. Below, each step of the process is described.

**Environmental antecedents:** In work organisations, an individual's behaviour is influenced by three key systems: the social system, the psychological system (relating to the individual), and the physical-technological system (Califf, 2022; McGrath, 1976). The interplay among these systems explains the environmental factors at play in technology-related stressful situations or events, as well as how techno-stressors manifest (Califf, 2022). Environmental antecedents involve a multitude of potential stressors within the workplace, such as role demands, task requirements, technological dependencies, physical environments, interpersonal interactions, behavioural expectations, job conditions, and organisational policies, among other factors (Califf *et al.*, 2020).

**Technostressors:** Technostressors are technology-induced stimuli or demands appraised by the individuals as threatening (Ayyagari *et al.*, 2011) encompassing five distinct factors also recognised as technostress creators (Ragu-Nathan *et al.*, 2008). These include techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty. Techno-overload occurs when technology forces individuals to work faster. Techno-invasion is associated with the blurring of work and home life due to technology. Techno-complexity is linked to users feeling that their technology skills are inadequate. Techno-insecurity involves users feeling threatened about losing their jobs due to technology or to others with better technical knowledge. Techno-uncertainty is related to the constant changes and upgrades that occur due to technology (Califf, 2022; Tarafdar *et al.*, 2007). Ayyagari *et al.*, (2011) suggested that some of the well-known stressors may be more pronounced with the use of ICTs at work and classify them as work overload, role ambiguity, invasion of privacy, job insecurity, and work-home conflict which overlaps the technostressors defined by Tarafdar *et al.*, (2007).

One noteworthy development is the recent reconceptualisation of technostress, which now includes both positive and negative technostressors, psychological responses, and outcomes (Califf, 2022; Tarafdar *et al.*, 2019). Tarafdar *et al.* (2019) in their conceptual paper propose that technostress comprises two distinct stress processes: techno-eustress and techno-distress. Techno-eustress relates to the positive aspects of technostress and challenge technostressors also called "good" technostress, whereas techno-distress related to the negative aspects and hindrance technostressors also called "bad" technostress. This positive and negative conceptualisation has been increasingly applied in various contexts, such as healthcare by Califf *et al.*, (2020) and in work-home spillover situations by Benlian (2020). Consequently, in this study, both challenge and hindrance technostressors are incorporated.

**Strain:** Strain is the immediate adverse reaction or state experienced due to various stressors (Ayyagari *et al.*, 2011; Lazarus and Folkman, 1987). Ayyagari *et al.*, (2011) in their study, aligning with the transaction view of stress, categorise the entire transactional process as '*stress*'. *'Stressors'* to as the stimuli encountered by the individuals and *'strain'* is the response to these stressors. The consequences of strain, for example, in terms of individuals' well-being or job performance are referred to as '*outcomes*'. In this study, a similar perspective is adopted, and strain is treated separately from the outcomes. This approach acknowledges that depending on the intensity and duration of the stressors, strain can manifest in various other outcomes (Umair *et al.*, 2023). Some studies have conceptualised strain as separate from outcomes including the famous stressor-strain-outcome model (Cao *et al.*, 2018; Koeske and Koeske, 1993; Maier, Laumer and Eckhardt, 2015; Zhang *et al.*, 2016). Sarabadani *et al.*, (2018) in their research, emphasise the potential for integrating Ayyagari *et al.*'s (2011) conceptualisation of strain into further studies. They argue that neglecting this construct, which best represents the felt experience of stress, as often seen in research in this domain, overlooks the affective mechanism by which stressors contribute to outcomes. On the other hand, some studies use strain and outcomes interchangeably in literature (Pflügner, Maier and Weitzel, 2021; Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2019; Tarafdar, Pullins, *et al.*, 2015).

**Outcomes:** Outcomes are consequences that cause changes in the psychological, physiological and behavioural functioning of an individual (Dhir *et al.*, 2019; Tandon *et al.*, 2021). In other words, they are conceptualised as ‘‘enduring behavioural or psychological consequences of prolonged … strain’’ (Koeske and Koeske, 1993, p. 11; Maier, Laumer and Eckhardt, 2015).To date, research has identified many negative outcomes that occur due to technostress such as dissatisfaction, turnover intention, negative organisational commitment, lower productivity, burnout, role conflict, and increased stress hormone excretion among others (Galluch *et al.*, 2015; Ragu-Nathan *et al.*, 2008; Suh and Lee, 2017; Tarafdar *et al.*, 2007, 2019). In voluntary IT use such as social media sleep deprivation, concentration problems, and self-disclosure are indicated (Salo *et al.*, 2019).

Each of the four stages in the model is linked by one of three intrapersonal evaluation processes: the appraisal process ( appraise the environment conditions), the decision process (decide how to respond to appraised conditions), and the performance process (decide how to act on those responses) (Califf *et al.*, 2020; McGrath, 1976). Specifically, the appraisal process connects environmental conditions with technostressors, the decision process connects technostressors with strain, and the performance process connects strain with outcomes (Califf, 2022; McGrath, 1976). Additional interrelations are explored in research on the technostress phenomenon, such as moderators, coping processes, and individual and organisational factors, but further analysis is beyond the scope of this review. Our primary focus lies on identifying antecedents and consequences which come under the front-end of the process, although it can be challenging to separate the subprocesses (represented in dotted lines) occurring within it. Nonetheless, there are studies that specifically concentrate on that aspect (Pirkkalainen *et al.*, 2019; Zhu *et al.*, 2023). The research model is illustrated in Figure 3.1 below.

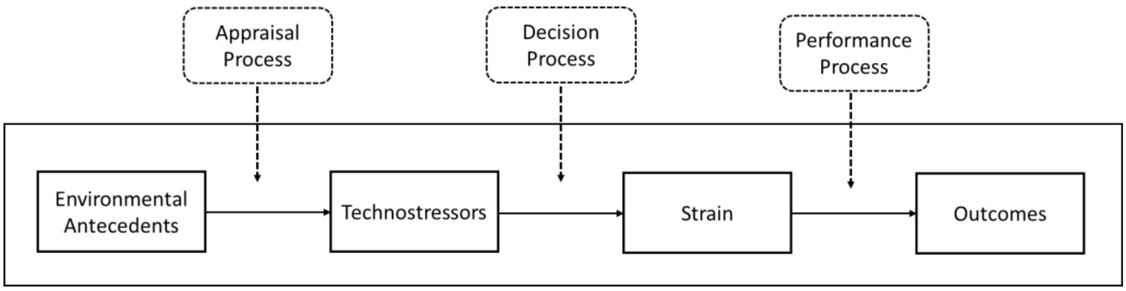


**Figure 3.1: Holistic technostress process**

### *3.2.2 Telework*

Telework represents an early form of virtual work, emblematic of the evolving concepts surrounding work and workplace (Bailey and Kurland, 2002). Lindström et al., (1997) in their research describe telework as a broad-ranging concept which can take on several different meanings, discuss various definitions and explain the inconsistency surrounding it. Typically, telework involves conducting at least some portion of work outside a traditional office setting (Aguinis and Lawal, 2013; Bailey and Kurland, 2002; Boell *et al.*, 2016). It is also referred to as ICT-enabled work, remote work, virtual work, or telecommuting, as articulated by Gajendran and Harrison (2007). Feldman and Gainey (2017) proposed four fundamental dimensions for studying teleworking, which include: (1) the frequency of teleworking by the employee, (2) whether the work follows fixed hours or offers a flexible schedule, (3) whether the teleworking is conducted from the employee's home or a satellite station established by the company, and (4) whether the decision to telework originated from the company's request or was initiated by the employee.

Due to the lack of a unanimous definition of teleworking across academic disciplines, in this study recent perspective from the IS field is adopted, as outlined by Carillo *et al.*, (2021). He describes telework as a fundamental restructuring of conventional work practices as it involves the execution of tasks remotely and often in collaboration, facilitated by ICTs. Mainly telework is classified based on two primary dimensions: the distance from the traditional workplace and the utilisation of ICTs for work purposes. Research on telework is generally aligned with the broader interest within IS regarding the role of ICTs in organising and managing work. Despite opportunities, the adoption of telework has been slower than anticipated, as highlighted by Boell et al., (2013). Moreover, there has been a gradual transition in the focus of IS scholars, moving away from examining telework exclusively during traditional working hours. Instead, attention has shifted towards a more dynamic and enduring form of work engagement facilitated by technology-enabled connectivity, particularly during after-hours (Chen and Karahanna, 2018). While studies exploring the benefits and challenges of telework do consider technological aspects, there tends to be an assumption of a predominantly passive role of ICTs (Boell *et al.*, 2013). The onset of the COVID-19 pandemic has reignited the imperative to study telework and virtual work phenomena, especially in extreme crisis scenarios, both epidemic and non-epidemic (Carillo *et al.*, 2021; De *et al.*, 2020; Sardeshmukh *et al.*, 2012). This research analysis confirms a surge in research on telework and technostress following the pandemic outbreak.

### *3.2.3 Platform work*

One of the hallmarks of modern work is the growth of online labour markets (OLMs). OLMs offer a novel model for organising work which differs from traditional work and telework in terms of how work is structured, communicated, managed, and delivered (Möhlmann *et al.*, 2020). Particularly the work relies on the use of algorithms to monitor and control platform workers (Möhlmann *et al.*, 2020; Wood *et al.*, 2019a; Zheng and Wu, 2022). Similar to telework, the definition of OLMs remains a subject of debate. Based on a recent IS study, OLMs are defined as platform-mediated work characterised by a network of socio-technical systems featuring complex technical infrastructures where temporary and part-time positions are filled by independent contractors across diverse businesses including knowledge work, shared transportation, and food delivery (Dedema and Rosenbaum, 2024).

Platforms are distinctive due to their triangular relationship involving two or more distinct user groups connected through an indirect network (Rietveld and Schilling, 2021). These platforms typically involve trilateral, and sometimes quadrilateral relationships with primary users such as individuals offering their labour through the platform, those seeking to procure their services, and the owners, operators, and administrators of the platform itself (Dedema and Rosenbaum, 2024; Duggan *et al.*, 2019). The working conditions of these platforms have attracted the interest of researchers in IS and related fields. A deeper understanding of platform work environments necessitates an examination of the role played by technology (Lehdonvirta, 2018; Möhlmann *et al.*, 2020). One aspect linked to technology and well-being is the exploration of technostress, which presents itself in various ways within these platforms (Umair *et al.*, 2023) and serves as the central focus of this research. However, there remains a scarcity of studies on this topic. This research highlights the importance of conducting further investigation into technostress, specifically focusing on its variations within and among different platforms.

**Table 3.1: Key differences between traditional work, telework and platform work**

| **Criteria** | **Traditional work** | **Telework** | **Platform work** |
|---|---|---|---|
| Work Process and hours (Bailey and Kurland, 2002; Brawley, 2017; Ma *et al.*, 2016) | Internet serves as a small portion of the overall work resources used in regular IT operations. Office timings 9 am to 5 pm apply | Partial organisational visits and work from home or defined location. Fixed and varied work hours | Constant internet access necessary. No specified work hours depend as long as you want to work on how many projects |
| No. of Employers (Aguinis and Lawal, 2013; Umair *et al.*, 2023) | Engaged with one employer | Engaged with one employer keeping a traditional relationship | Engaged with multiple employers in a single day or hour |
| Employment status (Kuhn and Maleki, 2017; Lindström *et al.*, 1997) | Employee/Employer | Employee/Employer or contractor | Not defined. Independent contractor |
| Control (Deng and Joshi, 2016; Kossek *et al.*, 2006; Ma *et al.*, 2016; Möhlmann *et al.*, 2020) | Bureaucratic control, mutual agreements on project requirements, quality criteria, project schedule, etc | Better control over their work schedule depending on conditions of boundary management | To some extent greater control over project selection but little control over project requirements. Governed by algorithmic management and control |
| Compensation and benefits (Lehdonvirta, 2018; Pabilonia and Victoria Vernon, 2022) | Mutually agreed compensation, bonuses | Agreed compensation and benefits, wage premiums | Compensation varies (considered unfair), micro-payment or piece-rate. No benefits provided |
| Training (Lascau *et al.*, 2019; Venkatesh and Speier, 2000) | Initial induction process or training provided | Training programmes available | No formal training |
| Communication (Bailey and Kurland, 2002; Gangi *et al.*, 2022; Suh and Lee, 2017; Umair *et al.*, 2023) | Interactive setting | Social Isolation | Higher Social Isolation Online communities/informal networks |
| Employee well-being (Duggan *et al.*, 2019; Gilbert *et al.*, 2011) | HR department exists as an organisation responsible for well-being of workers | Wellness programme | Little relevance to HR and no well-being support |

### *3.2.4 Key differences between Traditional, Telework and Platform Work*

Table 3.1outlines the distinguishing characteristics of three types of work arrangements: traditional work, telework, and platform work, across various criteria. Traditional work typically involves office-based operations with set hours with a clear employee and employer relationship. Within this structure, both parties agree upon work goals, performance criteria, compensation, and benefits (Ma *et al.*, 2016). Training opportunities are commonly provided, and a probationary period may precede full-time employment. The Human Resources (HR) department typically oversees the hiring process and the organisation offers various employee well-being programs (Gilbert *et al.*, 2011). Telework, on the other hand, allows for partial organisational visits and remote work, with flexible hours. Individuals can be classified as employees, freelancers or contractors (Bailey and Kurland, 2002). They have better control over their work schedule due to flexibility. Compensation is agreed upon, often with the possibility of wage premiums. Initial training is offered to employees and wellness programs exist. However, telework is associated with social isolation (Suh and Lee, 2017). Platform work, characterised by constant internet access and varied work hours, involves engagement with multiple employers in a single day or hour. However, their employment status is ambiguous and referred to in the literature as independent contractors (Kuhn and Maleki, 2017). Although platform work provides flexibility and autonomy, the truth is that much of this perceived freedom is undermined by algorithmic control. The compensation system in platform work is criticised for being inadequate and unfair, often resulting in workers receiving mere micro-payments for their efforts (Lehdonvirta, 2018; Wood *et al.*, 2019a). Moreover, the responsibility and risk are shifted entirely to the workers, with no rights to holidays or benefits typically associated with traditional employment. With no formal training, the work is performed in complete isolation. However, online communities formed by these workers facilitate information exchange among community members (Gangi *et al.*, 2022).

# 3.3 Methodology

To conduct a comprehensive examination of scholarly contributions related to the technostress phenomenon, this study adopted a structured methodology. The analysis relied on the Web of Science database by Clarivate, with a specific focus on the Social Sciences Citation Index (SSCI) to retrieve relevant articles for analysis.

## *3.3.1 Selection of Journals*

The objective of this study is to present an overview of technostress research from an IS perspective. To ensure a rigorous selection process, the Academic Journal Guide (published by the Chartered Association of Business Schools) was used as the foundation for journal selection criteria. The prominent IS journals were selected, as well as a thorough review of the early literature on technostress was conducted to identify key journals frequently referenced in previous work. To provide a comprehensive perspective, additional journals were included resulting in the inclusion of a total of 24 journals. Table 8.6 provides the list of selected journals.

## *3.3.2 Initial Query Run*

In alignment with recommendations by Tarafdar *et al.*, (2019), a robust query strategy was adopted for this study's search process. Specifically, the keywords *(techno* AND stress*) OR stress* OR strain OR coping*, were utilised as these terms encompass various facets of technostress and related concepts within the IS discipline. This approach enabled to capture articles that may have employed alternate terms such as technology addiction, technology stress, digital stress, or stressors. Our search encompassed titles, abstracts, author keywords, and additional keyword fields of all articles, ensuring comprehensive coverage of relevant literature. Additionally, email alerts were established to automatically retrieve articles published after the initial search, ensuring ongoing consideration for inclusion. The query was last executed on 21st February 2024.

**Table 3.2: Inclusion and exclusion criteria**

| Criteria | Reasons | Total articles | Example |
|---|---|---|---|
| Definite accept | 1) Articles that used technostress directly in their title, abstracts, or keywords<br>2) Articles define technostress concept based on IS researchers' definition such as (Ayyagari *et al.*, 2011; Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007).<br>3) Articles using alternate names to technostress such as technology anxiety, and technology overload but fit the definition criteria by IS researchers | 127 | (Cram *et al.*, 2022; Tarafdar, Pullins, *et al.*, 2015; Thunberg *et al.*, 2023; Yener *et al.*, 2021) |
| Definite reject | 1) Articles that focused on stress in general or workplace stressors not IT-induced stressors e.g., financial stress, daily life stress, depression, social stress.<br>2) Articles were removed where the context was not workplace such as gamification, virtual reality, cyberslacking, personal smartphone use, social media use, and online and offline communication generated stress.<br>3) Articles were removed where the outcome was technological exhaustion, but the antecedents were not directly related to technostress. | 669 | (Brailovskaia *et al.*, 2020; Cao *et al.*, 2018; Li, Yang, *et al.*, 2023; Mehtälä *et al.*, 2023; Meulenaere *et al.*, 2022; Sedera *et al.*, 2022) |
| In-between | 1) Articles which were applying technostress perspective as in other multi-layers of the process e.g., coping and appraisal, decision making, technology acceptance models<br>2) Articles include stress based on computer-mediated lessons or learning difficulty, multitasking, and cognitive demands based on computer reading like iPad or screens.<br>3) Conceptual theoretical/ descriptive papers on technostress | 100 | (Califf, 2022; Jeon *et al.*, 2023; Nastjuk *et al.*, 2023; Sharma and Gupta, 2023; Tarafdar *et al.*, 2019) |

### *3.3.3 Inclusion and Exclusion Criteria*

The article selection process involved following three phases:

- In *initial screening*, only peer-reviewed articles and those available as early access were retained, while book reviews, conference proceedings, and editorials were excluded. Additionally, articles not in English were excluded. Given the substantial volume of scholarly work on technostress since its inception, the timeframe for inclusion was limited to the last ten years to provide a current perspective on research trends. A total of 896 articles met the inclusion criteria.
- During the *secondary screening*, all relevant information, such as the title, abstract, document type, keywords, and additional details, was exported as an Excel file from Web of Science. This data served as the foundation for subsequent analysis steps. The articles initially retrieved from the search were then further refined to separate the most relevant ones. To facilitate this process, three distinct categories were established and colour-coded: "definite accept," "definite reject," and "in-between." Table 3.2 provides further details for these categories.

- In the *final screening phase*, the articles categorised in the previous step underwent thorough analysis. This involved a review of the abstract, construct definitions, measurement items where applicable, and the theoretical contributions of each article manually. Specifically, articles that did not incorporate any aspect of technostress, remained purely theoretical without addressing the four-step model or were descriptive in nature were excluded. This step ensured that only articles directly relevant to technostress and aligned with the established model were retained for further analysis. Additionally, backward and forward searches on the articles selected were performed and two articles were included in the analysis in the telework context.

## 3.4 Findings

The final articles were classified using a concept-centric approach, following the methodology suggested by Webster and Watson (2002). The four-step technostress framework, as outlined in section 2, was employed to organise the concepts. Each paper's contributions were systematically recorded under appropriate labels, as detailed in the Table 8.7. The findings were analysed within three different work contexts as illustrated in Figure 3.2.

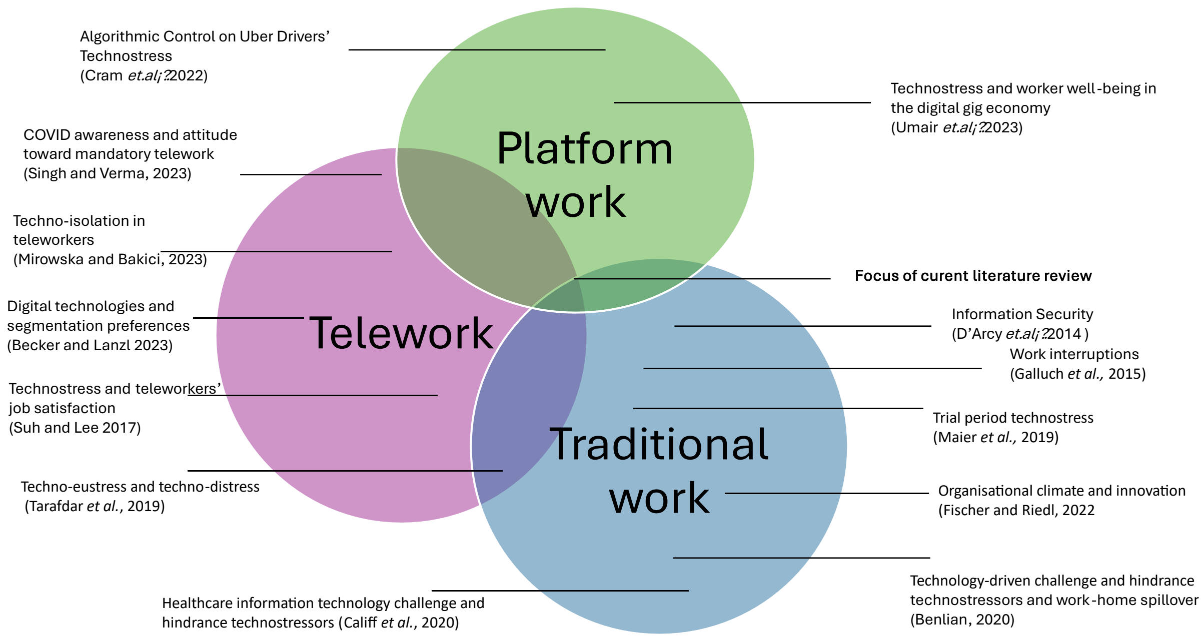


**Figure 3.2: Key papers related to technostress in each work context**

### *3.4.1 Environmental Antecedents*

In his seminal work, Ayyagari *et al.*, (2011) highlighted that IT possesses distinctive characteristics that serve as environmental antecedents to technostressors, which can be categorised into three main groups: usability (encompassing factors like usefulness, complexity, and reliability), intrusive (including aspects like presenteeism and anonymity), and dynamic (referring to the pace of change). Maier *et al.*,

(2019) describe these technology conditions or characteristics as the starting point in the transactional process of technostress.

Technostress literature represents the overall environment as intricately intertwined with technology. Traditionally, environmental antecedents in technostress process were only associated with technology, representing a condition embedded in the environment where the interaction with any IT artefacts (tools, hardware, software, or equipment) can induce stress in individuals (Tarafdar *et al.*, 2007). For instance, Truta *et al.*, (2023) in their research framed the use of technology and work-related tools such as email and social networks as specific environmental demands within higher education. While Zhao *et al.*, (2020) view the use of ICTs in the workplace as an environmental demand. Stich *et al.*, (2019b, 2019a) explained the circumstances in which technological attributes, particularly those associated with email usage, can be perceived as stressors. Significantly, they demonstrated that stress arises from IT usage when it both surpasses (such as email overload) and falls short of meeting the user's expectations (like email underload), developing the idea of fit and misfit as critical factors in stressor appraisal. Likewise, Pirkkalainen *et al.*, (2022) illustrate problematic IT use in the workplace as an environment employing the concept of proximal and distal antecedents to examine technostress. Proximal factors are directly linked to the outcome, while distal factors exert an indirect influence on the outcome through their impact on proximal factors. Further Pirkkalainen *et al.*, (2022) discuss that problematic IT use emerges from a blend of factors related to both the individual, such as the employee's perceptions of IT as a tool for managing work, and the organisational environment that promotes the use of IT for work.

Yazdanmehr *et al.*, (2023) cover an important topic considering the environmental antecedents in information security stress caused by information security policy (ISP) that can be a determinant of ISP violations. Building upon prior research investigating diverse mechanisms of mindfulness that might assist IS users in alleviating technostress, Pflügner *et al.*, (2021) examine how mindfulness, as a relevant individual factor, affects the perception of technostressors and their resulting outcomes. Their results indicate that mindfulness can be developed through training, suggesting that improving mindfulness could potentially lessen the perception of technostressors. Furthermore, by highlighting the significance of broad, stable, and dynamic personality traits, empirical evidence is presented to support the notion that IT mindfulness represents a dynamic, IS-specific trait with the most pronounced impact on technostressors.

Within technostress, IT-related interruptions and their effects are extensively studied as a central area describing the environmental antecedents such as instant messaging (IM) use at work. In their study, Hurbean *et al.*, (2023) explain how IM tools can disrupt work dynamics by prompting individuals to seek attention from their peers. Such interruptions, while seemingly innocuous, have the potential to disrupt workflow, leading to a diminished sense of control over tasks. Moreover, IM raises the expectation of immediate responses to messages from co-workers, creating a sense of urgency in workplace communication. This heightened expectation for timely responses may exacerbate perceived workload and stress levels, while also blurring the boundaries between work and personal life. Galluch *et al.,* (2015) in their study investigated the interaction among attributes of ICTs, individual characteristics, and interruptions using a transactional framework to explain stress in workplace. They pinpoint two crucial environmental antecedents associated with IT interruptions: the quantity and content of interruptions facilitated by ICTs. On the other hand, Müller *et al.,* (2023) use a multi-level approach to analyse shared mental models of ICTs (ICT SMM) an inherent cause in the teams for information overload and techno-frustration.

Moving beyond the traditional factors, Fischer and Riedl (2022) conceptualise the organisational climate of innovation as an antecedent to the appraisal of distress related to technological change in organisations. Further, they highlight, two facets of an organisational climate of innovation (i.e. implementation of new ideas and mutual support) with a potential to influence stress appraisal. As technological change can be a source of uncertainty, the way it is implemented is crucial. This is in line with the results by Wang *et al.,*(2008) who found that within organisational environments where innovation coexists with competitiveness an increase in ICT-related distress exists. Cao and Yu (2019) present excessive social media use in work as an environmental antecedent and differentiate three key dimensions of excessive social media use (excessive social, hedonic, and cognitive).

The teleworking or remote e-working trend has triggered a rapid reconfiguration of work, bringing forth a myriad of implications for both organisations and employees. Importantly, there has been a significant surge in telework-related research following the onset of the pandemic. For example, Andrulli and Gerards (2023) explore the concept of New Ways of Working (NWW), such as teleworking, which relies on increased usage of work-related ICT. They investigate the impact of NWW during the COVID-19 pandemic as an antecedent on employee well-being, demonstrating that technostress acts as a mediator in the relationship between NWW and employee well-being. While Taser *et al.,* (2022) explore e-remote working and employees' subjective mental experiences related to concentration and satisfaction at work (i.e., flow) due to COVID-19. Additionally, Singh and Verma (2023) examine the awareness of COVID-19 among Danish employees and their behaviour toward mandatory telework, focusing specifically on technology anxiety as a key factor influencing their response to the transition to remote work.

In outlining the technological aspects of telework, Mirowaska and Bakici (2023) identify three key IT characteristics: the transformation of communication through ICT, the constraints of ICT-enabled work environments, and the reduction of informal exchanges facilitated by ICT which led to techno-isolation. This sheds light on the evolving nature of telework environments. Becker and Lanzl (2023) investigate into segmentation preferences regarding the utilisation of four prevalent digital technologies: emails, messengers, audio, and video calls. The study explores segmentation preferences i.e., individuals' inclinations to separate various aspects of their lives distinctly. Moreover, it examines how the technological environment can induce technostress differently based on segmentation preference. The central focus in all of these studies revolves around the technology-driven environment, specifically examining its impact in the context of the COVID-19 pandemic. Earlier the COVID-19 period, Suh and Lee (2017) researched technostress and teleworkers' job satisfaction, introducing environmental antecedents that go beyond IT. Their study highlighted job characteristics such as job autonomy and task interdependence as crucial factors impacting technostress and job satisfaction among teleworkers along with IT characteristics such as IT complexity, IT presenteeism and pace of IT change.

In the context of platform-based work, research on technostress is still in its early stages. Cram *et al.*, (2022) identified algorithmic control as a significant environmental antecedent contributing to technostress among Uber drivers. On the other hand, Umair *et al.* (2023) investigated digital platforms such as Amazon Mechanical Turk, highlighting job autonomy and feedback as crucial environmental antecedents to technostress. Their study also explored the roles of IT complexity and IT presenteeism as environmental antecedents in the context of platforms.

### *3.4.2 Technostressors*

Over the years, technostressors have been defined as factors that can detrimentally affect both individual and organisational well-being. Hindrance technostressors are typically classified such as Techno-complexity, Techno-invasion, Techno-overload, Techno-uncertainty, and Techno-insecurity (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007). In traditional workplace contexts, these technostressors have been extensively studied across various organisations, with researchers unanimously acknowledging their negative impact (Korzynski *et al.*, 2021; Ma *et al.*, 2021; Maier *et al.*, 2019; Pflügner, Maier, Mattke, *et al.*, 2021; Pirkkalainen *et al.*, 2019; Wang *et al.*, 2020; Yener *et al.*, 2021; Yuan *et al.*, 2023; Zhao *et al.*, 2020). To deepen our understanding of these concepts, some researchers have chosen to focus on specific dimensions or aspects. For instance, a commonly examined stressor is overload with variations such as techno-overload, role overload, role ambiguity, role conflict, and information overload (Müller *et al.*, 2023; Thunberg *et al.*, 2023; Yu, Chen, *et al.*, 2023). Yu *et al.*, (2023) highlight incongruent information overload and incongruent interruption overload as hindrance technostressors. Tams et al., (2022) explore perceived interruption overload, while Harris *et al.*, (2015) discuss it in terms of communication, social, and system overload.

Some researchers have defined hindrance technostressors in terms of specific scenarios, such as the inability to use smartphones for non-work reasons in the workplace and ICT-enabled work during non-working hours (WNWHs) (Whelan and Turel, 2024; Wong *et al.*, 2024). Additionally, the invasion of professional social media (PSM) in the workplace has been identified as another aspect of hindrance technostressors (Oksa *et al.*, 2022). In evaluating how trail use of an IT can induce stress Maier *et al.*, (2022) identified IT characteristics such as perceived difficulty of use, unreliability, and personalisation complexity. Additionally, change characteristics including transition costs, habit disruption, and incompatibility contribute to the creation of technostressors during this phase. Furthermore, Intrusive characteristics such as monitoring, and privacy concerns add another layer of stress for individuals navigating through this trial period.

In the context of information security policy, hindrance technostressors are primarily classified as perceived hindrance, role uncertainty, role conflict, resource inadequacies, administrative hassles, and job insecurity (Yazdanmehr *et al.*, 2023). Hwang *et al.,* (2022) research also confirms the presence of uncertainty, complexity, and overload as stressors within this context. Chiu *et al.,* (2023), studying technology-induced job insecurity (techno-insecurity), categorises techno-insecurity into two categories: job-related (techno-overload, techno-invasion) and technology-related (techno complexity, techno-uncertainty) as technostress creators. Pirkkalainen *et al.*, (2019) identify IT insecurity, fear of missing out, IT use autonomy, and involvement facilitation as contributors to hindrance technostress. Gotez and Boehm (2020) similarly focus on technology insecurity as a significant factor.

The significance of techno-reliability as a distinct technostressor is highlighted by researchers (Califf *et al.*, 2020; Fischer and Riedl, 2022; Pirkkalainen *et al.*, 2019; Shadbad and Biros, 2022). This phenomenon highlights the challenges individuals face as they navigate through technological advancements, handling issues related to system dependability, performance consistency, and the reliability of digital tools and platforms. Some researchers have delineated technostressors in terms of both creators and inhibitors. They have identified inhibitors such as technical support provision, literacy facilitation, and involvement facilitation. These inhibitors serve as essential factors in mitigating technostress, offering support, enhancing digital literacy, and encouraging active involvement in technology-related tasks, thus alleviating the negative impacts of technostressors on individuals and organisations (Fuglseth and Sørebø, 2014; Jena, 2015).

In context of telework, not all technostressors apply similarly, and the results can vary depending on the specific circumstances. Researchers have adopted a mixed approach to studying hindrance technostressors in telework scenarios. Some have focused on the typical five technostressors (Andrulli and Gerards, 2023; Azpíroz-Dorronsoro *et al.*, 2023), while others highlight overload, invasion, interruptions, and role conflict as major stressors (Banerjee and Gupta, 2024; Becker and Lanzl, 2023). Singh and Verma (2023) demonstrate that technological anxiety predicts employees’ attitudes toward telework as a stressor. Additionally, emerging technostressors in this context include techno-isolation and loneliness (Mirowska and Bakici, 2023; Taser *et al.*, 2022).

In the telework context, ICT-related challenge stressors such as ICT-enabled multitasking, ICT-enabled work pace, and the use of ICT-related skills are crucial determinants of telework success (Meier *et al.*, 2023). However, the positive effects of challenge stressors are diminished when they occur together with hindrance stressors. Hindrance technostressors discussed in telework context include ICT hassles, inadequate ICT resources, and unclear ICT instructions. The findings indicate that teleworkers derive benefits from challenge stressors only when they are not simultaneously contending with hindrance stressors. Moreover, challenge stressors can exacerbate negative outcomes when teleworkers experience them alongside hindrance stressors, emphasising the importance of managing both types of stressors effectively in telework environments.

In platform work, Cram *et al.,* (2022) research integrates control and technostress literature to theoretically conceptualise algorithmic control as a condition that Uber drivers encounter. This condition is associated with both challenge and threat technostressors. By examining algorithmic control within the framework of technostress, the study explains the intricate relationship between algorithmic control mechanisms and the stressors they impose on platform workers. This integration provides valuable insights into the challenges encountered by workers in the gig economy and emphasises the significance of understanding the implications of algorithmic control on worker well-being and performance. Platforms overload and job insecurity emerged as specific significant technostressors in digital platforms. In these platforms due to rating systems workers must constantly strive to meet the expectations of their employer which adds to overload. The algorithmic control inherent to theses platforms inevitably affects workers' job insecurity which can be a source of frustration and stress (Umair *et al.,* 2023).

In this analysis, research articles that directly incorporated challenge technostressors into their research models or empirically demonstrated their positive impact were included. Furthermore, studies that applied the challenge and hindrance framework but considered general workplace stressors rather than specifically focusing on technostressors were not included in our analysis. Additionally, a common trend observed in the literature is that when technostressors are mentioned, they are typically classified as negative. Therefore, even if an article did not explicitly classify technostressors as hindrance, it was categorised as such based on this general approach.

### *3.4.3 Strain*

Much of the literature on technostress often treats strain and outcomes as interchangeable concepts, considering strain as a type of outcome. However, there is a significant body of research that distinguishes strain as a separate concept from outcomes. For instance, Ayyagari *et al.,* (2011) classify strain and other outcomes distinctly. Additionally, the stressor-strain-outcome model specifies strain as a separate component. According to Lazarus' transactional theory, strain is viewed as a short-term, immediate reaction to stress, whereas outcomes are considered as longer-term effects (Lazarus and Folkman, 1987). Therefore, in this research, strain represents the initial response to stress, and depending on its intensity and duration, it can lead to further detrimental effects termed as outcomes. The studies classified in this review under the strain category are those that specifically treat strain as a sperate concept from outcomes.

Strain is employed as a distinct concept in many studies (Galluch *et al.*, 2015; Shadbad and Biros, 2022; Umair *et al.*, 2023; Yan *et al.*, 2013; Yuan *et al.*, 2023). Some studies even term it as techno-strain (Maier *et al.*, 2019) or techno-frustration (Müller *et al.*, 2023). On the other hand, some studies have considered strain but have defined it using different terminology, such as emotional exhaustion (Cao and Yu, 2019) and work exhaustion (Oksa *et al.*, 2022). Furthermore, strain can manifest in various forms, such as work-life conflict (Whelan and Turel, 2024) and job dissatisfaction (Shi *et al.*, 2023). In the context of social media use at work, strain is termed social media exhaustion (Cao and Yu, 2019), while Fuglseth and Sørebø (2014) describe it as employee dissatisfaction with ICT use. In telework settings, Mirowska and Bakici (2023) classify strain as a short-term outcome, whereas in platform work it is characterised as an immediate adverse reaction (Umair *et al.*, 2023). These distinctions highlight the diverse ways in which strain can be conceptualised and experienced across different contexts and research studies.

### *3.4.4 Outcomes*

Outcomes of technostress can manifest in various forms, including physiological symptoms, psychological reactions, and behavioural attitudes. For instance, Goetz and Boehm (2020) describe the impact of technostress on general health, highlighting its potential to affect physical well-being. Previous literature has also identified symptoms such as headaches, physical problems, and neuroendocrine indicators as potential physiological manifestations of technostress (Tarafdar *et al.*, 2019). Additionally, Truta *et al.*, (2023) outline the adverse effects of technostress on overall well-being, emphasising its broader impact beyond specific symptoms or indicators. This suggests that technostress can influence psychological well-being, emotional health, and overall quality of life, highlighting the importance of addressing technostress as a holistic concern.

Commonly studied behavioural outcomes associated with technostress include work productivity (Thunberg *et al.*, 2023; Yu, Chen, *et al.*, 2023); IT-enabled productivity (Jena, 2015; Pirkkalainen *et al.*, 2019; Yuan *et al.*, 2023; Zhao *et al.*, 2020), professional social media enabled productivity (Oksa *et al.*, 2022). Moreover, the outcomes include a wide range of performance indicators with variations like job performance, (Hurbean *et al.*, 2023; Wang *et al.*, 2020), in-role performance (Wong *et al.*, 2024) task performance, innovation performance, user performance, contextual performance (Yuan Q 2023, Yener 2021). These performance variations reflect different aspects of individual and organisational effectiveness, highlighting the multifaceted impact of technostress on work-related outcomes. Additional IT use behaviours and related outcomes associated with technostress include routine use and innovative use (Maier 2021), overall work-related IT usage (Tams 2020) commitment (Jena 2015), and negative affectivity (Jena 2015).

In terms of psychological reactions various outcomes associated with technostress include an intention to violate IT policies (D'Arcy, Gupta, *et al.*, 2014; Shadbad and Biros, 2022; Yazdanmehr *et al.*, 2023) intention to reject IT or use IT (Fuglseth and Sørebø, 2014; Maier *et al.*, 2022), deviance (Chiu *et al.*, 2023), organisational commitment compliance intention (Hwang *et al.*, 2022; Hwang and Cha, 2018) turnover intention (Califf *et al.*, 2020; Harris *et al.*, 2022), emotional exhaustion (Ma *et al.*, 2021), user satisfaction or job satisfaction (Califf *et al.*, 2020; Fischer *et al.*, 2021; Jena, 2015; Yin *et al.*, 2018). Other outcomes discussed in literature include work-family conflict, burnout (Harris *et al.*, 2015, 2022; Ma *et al.*, 2021; Pflügner, Maier and Weitzel, 2021; Wang *et al.*, 2020; Yener *et al.*, 2021), partner satisfaction (Benlian, 2020) and cyberslacking or cyberloafing (Güğerçin, 2020).

In the telework context, a similar pattern is observed in the commonly studied outcomes as in traditional work settings such as telework productivity or success (Meier *et al.*, 2023; Singh and Verma, 2023), effectiveness at work (Banerjee and Gupta, 2024) job satisfaction (Singh and Verma, 2023; Suh and Lee, 2017). Moreover, technology anxiety, exhaustion at work and work-family conflict are studied (Azpíroz-Dorronsoro *et al.*, 2023; Becker and Lanzl, 2023). Taser *et al.*, (2022) studied remote worker's flow experiences. Other than that, distal outcomes (Mirowska and Bakici, 2023) and job-related affective well-being (Andrulli and Gerards, 2023) are studied.

In the platform context, Cram *et al.* (2022) investigated technostress outcomes in terms of continuance intentions and workaround use for Uber drivers. Meanwhile, in digital platforms, Umair *et al.* (2023) investigated technostress outcomes in terms of subjective well-being dimensions, including cognitive well-being and job-related affective well-being( positive affective well-being, negative affective well-being), along with platform workers' discontinuous intention.

Since 2019, there has been a notable surge in technostress research, as an increasing number of researchers have explored various facets of this phenomenon in recent years. Among the prominent contexts explored in technostress literature, the use of social media emerges as a recurring theme. For articles that didn't fit into the four-step model, Table 8.8 shows their classifications alongside the contextual focus of the study.

## 3.5 Contributions

This research makes significant contributions. Theoretically, this study offers a comprehensive review that elucidates how technostress has evolved alongside the changing nature of work, encompassing traditional work, telework, and platform work. Practically, the summary of technostress literature provided can be highly beneficial for practitioners seeking to understand the antecedents and outcomes of technostress. This understanding can inform the design of strategies aimed at mitigating its effects in workplaces, fostering healthier and more productive work environments. Drawing on insights from this review, organisations can develop interventions and support systems to more effectively manage technostress among employees, thereby enhancing both overall well-being and performance.

## 3.6 Limitations

This research also presents several limitations. Firstly, while this review provides insights into technostress from an IS perspective, it is crucial to acknowledge that technostress is a multidisciplinary phenomenon. Therefore, future studies should consider incorporating non-IS perspectives to enhance the depth and breadth of understanding, ultimately contributing to an updated synthesis of the literature. Secondly, while the focus here primarily revolves around the workplace context, it is important to recognise that technostress extends beyond professional settings to encompass various domains such as social media usage, online learning systems, and gamification. Future research should encompass these diverse contexts in their analyses to provide more comprehensive reviews. Additionally, considering the distinct technostressors and mitigation strategies in private contexts, there is a need for separate investigations, as highlighted by Pflügner (2022). Thirdly, current research primarily focuses on the early stages of the technostress process. However, there is a need for future studies to delve deeper into investigating the appraisal and coping mechanisms linked with technostress. By conducting more detailed reviews, researchers can offer a more nuanced understanding of how individuals assess and cope with technostress, thus contributing to a more comprehensive body of knowledge in this area. Lastly, the inclusion criteria were limited to peer-reviewed journals. While effort was made to expand article coverage through forward and backward searches, it is important to acknowledge that this dataset may not be exhaustive. Therefore, in future, to facilitate more comprehensive analyses further databases should be included. Moving forward, future research could explore alternative databases such as Scopus and EBSCOhost to capture publications not indexed by Web of Science. Additionally, considering the significant volume of research on technostress in recent years, employing advanced review methods like meta-analysis could offer insights into the rich body of existing research, identifying potential contradictions and gaps for further exploration. Furthermore, a review exploring the use of alternative models and frameworks used in technostress research can also offer valuable theoretical extensions.

# Chapter 4

# Examining Technostress and its Impact on Worker Well-being

## 4.1 Introduction

As platform technology has advanced, new business models and forms of work have emerged. One such type of work is the *gig economy* (Berg *et al.*, 2018), which is defined as a collection of markets that match workers and employers via internet-based technological platforms to perform specific tasks (Donovan *et al.*, 2016). The gig economy has attracted growing attention in both mainstream and academic publications and is usually discussed in terms of two key types, namely the physical gig economy and the digital gig economy (Heeks, 2017). The physical gig economy involves work that is transacted via platforms but that requires location-bound physical activity such as food delivery and ride provision (Heeks *et al.*, 2021). The digital gig economy includes completion of location-independent digital tasks that are facilitated by online platforms, also referred to as *online labour markets* (OLMs), e.g., Amazon Mechanical Turk (MTurk)[5] and Upwork (Heeks, 2017; Horton, 2010). These markets offer a wide variety of tasks, varying from simple to complex in nature, and include data verification, data processing, audio transcription, survey taking, software development and web design, amongst others (Hunt and Scheetz, 2019). The primary focus of this paper is OLMs, which represent the digitisation of both work process and work organisation (Huws, 2017). In recent years, the number and scale of OLMs have increased significantly, and their contribution to the broader gig economy continues to grow (Tay and Large, 2022).

More than 162 million people in Europe and the United States, or almost 30% of the working-age population, are engaged in these digital markets (Manyika *et al.*, 2016; Möhlmann *et al.*, 2020). The McKinsey Global Institute (2015) estimated that OLMs could contribute up to US$2.7 trillion to global GDP, benefitting more than 540 million individuals by 2025. A recent prediction shows that these platforms are growing at an annual rate of 25% and will mediate every one in three labour transactions within the next decade (Heeks *et al.*, 2021; Wood *et al.*, 2019b). These figures are likely to increase

[5] MTurk is an online labour market where employers (called requesters) recruit employees (called workers) to complete HITs (Human Intelligence Tasks) for remuneration (called a reward) (Hunt and Scheetz, 2019).

after the COVID-19 pandemic, as many people are turning towards OLMs for work flexibility and additional income (Fairwork, 2020).

OLMs offer many opportunities, such as additional income, a just-in-time workforce, and temporal flexibility (Wood *et al.*, 2019a). Yet, they have created significant social, economic, and individual challenges (Bajwa, Knorr, *et al.*, 2018). In particular, the implications of OLMs for worker well-being are much debated (Ashford *et al.*, 2018; Freni-Sterrantino and Salerno, 2021; Kuhn and Maleki, 2017; Valenduc, 2017). At a broader level, it is argued that OLMs erode labour protections, undermine the standard employment relationship, and advocate casualisation of work, due to their precarious nature (Kässi and Lehdonvirta, 2018; De Stefano, 2016). At the individual level, problems like tedious tasks, constant rejection, low payment, time pressure, and limited social interaction are well-documented (Bajwa, Gastaldo, *et al.*, 2018; Bergvall-Kåreborn and Howcroft, 2014; Heeks, 2017; Wood *et al.*, 2019a). A survey by the International Labour Office on OLMs reports that almost nine out of ten workers get rejections, with the median hourly wage being only US$2 (Berg *et al.*, 2018). Similarly, another survey on OLMs reports that 54% of workers work at very high speeds, 22% feel distressed because of their work, and 60% struggle to meet tight deadlines (Wood *et al.*, 2019a). While initial research has examined the underlying motivations to join OLMs (Durward *et al.*, 2020; Keith *et al.*, 2019) and job quality and control (Möhlmann *et al.*, 2020; Wood *et al.*, 2019a), empirical insights related to worker health and well-being, and the impact of gig work in the information technology (IT) field, are limited to date (Bajwa, Gastaldo, *et al.*, 2018; Freni-Sterrantino and Salerno, 2021; Kaine and Josserand, 2019). This is particularly true where OLMs are concerned.

OLMs are inherently different from traditional employment due to structural differences in the way work is performed (Möhlmann *et al.*, 2020). The centrality of digital elements allows for greater flexibility and freedom for workers (Brawley, 2017; Ens *et al.*, 2018). However, technology can be a double-edged sword, as excessive and prolonged use of technology adds to stress (Krishnan, 2017). The experience of individual stress caused by using information technology is referred to as *technostress* (Tarafdar *et al.*, 2007). Technostress research typically focuses on the misfit between individuals and their environment by distinguishing between technostressors (events encountered by individuals, and also known as technology-induced stressors), strain (immediate adverse reaction to technostressors) and outcomes (the decrease in psychological and behavioural functioning of the individual) (Ayyagari *et al.*, 2011; Tandon *et al.*, 2021). Apart from the digital propensity of work, distress can be intensified in OLMs due to the way they are designed and operated (Bajwa, Gastaldo, *et al.*, 2018). Without hierarchical relationships and self-management enabled by algorithms, workers' behaviour and performance are hampered (Duggan *et al.*, 2021). For instance, some OLMs limit the worker's ability to find tasks, restrict workers with lower ratings, and restrict workers' ability to negotiate prices (Kellogg *et al.*, 2020; Wood *et al.*, 2019a). The prevalence and impact of these sources of strain make workers more vulnerable (Ashford *et al.*, 2018), and they feel penalised for factors beyond their control

(Bajwa, Gastaldo, *et al.*, 2018). Therefore, determining the effects of technostress on workers in OLMs is a novel and significant area of enquiry.

This paper draws from the theoretical perspectives of technostress, person–environment fit and job characteristics to inform the development of a research model which advances the understanding of the effects of digital technology on gig workers. This research aligns with the United Nations Sustainable Development Goals (SDGs), which emphasise ensuring healthy lives and promoting well-being as a fundamental requirement for decent work (United Nations, 2015). If more people are working on OLMs, it is critical to understand how adverse outcomes of worker well-being materialise so that targeted interventions can be designed, tested and implemented. Specifically, this paper aims to address the following research question:

*Do the technology and job characteristics of online labour markets influence strain, and is this relationship mediated by technology-induced stressors?*

This research contributes to information systems (IS) literature on technostress and technology-based work environments. Technostress is a multi-phase process, and focusing on subsets of the process is typical due to the complexity of assessing all the elements simultaneously (Cram *et al.*, 2022). Prior research has contributed in various ways by identifying antecedents (Ayyagari *et al.*, 2011) and consequences (Ragu-Nathan *et al.*, 2008; Srivastava *et al.*, 2015; Wang *et al.*, 2008), classifying technostressors (Tarafdar *et al.*, 2007) or focusing solely on appraisal and coping (Pirkkalainen *et al.*, 2019). Traditionally, technostress is studied in a wide range of professionals, e.g., IT professionals, sales workers, healthcare workers and academics. Research in this context reports technology characteristics as the primary antecedent of technostress, leading to lower productivity, organisational commitment and satisfaction (Ayyagari *et al.*, 2011; Califf *et al.*, 2020; Ragu-Nathan *et al.*, 2008; Tarafdar, Pullins, *et al.*, 2015; Whelan *et al.*, 2022). OLMs are a unique work arrangement, and there is a limited understanding of how technostress materialises on such platforms.

In addition to the characteristics of technology, to advance understanding of the technostress process in OLMs this research focuses on OLMs job characteristics, namely job autonomy (decision-making authority in relation to work) and feedback (*negative* feedback is the evaluation of work performed as poor or insufficient). Job autonomy and feedback are key attributes of gig work as autonomy means that workers are responsible for managing their work logistics and establishing routines without anyone holding them accountable, while feedback fosters trust and guarantees reward (Ashford *et al.*, 2018; Kokkodis and Ipeirotis, 2015). This study also provides a more fine-grained assessment of the impact of technostress on worker well-being by examining different well-being dimensions (i.e., cognitive well-being and affective well-being), as well as discontinuous intention. Previous technostress research which has investigated well-being outcomes has generally focused on broad well-being constructs (Ragu-Nathan *et al.*, 2008; Srivastava *et al.*, 2015). In addition, most previous studies assessing technostress have analysed the overall effect of technostressors (i.e., amalgamated as a second-order construct), indicating an overall negative impact on outcomes (Pflügner, Maier and Weitzel, 2021; Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007). However, few studies have examined the impact of individual technostressors on outcomes (i.e., using a first-order construct), e.g., invasion, uncertainty, role-ambiguity (Brooks and Califf, 2017; Califf *et al.*, 2020; Maier, Laumer, Eckhardt, *et al.*, 2015). These studies have suggested that the impact of technostressors may differ depending on the outcome being measured. For example, insecurity has a positive impact on strain, a negative impact on productivity, and no significant impact on organisational commitment (Ayyagari *et al.*, 2011; Qiang Tu *et al.*, 2005; Sarabadani *et al.*, 2018). Therefore, further research is needed to gain a more nuanced understanding of the individual roles of technostressors and to contribute to the ongoing debate in this field (Nastjuk *et al.*, 2023). In this context, this study adds to existing literature by providing insights into how concepts related to technostress differ from emerging work environments such as OLMs, as opposed to the traditional workplace. The data is collected from an OLM through a large-scale online survey to validate the proposed research model.

## 4.2 Theoretical Framework

Stress is often discussed as a mismatch between a person's resources and what they experience in their environment, which thereby threatens their well-being (Cooper and Cartwright, 1997). The term technostress was first introduced by Craig Brod (1984), and it refers to the stress experienced due to the use of IT (Tarafdar *et al.*, 2007). Since then, the concept has been extended by researchers to a wide range of conditions that exacerbate technostress, including but not limited to multitasking, constant connectivity and information overload (Benlian, 2020; Ragu-Nathan *et al.*, 2008; Srivastava *et al.*, 2015). In IS literature, as Figure 4.1 illustrates, the phenomenon of technostress is considered a holistic process that consists of four stages: *environmental antecedents*, *technostressors*, *strain* and *outcomes* (Ayyagari *et al.*, 2011; Califf *et al.*, 2020). Each stage in this process is interconnected and represents the pathway of a stressful encounter by an individual (Califf *et al.*, 2020). Environmental antecedents are predictive of technostressors through appraisal of the situation, which in turn contributes to an immediate short-term reaction known as strain. In the end, depending on how a person copes with the situation, strain can lead to further detrimental outcomes (Lazarus and Folkman, 1987). Before further detailing this process, the section below first describes the *person–environment* (P–E) fit theory, which provides a conceptual basis for the understanding of technostress within the context of OLMs.

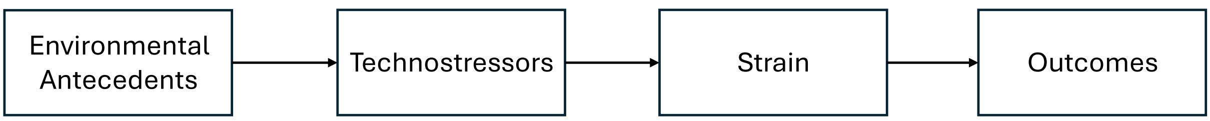


**Figure 4.1: Overview of the technostress process**

### *4.2.1 Person–Environment Fit Theory*

The P–E fit theory advocates that the emergence of stress is due to a change or mismatch in the equilibrium relationship between an individual and their environment (Edwards and Cooper, 1990; Yang *et al.*, 2008). This theory has been widely used to examine stress in organisational studies (Wang *et al.*, 2020; Yang *et al.*, 2008), psychology (Edwards *et al.*, 2006; Kristof-brown *et al.*, 2005) and information systems (Ayyagari *et al.*, 2011; Brooks and Califf, 2017). The prominence of P–E fit theory is primarily due to its conceptual advantages over alternatives in explaining why stress emerges (Edwards, 1996). Most importantly, it takes into consideration an individual and the individual differences in perceptual and cognitive processes underpinning the relationship between stress stimuli and response (Edwards and Cooper, 1990; Tarafdar *et al.*, 2019). Within IS research, a person's compatibility with the technology environment has also been studied (Ayyagari *et al.*, 2011; Brooks and Califf, 2017; Yan *et al.*, 2013). In OLMs, the requesting organisation or person is often unknown to workers, and the platform serves as an intermediary between task requesters and workers (Schulze *et al.*, 2012). Therefore, this study focuses on a worker's compatibility with their job and technology environment. The *person–job* (P–J) fit emphasises that stress arises due to a misfit between an individual's characteristics and their specific job-related tasks. This misfit, which is based on subjective evaluations, i.e., how the individual perceives the job situation, can arise in two ways (Edwards, 1996). First, demand-ability is the match between the demands of the job and the worker's ability to meet those demands. Second, needs–supplies fit is the match between the worker's needs or interests and the job resources. The *person–technology* (P–T) fit underlines that the gap between an individual's abilities and the characteristics of their IT environment is also a significant cause of stress in a work setting (Ayyagari *et al.*, 2011). The technology environment in OLMs has unique characteristics, in terms of IT complexity and connectivity, that can generate stress. This evaluation of P–J and P–T misfit by the individual induces stress, increasing the impact of stressors and strain (Ayyagari *et al.*, 2011; Brooks and Califf, 2017).

### *4.2.2 Environmental Antecedents*

*Environmental antecedents*, also referred to as environmental conditions, are potential sources of stressful situations in the workplace (Califf *et al.*, 2020; Tarafdar *et al.*, 2019). IS literature on technostress has largely considered technology characteristics as the environmental antecedent. For example, technology's pace of change is positively associated with role-ambiguity and technology reliability is negatively related to work overload (Ayyagari *et al.*, 2011). The technology environment in which gig workers operate brings its own peculiarities that can induce technostress (Cram *et al.*, 2022).

Based on prior research on OLMs, Umair *et al.* (2019) conducted a pilot test to identify the most important technology and job characteristics of these platforms. Using informal interviews and a survey that asked respondents to rank OLMs' attributes in terms of importance, the topmost emerging characteristics and stressors were included in the model. Accordingly, this study will focus on two technology characteristics of OLMs. *IT complexity* is defined as the degree to which the use of technology for work requires effort, and *IT presenteeism* is defined as the degree to which technology enables workers to be easily reachable (Ayyagari *et al.*, 2011). In OLMs, the complexity of IT knowledge needed to perform tasks varies, ranging from software engineering to online translation (Heeks, 2017; Kässi and Lehdonvirta, 2018; Wood *et al.*, 2019a). Consequently, OLM workers can experience a high work overload in a short time frame due to the IT complexity (Shu *et al.*, 2011; Wang *et al.*, 2008). Similarly, the need to search for and perform high-paying tasks increases IT presenteeism, and the geographical time zone difference between requesters and workers enhances this pressure (Brawley, 2017; Lehdonvirta, 2018). Thus, job insecurity increases due to intense competition for a single task, which prevents workers from working all the hours they desire (Keith *et al.*, 2020).

Besides technology characteristics, recent research has also considered environmental antecedents beyond technology, such as job characteristics (Brooks and Califf, 2017; Suh and Lee, 2017) and organisational climate (Fischer and Riedl, 2022). Suh and Lee (2017) showed that, for teleworkers, job autonomy and task interdependence are positively associated with technostressors. Brooks and Califf (2017) showed that job characteristics have a moderating effect between social media-induced technostress and job performance. Yet, the question of how job and technology characteristics jointly affect technostress remains unclear, especially in the context of OLMs.

Job characteristics theory provides an appropriate lens to examine the job environment of OLM workers, because it focuses on understanding how job characteristics determine workers' attitudes and behaviours (Hackman and Oldham, 1976). This theory identifies five key attributes of a job, i.e., skill variety, task identity, task significance, autonomy and feedback. Skill variety refers to the heterogeneity of skills needed to perform work activities, while task identity captures whether the work is completed as a holistic identifiable piece. Task significance is defined as work having a meaningful impact on others' lives. This study focuses on job autonomy and feedback as key environmental antecedents to technostress in OLMs. *Job autonomy* is the degree of freedom and discretion allowed to an employee over their job (Hackman and Oldham, 1976), and negative *feedback* is the evaluation of work performed as poor or insufficient (Steelman *et al.*, 2004). Job autonomy and feedback are central issues for OLMs since workers can perceive themselves to be controlled by algorithms (Kokkodis and Ipeirotis, 2015; Möhlmann *et al.*, 2020). In comparison, task significance, task identity and skill variety have been found to have limited relevance in the context of OLMs (Brawley and Pury, 2016; Liu *et al.*, 2023). More importantly, empirical evidence suggests that the well-being of IT professionals is positively associated with job characteristics such as feedback and job autonomy (Chen, 2008).

### *4.2.3 Technostressors*

Technostressors are technology-induced stimuli or demands appraised by individuals as threatening (Ayyagari *et al.*, 2011). In IS literature, there are five commonly identified technostressors: complexity, invasion, insecurity, uncertainty and overload (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007). Other forms of technostressors, such as boredom and involvement, are also highlighted in recent research (Fischer *et al.*, 2021). The phenomenon of technostress is tied to the nature of work, and context-specific studies focus on stressors that are most relevant to the work environment (Anh *et al.*, 2023; Cram *et al.*, 2022; Fischer and Riedl, 2022; Galluch *et al.*, 2015; Suh and Lee, 2017). Therefore, this study chose to focus on two technostressors that are expected to have a unique relationship with technology and the job characteristics of OLMs (Umair *et al.*, 2019). First, the model includes *work overload*, which is defined as an individual's perception that assigned work exceeds their capability (Ayyagari *et al.*, 2011). It is particularly relevant to OLMs due to work transience resulting in a higher burden at the worker's end, which is also termed "front-stage work". To maintain a good reputation and become their own "brand", workers must constantly strive to meet the expectations of each requester, thus coming under significant pressure to present themselves in the best possible way (Ashford *et al.*, 2018, p. 27). The overwhelming demands of informal networking and finding quality work lead to work intensification (Ellmer and Reichel, 2018). Second, the model includes *job insecurity*, which is defined as an individual's perception of the threat of job loss (Ayyagari *et al.*, 2011). It is considered a key stressor under the competitive pressures of OLMs (Ashford *et al.*, 2018; Wood *et al.*, 2019b). Job insecurity in OLMs may be experienced differently than in a traditional work environment, as workers cannot truly be fired. However, workers may be prevented from finding work because of lack of individual resources, such as the inability to meet requester expectations and the resulting lower ratings on the platform. The algorithmic control inherent to OLMs inevitably affects workers' job insecurity (Keith *et al.*, 2020), which can be a source of frustration and stress. The technostress process explains that increasing demands or technostressors that significantly tax individual resources lead to strain (Califf *et al.*, 2020; Fuglseth and Sørebø, 2014; Tarafdar *et al.*, 2019).

### *4.2.4 Strain and Outcomes*

Strain is the immediate adverse reaction or state experienced due to various stressors (Lazarus and Folkman, 1987; Tarafdar *et al.*, 2019). Depending on the intensity and duration of the stressors, strain can lead to other outcomes as well. Such outcomes are consequences that cause changes in psychological, physiological and behavioural functioning of an individual (Dhir *et al.*, 2019; Tandon *et al.*, 2021). For instance, technostress research reports that strain causes psychological outcomes such as exhaustion, lower commitment and burnout (Ayyagari *et al.*, 2011; Srivastava *et al.*, 2015; Tarafdar *et al.*, 2020); potential physiological outcomes such as increased stress hormones (Galluch *et al.*, 2015; Riedl, 2012); and behavioural outcomes such as turnover and lower productivity (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007). This research focuses on psychological and behavioural outcomes rather than physiological outcomes, as the latter are drawn from a different conceptual perspective, namely neurobiology.

In terms of psychological outcomes, the model focuses on subjective well-being. Subjective well-being is deeply intertwined with workers' income, employment and working conditions (Berger *et al.*, 2019). In the context of OLMs, subjective well-being is an important phenomenon for study because of the precarious environment, with a lack of guidelines on how platforms support worker well-being (Arnoldi *et al.*, 2021). Berger *et al.* (2019) reported lower levels of subjective well-being and higher levels of anxiety for workers on these platforms. OLMs pose unique challenges, and it is critical to evaluate how this new form of work functions and how it impacts worker well-being (Keith *et al.*, 2020). Subjective well-being has two dimensions: cognitive well-being and affective well-being (Diener *et al.*, 1985). *Cognitive well-being* describes global judgements of one's life or an individual's evaluation of life satisfaction in general (Diener *et al.*, 1985). *Affective well-being* refers to the intensity with which an individual experiences two types of affect: *positive affective well-being* (experience of pleasant emotions and moods) and *negative affective well-being* (experience of unpleasant emotions and moods). Affective well-being can be assessed for any domain, e.g., work, family, health, leisure (Diener, 2000). Since the research focuses on work in OLMs, the study will refer to it as job-related affective well-being. Previous literature on technostress has investigated factors that contribute to individual well-being, e.g., exhaustion and job satisfaction (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2020); however, it is not known whether and how technostress contributes to dimensions of subjective well-being.

In terms of behavioural outcomes of technostress, the model considers discontinuous intention, which is defined as an individual's decision to quit using a system (Turel, 2014). Prior research has studied discontinuous intention in the context of system adoption and social media, where negative feelings can lead to avoidance of a situation's recurrence or a switch to alternatives (Maier, Laumer, Weinert, *et al.*, 2015; Zhang *et al.*, 2016). Workers have the flexibility to organise work in OLMs, but that comes at the cost of lower earnings. Therefore, an important question is whether an increase in technostress leads to discontinuous intention. Answering this question will help us understand workers' decisions to leave a platform or to continue to work on it even when they do not want to. Moreover, assessing discontinuous intention will help platforms to implement adequate strategies to deal with potential turnover of workers. The research model also explored the mediating effect of strain on the relationship between technostressors and the outcomes described above.

## 4.3 The Research Model

Based on the concepts and theoretical perspectives described earlier, the model uses the two instantiations of P–E fit (i.e., P–T fit and P–J fit) to frame the hypotheses associated with this study. Figure 4.2 illustrates the research model in detail.

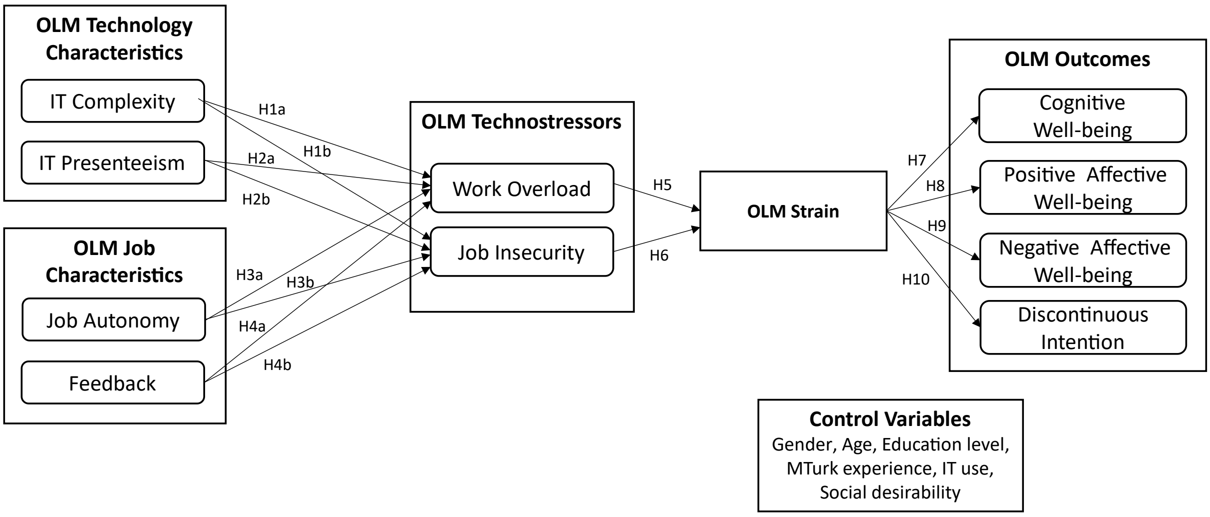


**Figure 4.2: Proposed research model for technology-job characteristics and technostress**

### *4.3.1 Technology Characteristics and Technostressors*

New features and updates occur continuously in IT systems, which can be challenging for workers since it requires them to spend more time learning, with this in turn leading to frustration (Tarafdar *et al.*, 2007). Such IT complexity also has importance in OLMs because employees receive no formal training before joining a platform, and tasks vary in their complexity (Lascău *et al.*, 2019). Given the competitive nature of OLMs, workers are constantly under pressure to meet tight deadlines (Wood *et al.*, 2019a). IT complexity means that apart from the regular search for available tasks, workers frequently need to develop new skills. For example, installing a web-based HIT scraper, creating extensions for user scripts, and organising tasks, do not come under the actual task requirements but are still necessary skills. On average, workers spend an extra 20 minutes on each task. This extra effort includes searching for new tasks and fulfilling qualifications, which creates frequent interruptions during work (Berg *et al.*, 2018). To deal with complexity, workers need to expend more effort in gathering knowledge, resulting in an enhanced P–T misfit (Ayyagari *et al.*, 2011). Therefore, the study hypothesises:

*H1a: In OLMs, IT complexity is positively associated with work overload.*

OLM workers are usually located in different geographical regions, where technology resources may be limited (Heeks, 2017). Technical issues, constant interruptions, workflow changes, and IT equipment also impact productivity and technostress (Lascău *et al.*, 2019; Srivastava *et al.*, 2015). For example, a worker may have to search for new tasks while working on another task in parallel, which means they must manage multiple streams of information concurrently (Brooks and Califf, 2017). In OLMs, this frustration is reflected in worker job insecurity, due to limited task availability and loss of work (Lehdonvirta, 2018; Wood *et al.*, 2019a). The additional time and effort needed to complete tasks create stress as workers are left with unpaid or rejected work when another worker submits the same task first.

Such technology-induced factors disrupt valued job-related aspects such as continuity and stability, resulting in P–T misfit associated with technostress. Thus,

*H1b: In OLMs, IT complexity is positively associated with job insecurity.*

*IT presenteeism* is associated with additional work demands arising from increased responsiveness (Ayyagari *et al.*, 2011). New digital and collaborative tools have increased connectivity, which at the same time has enhanced the flow of information, leading to information overload. When individuals receive more information than required, it causes fatigue (Suh and Lee, 2017). Evidence suggests that enabling employees to be accessible anytime and anywhere through IT devices leads to stress over time, by increasing availability, responsiveness and employer expectations (Mazmanian, 2013). In OLMs, workers can simultaneously have as many employers as they see fit in a day or an hour, meaning they face varying employer demands. Moreover, workers rely on informal sources of information such as forums to learn new tricks or get notified of high-paying tasks. This increase in demands can lead to stress arising from P–T misfit. Hence, IT presenteeism may aggravate the perception of work overload in OLMs.

*H2a: In OLMs, IT presenteeism is positively associated with work overload.*

Due to the competitive nature of OLMs and the need to be always online to get the "best" high-paying tasks, presenteeism can also lead to job insecurity. Although workers have a choice to remain disconnected, this may not always be possible. For instance, a worker may need to stay connected longer when the amount of available work is limited, thus increasing job insecurity (Lehdonvirta, 2018; Wood *et al.*, 2019a). The increased permeability of work boundaries can affect workers, which can cause work intensification and higher stress (Ellmer and Reichel, 2018). Workers may experience a blurring of the line between work and personal life, which has been associated with increased technostress (Ayyagari *et al.*, 2011). As individuals are limited in their abilities (resources), the increased pressure can create a P–T misfit. Thus,

*H2b: In OLMs, IT presenteeism is positively associated with job insecurity.*

### *4.3.2 Job Characteristics and Technostressors*

Autonomy is essential in a job because it reduces work overload, and workers can effectively manage their time between different activities (Ahuja *et al.*, 2006). In OLMs, workers perceive a certain amount of autonomy regarding their work scheduling as they can decide when and where to perform work and how they work (Durward *et al.*, 2020). On the other hand, workers have little control over the task requirements, quality expectations, feedback and deadlines, which are pre-specified as instructions (Ma *et al.*, 2016). Despite experiencing some autonomy, the competitive environment creates an undesirable pressure to quickly complete as many tasks as possible, leading to work intensification (Wood *et al.*, 2019a). Tasks also become challenging due to unclear instructions, irregular working hours or embedded qualification requirements (Kaplan *et al.*, 2018, Ellmer and Reichel, 2018). The job demands–control model explains the interaction between job demands and job autonomy, where work overload is thought to induce stress and job autonomy to reduce that effect (Karasek 1979). Therefore, it follows that workers with a higher level of job autonomy are less likely to experience a P–J misfit. Hence,

*H3a: In OLMs, job autonomy is negatively associated with work overload.*

Job autonomy in IT professionals has been associated with reduced stress, given that workers are offered the flexibility to manage their schedules (Brooks and Califf, 2017). Although OLMs offer autonomy to workers, it comes at the cost of uncertainty and insecurity (Bajwa, Gastaldo, *et al.*, 2018). The decisions governed by invisible algorithms heavily impact workers' ability to perform tasks (Duggan *et al.*, 2021). The benefits of autonomy accrue to only the few workers who are favoured by algorithms. In contrast, for income-dependent workers, this leads to anxiety, overwork and hope for secure work (Petriglieri *et al.*, 2018; Wood *et al.*, 2019a). The job-related benefits, such as freedom to schedule one's own work and career opportunities, minimise job threats (Ashford *et al.*, 2018). Job autonomy allows workers to manage time better; hence, individuals experience less P–J misfit. Based on this analysis, the hypothesis is:

*H3b: In OLMs, job autonomy is negatively associated with job insecurity.*

Feedback, both favourable and unfavourable, creates an impact on work-related outcomes such as performance and satisfaction (Steelman *et al.*, 2004). OLM workers typically expect requesters to provide feedback about why their work is rejected or accepted (Liu *et al.*, 2023). Feedback plays a more critical role in OLMs because it allows the hiring of efficient workers based on their previous ratings and guarantees future selection by creating mutual trust (Kokkodis and Ipeirotis, 2015). OLM workers face constant pressure to maintain a good reputation and higher ratings (Ellmer and Reichel, 2018). Workers with consistently lower ratings or a larger number of rejections may need to exert more effort to overcome the bad ratings. Therefore, workers who receive negative feedback are more likely to experience work overload resulting in a P–J misfit. Thus, the following hypothesis is proposed:

*H4a: In OLMs, feedback is positively associated with work overload.*

In OLMs, direct feedback is considered essential because receiving approval for work is a prerequisite for payment. Feedback can take various forms, including notification of acceptance, rating of quality of work, and individual feedback from the requester (Durward *et al.*, 2020). However, feedback is sometimes a source of worry because workers feel punished for factors beyond their control in OLMs (Bajwa, Knorr, *et al.*, 2018). Specifically, unfair rejection is a major risk that workers experience (McInnis *et al.*, 2016). Furthermore, when workers get negative or insufficient feedback, this raises the threat of job insecurity because the probability of their future selection for a task is reduced, making continuity of work on the platform less viable (Wood *et al.*, 2019a). In MTurk, most employers use filters to screen workers to ensure that workers with low acceptance rates and below a specified percentage cannot view their tasks, thus limiting task availability (Lovett *et al.*, 2018). Therefore, workers who receive negative feedback are more likely to experience stress and a P–J misfit. Hence, the following hypothesis is suggested:

*H4b: In OLMs, feedback is positively associated with job insecurity.*

### *4.3.3 Technostressors, Strain and Outcomes*

In this study, the primary emphasis is on two technostressors: work overload and job insecurity. Due to algorithmic control and user-interaction mechanisms in OLMs, the work can be highly intense despite workers being given the flexibility and choice to manage tasks. Workers experience high levels of competition, as maximising the number of tasks requires completion as quickly as possible, increasing work overload (Wood *et al.*, 2019a). The stressors, such as work overload, are associated with strain as they compel one to work faster and to process excessive information, resulting in exhaustion (Karasek, 1979; Tarafdar *et al.*, 2007). Thus:

*H5: In OLMs, work overload is positively associated with strain.*

Research demonstrates that job insecurity is strongly linked to work-related well-being (Freni-Sterrantino and Salerno, 2021; Karasek, 1979) as it impacts emotional experiences such as worry and results in an immediate unconscious reaction, i.e., strain (Maier, Laumer, Weinert, *et al.*, 2015). In OLMs, constantly finding new tasks under pressure makes workers feel easily replaceable, creating greater job insecurity. Job insecurity is associated with strain because a job is a source of stability and self-efficacy (Ashford *et al.*, 2018; Witte, 1999). Therefore, the following hypothesis is proposed:

*H6: In OLMs, job insecurity is positively associated with strain.*

Once individuals experience strain, they may assess the stressful situation and respond either psychologically by feeling exhausted as a result of using IT, or by showing a behavioural outcome such as withdrawing from the threatening situation (Maier *et al.*, 2015). This study considers cognitive well-being (i.e., overall life satisfaction), positive affective well-being and negative affective well-being as psychological outcomes of strain; and also examines discontinuous intention as a behavioural outcome of strain.

Traditionally the effects of strain outside the workplace are limited but still substantial on life satisfaction (Witte, 1999; Witte *et al.*, 2015). However, OLMs are known for the trade-off between flexibility and the challenges associated with a digital form of work. Existing studies on OLMs report high life satisfaction, even at low income, primarily because of various push and pull motivations to join the platform (Berger *et al.*, 2019; Keith *et al.*, 2019). Strain can create an immediate effect on emotions during and right after a stressful encounter (Lazarus and Folkman, 1987). Prior studies have linked job stressors to a wide range of positive and negative affective states at work, such as enthusiasm, happiness, fear and anxiety (Anderson *et al.*, 2015; Paul *et al.*, 2000). While all workers experience emotions at work, the unique environment of OLMs makes workers more prone to intense and oscillating experiences within a short time. For instance, negative emotions may arise due to financial instability, identity issues, work transience and unpredictability (Ashford *et al.*, 2018; Petriglieri *et al.*, 2018). However, the work environment in OLMs also emphasises the positive emotions accompanied by these challenges. For example, a worker who is consistently earning a low wage may feel frustrated but is likely to continue working for the same requester because it gives a feeling of accomplishment.

Prior research has established that strain can lead to behavioural outcomes such as turnover and lower productivity (Ragu-Nathan *et al.*, 2008; Tarafdar *et al.*, 2007). In the context of social media, constant negative feelings lead to avoiding a situation's recurrence, which results in discontinuous intention (Maier *et al.*, 2015). Similarly, in OLMs constant strain may result in workers ceasing to work for a particular requester or platform. Since most workers depend on OLMs for income, a better understanding of both psychological and behavioural outcomes is necessary. Based on the technostress process described in Figure I, the following hypotheses are proposed:

*H7: In OLMs, strain is negatively associated with cognitive well-being.*

*H8: In OLMs, strain is negatively associated with positive affective well-being.*

*H9: In OLMs, strain is positively associated with negative affective well-being.*

*H10: In OLMs, strain is positively associated with discontinuous intention.*

# 4.4 Research Methodology

## *4.4.1 Data Collection*

**Participant Recruitment:** The data was collected through a survey via MTurk by following the guidelines for conducting behavioural research (Kaplan *et al.*, 2018; Mason and Suri, 2012). A sample consisting of 366 workers was recruited to perform this survey, which was posted as a human intelligence task (HIT) on MTurk with a clear description. Workers were able to click on a web link which redirected them to the online survey hosted through the Qualtrics platform. The data was collected from both Master[6] and regular workers. This study staggered the release of HITs to recruit workers with varying numbers of HITs previously completed. Starting with qualifying workers who have completed 10,000 HITs, gradually the criteria were reduced, and the HITs were made available to

[6] An MTurk Master Worker is someone who has consistently demonstrated a high degree of success in performing a wide range of HITs across a large number of requesters.

workers who have completed at least 5000, 1000, 500 and 100 HITs. The HIT approval rate was initially set at 98% and then slowly reduced to 96% to create more diversity in data and to increase the chance of participation. Generally, setting HIT approval rate at 95% can produce high-quality data (Hunt and Scheetz, 2019).

**Duration:** The data was collected for 15 days, including weekends, between the months of May and June in 2020. The survey was administered in six batches at various times each day (starting time in Pacific Daylight Time, PDT: 2 am, 6 am, 10 am, 2 pm, 6 pm and 10 pm). Batches of HITs were posted each day by moving the above timings ahead by one hour to collect the data throughout the entire 24-hour period on MTurk. This approach was employed because researchers have indicated a difference in the online sample across the time of the day. In addition, workers' participation in online studies can impact task performance as people have different experiences and personality profiles (Arechar *et al.*, 2017).

**Remuneration:** Before running the experiment, a test run was conducted. Two experienced workers reviewed the survey critically. The feedback recommended no significant changes besides a minor design issue which was corrected. As well as the HIT payment, a bonus of US$5 was paid to them. The compensation rate for the HIT was determined by considering the time estimated to complete the HIT and the US minimum wage (i.e., US$7.25 per hour). The payment for the HIT was estimated considering US$10 per hour, which is higher than the US minimum wage. Consequently, the payment was set to US$2.50 for the 15 minutes HIT.

**Data Quality:** MTurk is a popular tool for data collection. Nevertheless, researchers have raised some concerns over its data quality (Lovett *et al.*, 2018). Therefore, appropriate measures were taken to minimise the risk of low-quality data. First, to assess workers who may be using form-filling software or bots to complete surveys quickly, reCAPTCHA was used at the start of the survey to identify whether the activity on the screen was produced by a human or a computer program such as a bot. Second, instructed-response items were used to address the issue of spam individuals. Two attention-check items with an obvious correct response were included, embedded at different points in the survey. In addition, a single data quality item was included, as suggested by Brawley (2017).

### *4.4.2 Measures*

The measurement items were adopted from well-established existing literature to enhance validity. However, where needed, the wording of the items was slightly modified to fit research context. For example, employers and tasks were referred to as requesters and HITs, respectively, and workers were instructed to base their answers on their "job" or "work" on their "use of MTurk" as suggested by earlier research in MTurk (Brawley, 2016; Brawley, 2017). IT complexity, IT presenteeism, work overload, job insecurity and strain were measured by the items given by Ayyagari *et al.* (2011). IT complexity measures were reverse coded (i.e., higher scores on these items imply lower complexity), as used by

Ayyagari (2011). Job autonomy was measured using items given by Ahuja *et al.* (2006). Feedback was measured using items given by Steelman *et al.* (2004). The dependent variable cognitive well-being was measured using items given by Diener *et al.* (1985). Job-related affective well-being was measured through the scale used by Anderson (2015), including positive affective well-being (PAWB) and negative affective well-being (NAWB). Discontinuous intention was measured using the items given by Turel (2014). The measures for all constructs, the source and the response scale are shown in detail in Table 8.1. Note that participants were instructed that for the purpose of this study references to your 'job' and your 'work' referred to the use of MTurk. Therefore, each set of questions started with "Considering MTurk work".

The research model also included several control variables within the model that have been shown to potentially influence the hypothesised relationships. Therefore, the study controlled for individuals' gender, age, education level, MTurk experience and IT use. Furthermore, the study also controlled social desirability bias, i.e., the tendency of individuals to give socially desirable responses, which is usually a concern in self-report surveys (Kwak *et al.*, 2021), measured as true and false on the scale given by Reynolds (1982).

### *4.4.3 Data Filtering and Sample Size*

The analysis started by looking at evidence for the use of bots as, lately, there have been concerns about a "bot panic", i.e., automated programs mimicking human behaviour on MTurk (Dreyfuss, 2018). All respondents who were asked to confirm that they were human using the reCAPTCHA passed the test. A total of 474 responses were received in Qualtrics. After eliminating the incomplete responses (41), respondents who failed the attention check (34), unsuccessful data quality tests (6), and multiple submission attempts (27), only 366 responses were suitable for data analysis. The study used Qualtrics built-in IP address feature to minimise the risk of multiple submissions and eliminate any misleading information about location. To determine the adequate sample size requirement, the G* power tool was used (Faul *et al.*, 2009). The proposed sample size had an effect size of 0.15, an alpha of 0.05, and a power of 0.95; the minimum sample size needed was 89 for four independent variables. Thus, the sample size of 366 is sufficient to report findings with confidence.

### *4.4.4 Demographic Profile*

A descriptive analysis was conducted to extract the demographic profile of MTurk respondents. The sample included 63.39% men and 36.61% women. The top two countries from which MTurk workers completed the survey were the US (72.13%) and India (23.49%) followed by Brazil, Italy, Ireland, Pakistan, Thailand, Singapore, North Macedonia, Canada and Germany. The dominance of the US and India among the worker population is well-documented in the literature (Berg *et al.*, 2018). Table 4.1 shows the demographic profile of participants.

**Table 4.1: Demographic profile of participants (*n*=366)**

| Variable | Category | Frequency (*n*) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 232 | 63.39% |
| | Female | 134 | 36.61% |
| Age | 18-24 years | 17 | 4.64% |
| | 25-30 years | 90 | 24.59% |
| | 31-40 years | 146 | 39.89% |
| | 41-50 years | 75 | 20.49% |
| | 51-60 years | 31 | 8.47% |
| | Greater than 60 | 7 | 1.91% |
| Education Level | Some High School | 1 | 0.27% |
| | High School | 35 | 9.56% |
| | Some College | 45 | 12.30% |
| | Associate Degree | 35 | 9.56% |
| | Bachelor's Degree | 200 | 54.64% |
| | Master's Degree | 43 | 11.75% |
| | Advanced Graduate Work or PhD | 7 | 1.91% |
| MTurk Experience | Less than 1 year | 38 | 10.38% |
| | 1 to 2 years | 49 | 13.39% |
| | 3 to 4 years | 99 | 27.05% |
| | 5 or more years | 180 | 49.18% |
| MTurk Status | Regular Status | 141 | 38.52% |
| | Master Status | 225 | 61.47% |

## 4.5 Results and Data Analysis

This section represents the results of common method bias and non-response bias followed by primary analysis.

### *4.5.1 Common Method Bias and Non-response Bias*

All the measured variables were tested for *common method bias* (CMB) since the data were self-reported and collected from a single source. The extent of common method bias was assessed using two approaches. First, Harman's one-factor test was performed by including all items in principal components factor analysis (Podsakoff *et al.*, 2003). Evidence for common method bias exists when one factor accounts for most of the covariance (i.e., explained variance > 50%). The specified 'one factor' explained 17% variance, and hence the data do not indicate evidence of common method bias. Second, CMB was tested based on variance inflation factors (VIF), as suggested by Kock (2015). The highest VIF value was for work overload and strain, i.e., 1.741. The occurrence of a VIF greater than 3.30 for any latent variable indicates CMB may contaminate the model. The model indicates values lower than 3.30; thus, the model is considered free of CMB.

As the data was collected through a survey, the presence of non-response bias can be an issue regardless of the response rate achieved. To test for non-response bias, wave analysis was performed and compared the late responders to the early responders (Atif *et al.*, 2012; Lewis *et al.*, 2013). The response variation was assessed by comparing the means of the first and the last 50 responders using the sample t-test method. No significant differences in the set of comparisons were found; thus, non-response bias was deemed not to be a significant issue (see Table 8.2).

## 4.5.2 *Structural Equation Modelling*

Next, structural equation modelling (SEM) using partial least squares (PLS) was used to test the proposed research model with the help of SmartPLS software v.3.3.3 (Ringle *et al.*, 2015). As a second-generation SEM technique, PLS has been used for modelling causal networks of effects simultaneously, and it is of much value in behavioural research (Lowry and Gaskin, 2014). The SEM analysis is conducted following a two-stage analytical procedure (Hair *et al.*, 2014). The first stage assessed the measurement model for reliability and validity. The second stage evaluated the structural model to test the research hypotheses.

**Table 4.2: Item loadings and descriptive statistics**

| Construct | Item | Loading | Mean | Median | Standard Deviation |
|---|---|---|---|---|---|
| IT Complexity | ITC1 | 0.891 | 6.006 | 6 | 0.869 |
| | ITC2 | 0.914 | 5.937 | 6 | 0.964 |
| | ITC3 | 0.879 | 5.898 | 6 | 0.952 |
| IT Presenteeism | ITP1 | 0.728 | 5.788 | 6 | 1.045 |
| | ITP2 | 0.833 | 5.890 | 6 | 1.009 |
| | ITP3 | 0.902 | 5.956 | 6 | 0.989 |
| | ITP4 | 0.889 | 5.915 | 6 | 0.942 |
| Job Autonomy | AU3 | 0.852 | 5.573 | 6 | 1.376 |
| | AU4 | 0.885 | 5.171 | 5 | 1.627 |
| Feedback | UF1 | 0.825 | 3.733 | 4 | 1.857 |
| | UF2 | 0.810 | 4.849 | 5 | 1.645 |
| | UF3 | 0.808 | 4.860 | 5 | 1.581 |
| | UF4 | 0.821 | 4.758 | 5 | 1.549 |
| Work Overload | WO1 | 0.889 | 3.019 | 3 | 1.680 |
| | WO2 | 0.924 | 3.193 | 3 | 1.754 |
| | WO3 | 0.939 | 3.047 | 3 | 1.743 |
| Job Insecurity | JI1 | 0.870 | 3.992 | 4 | 1.629 |
| | JI2 | 0.923 | 3.190 | 3 | 1.653 |
| Strain | STR1 | 0.937 | 3.141 | 3 | 1.499 |
| | STR2 | 0.951 | 3.107 | 3 | 1.513 |
| | STR3 | 0.939 | 3.281 | 3 | 1.590 |
| | STR4 | 0.928 | 3.220 | 3 | 1.628 |
| Cognitive Well-being | CW1 | 0.942 | 4.546 | 5 | 1.777 |
| | CW2 | 0.914 | 4.686 | 5 | 1.738 |
| | CW3 | 0.930 | 4.857 | 5 | 1.828 |
| | CW4 | 0.882 | 4.658 | 5 | 1.790 |
| | CW5 | 0.817 | 3.868 | 4 | 2.027 |
| Positive Affective Well-being | PA1 | 0.807 | 3.358 | 3 | 0.953 |
| | PA2 | 0.786 | 3.438 | 3 | 1.046 |
| | PA3 | 0.894 | 3.063 | 3 | 1.085 |
| | PA4 | 0.899 | 3.234 | 3 | 1.080 |
| | PA5 | 0.867 | 3.039 | 3 | 1.175 |
| Negative Affective Well-being | NA1 | 0.853 | 2.562 | 3 | 0.984 |
| | NA2 | 0.829 | 2.025 | 2 | 0.989 |
| | NA3 | 0.814 | 2.240 | 2 | 1.106 |
| | NA4 | 0.852 | 2.504 | 3 | 1.129 |
| | NA5 | 0.673 | 2.523 | 3 | 1.076 |
| Discontinuous Intention | DI1 | 0.929 | 1.796 | 1 | 1.692 |
| | DI2 | 0.942 | 1.658 | 1 | 1.514 |
| | DI3 | 0.936 | 1.678 | 1 | 1.551 |

## 4.5.3 *Measurement Model*

First, the path modelling procedure was carried out by calculating the PLS algorithm with a maximum of 300 iterations (with the path weighting scheme as a weighting method) to evaluate the measurement model. As all constructs in the model were reflective, the procedures recommended by Hair *et al.* (2019) were followed. To ensure the reliability and validity of the measurement model, indicator loadings, internal consistency reliability, convergent validity and discriminant validity were assessed (Hair *et al.*, 2019). The first step requires measuring indicator loadings. Loadings above 0.7 are recommended as a benchmark. For a few items, outer loadings were below the threshold and were eliminated. Therefore, two items from job autonomy and one from job insecurity were removed (see Table 8.1). Each of the measurement items had a significant loading ($p < 0.01$) on the respective latent construct, which was below the 0.05 threshold proposed by Gefen and Straub (2005). Table 4.2 shows all item loadings.

In the second step, composite reliability (CR) was used to measure reliability (CR > 0.7). The results indicate that the CR for all the variables is greater than 0.7, indicating good internal consistency. In addition, Cronbach's alpha $\alpha$ was used to check the internal consistency reliability ($\alpha > 0.7$). The results indicate $\alpha$ above the threshold value for all the variables except job autonomy, which showed marginally low consistency reliability ($\alpha = 0.676$). However, studies support $\alpha = 0.6$ as an acceptable threshold (Kim *et al.*, 2009; Taber, 2018).

The third step involved measuring the convergent validity of each construct measure. For this purpose, average variance extracted (AVE) was used to verify each construct, which in this case was greater than 0.5 for all variables. In sum, the model's convergent validity could be established. Table 4.3 shows reliability and validity of each construct.

**Table 4.3: Construct reliability and validity**

| **Construct** | **Cronbach's Alpha** | **Composite Reliability** | **Average Variance Extracted (AVE)** |
|---|---|---|---|
| IT Complexity | 0.876 | 0.923 | 0.800 |
| IT Presenteeism | 0.877 | 0.905 | 0.707 |
| Job Autonomy | 0.677* | 0.860 | 0.755 |
| Feedback | 0.854 | 0.889 | 0.666 |
| Work Overload | 0.905 | 0.941 | 0.841 |
| Job Insecurity | 0.760 | 0.892 | 0.805 |
| Strain | 0.955 | 0.967 | 0.881 |
| Cognitive Well-being | 0.940 | 0.954 | 0.806 |
| Positive Affective Well-being | 0.906 | 0.929 | 0.725 |
| Negative Affective Well-being | 0.864 | 0.903 | 0.651 |
| Discontinuous Intention | 0.929 | 0.955 | 0.876 |

* Slightly lower than the threshold of 0.7

The fourth step was to assess the discriminant validity, which is the extent to which a construct is empirically distinct from other constructs in the model. Traditionally used criteria, as proposed by Fornell and Larcker (1981), is to measure the square root of AVE of each latent variable that should be higher than the correlations among the latent variable. In Table 4.4, Fornell–Larcker criterion off-diagonal values represent the correlation coefficients between potential constructs, and the diagonal values represent the square root of the AVE value of each construct. Cross-loading factors are also used to test a reflective measurement model's discriminant validity. Table 8.3 reports the cross-loading factors among the measured items, indicating that each indicator loading is higher than its cross-loadings. In addition, heterotrait–monotrait ratio (HTMT) of the correlations was utilised to assess further discriminant validity (Henseler *et al.*, 2015). The highest absolute HTMT value for the measures was 0.75, which satisfies the threshold of maximum 0.85. In summary, results show the data passes reliability and validity evaluation (see Table 4.5). Moreover, the variance inflation factor (VIF) was used to assess the concern of possible multicollinearity for the structural model. The results reveal each VIF < 3, as recommended by Hair *et al.* (2019). Thus, multicollinearity was not an issue in this study.

**Table 4.4: Discriminant validity: Fornell–Larcker criterion**

| | IT Complexity | IT Presenteeism | Job Autonomy | Feedback | Work Overload | Job Insecurity | Strain | Cognitive Well-being | Positive Affective Well-being | Negative Affective Well-being | Discontinuous Intention |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IT Complexity | **0.895** | | | | | | | | | | |
| IT Presenteeism | 0.560 | **0.841** | | | | | | | | | |
| Job Autonomy | 0.200 | 0.149 | **0.869** | | | | | | | | |
| Feedback | -0.005 | 0.013 | 0.046 | **0.816** | | | | | | | |
| Work Overload | -0.211 | -0.196 | -0.068 | 0.271 | **0.917** | | | | | | |
| Job Insecurity | -0.163 | -0.081 | -0.036 | 0.203 | 0.619 | **0.897** | | | | | |
| Strain | -0.285 | -0.180 | -0.018 | 0.213 | 0.698 | 0.571 | **0.939** | | | | |
| Cognitive Well-being | 0.107 | -0.022 | 0.206 | 0.187 | 0.017 | -0.039 | -0.108 | **0.898** | | | |
| Positive Affective Well-being | 0.164 | 0.065 | 0.182 | 0.225 | 0.049 | -0.026 | -0.064 | 0.580 | **0.852** | | |
| Negative Affective Well-being | -0.195 | -0.091 | -0.149 | 0.091 | 0.456 | 0.362 | 0.549 | -0.357 | -0.410 | **0.807** | |
| Discontinuous Intention | -0.207 | -0.241 | -0.055 | 0.231 | 0.470 | 0.355 | 0.489 | 0.159 | 0.108 | 0.339 | **0.936** |

Note: Numbers in bold are the square root of the AVE value for each variable.

**Table 4.5: Heterotrait–monotrait ratio (HTMT)**

| | IT Complexity | IT Presenteeism | Job Autonomy | Feedback | Work Overload | Job Insecurity | Strain | Cognitive Well-being | Positive Affective Well-being | Negative Affective Well-being |
|---|---|---|---|---|---|---|---|---|---|---|
| IT Presenteeism | 0.637 | | | | | | | | | |
| Job Autonomy | 0.260 | 0.208 | | | | | | | | |
| Feedback | 0.063 | 0.136 | 0.085 | | | | | | | |
| Work Overload | 0.234 | 0.185 | 0.086 | 0.251 | | | | | | |
| Job Insecurity | 0.189 | 0.088 | 0.116 | 0.220 | 0.738 | | | | | |
| Strain | 0.309 | 0.166 | 0.035 | 0.184 | 0.749 | 0.659 | | | | |
| Cognitive Well-being | 0.119 | 0.049 | 0.254 | 0.175 | 0.064 | 0.078 | 0.116 | | | |
| Positive Affective Well-being | 0.184 | 0.099 | 0.233 | 0.217 | 0.092 | 0.040 | 0.090 | 0.624 | | |
| Negative Affective Well-being | 0.219 | 0.104 | 0.195 | 0.121 | 0.511 | 0.437 | 0.597 | 0.398 | 0.467 | |
| Discontinuous Intention | 0.226 | 0.229 | 0.075 | 0.201 | 0.509 | 0.413 | 0.518 | 0.169 | 0.119 | 0.376 |

### *4.5.4 Structural Model*

To test the structural model, the path-coefficients, the *t*-values of the variables and their statistical significance (*p*-values) were assessed using the bootstrap re-sampling method with 5000 samples. The results indicate that from the technology characteristics, IT complexity was significantly positively associated with both technostressors, i.e., work overload supporting *H1a* ($t = 2.698$; *p*-value < 0.01) and job insecurity *H1b* ($t = 2.849$; *p*-value < 0.01). In terms of job characteristics, only feedback was significantly positively associated with work overload, supporting *H4a* ($t = 5.019$; *p*-value < 0.001) and job insecurity *H4b* ($t = 3.311$; *p*-value < 0.01). IT presenteeism and job autonomy showed no significant relationship with either technostressor. Therefore, none of hypotheses *H2a*, *H2b*, *H3a* or *H3b* are supported. Both the work overload and job insecurity technostressors showed a significantly positive relationship with strain ($t = 8.629$; *p*-value <0.001 and $t = 3.865$; *p*-value <0.001 respectively), supporting *H5* and *H6*. Among the dependent variables, strain had a significantly positive relationship with negative affective well-being ($t = 8.445$; *p*-value < 0.001) and discontinuous intention ($t = 9.954$; *p*-value <0.001). Therefore, hypotheses *H9* and *H10* are supported. However, strain had no significant relationship with cognitive well-being or positive affective well-being, so hypotheses *H7* and *H8* are rejected. A summary of results along with path-coefficients, *t*-values and *p*-values in provided in Table 4.6 below.

**Table 4.6: Results for hypotheses**

| Hypothesis | Path | Coefficient | *t*-value | *p*-value | Decision |
|---|---|---|---|---|---|
| *H1a* | IT Complexity → Work Overload | -0.150 | 2.698 | 0.007** | Supported |
| *H1b* | IT Complexity → Job Insecurity | -0.173 | 2.849 | 0.004** | Supported |
| *H2a* | IT Presenteeism → Work Overload | -0.100 | 1.916 | 0.055 | Not supported |
| *H2b* | IT Presenteeism → Job Insecurity | 0.035 | 0.546 | 0.585 | Not supported |
| *H3a* | Job Autonomy → Work Overload | -0.030 | 0.555 | 0.579 | Not supported |
| *H3b* | Job Autonomy → Job Insecurity | -0.020 | 0.320 | 0.749 | Not supported |
| *H4a* | Feedback → Work Overload | 0.240 | 5.019 | 0.000*** | Supported |
| *H4b* | Feedback → Job Insecurity | 0.179 | 3.311 | 0.001** | Supported |
| *H5* | Work Overload → Strain | 0.531 | 8.629 | 0.000*** | Supported |
| *H6* | Job Insecurity → Strain | 0.203 | 3.865 | 0.000*** | Supported |
| *H7* | Strain → Cognitive Well-being | -0.040 | 0.709 | 0.478 | Not supported |
| *H8* | Strain → Positive Affective Well-being | -0.010 | 0.199 | 0.842 | Not supported |
| *H9* | Strain → Negative Affective Well-being | 0.448 | 8.445 | 0.000*** | Supported |
| *H10* | Strain → Discontinuous Intention | 0.460 | 9.954 | 0.000*** | Supported |

**p*-value < 0.5; ***p*-value < 0.01; ****p*-value < 0.001

The commonly used measure to evaluate the structural model is the coefficient of determination $R^2$ value, which explains the model's predictive power (Hair *et al.*, 2019). In terms of the model's predictive power ($R^2$), technology and job characteristics explained 22% of the variance in work overload and 13% in job insecurity. Both technostressors explained a variance of 55% on strain. The explained variance on dependent variable negative affective well-being is 39% and on discontinuous intention was 29%.

Next, the effect sizes $f^2$ for each path model were calculated. As a rule of thumb, values of 0.02, 0.15, and 0.35 are interpreted as small, medium and large effects (Hair, 2019). The $f^2$ values for *H1a*, *H1b*, *H4a* and *H4b* are 0.020, 0.022, 0.072 and 0.036 respectively, indicating a weak effect. The $f^2$ values of *H2a*, *H2b*, *H3a* and *H3b* showed no effect as values were below 0.02. For both technostressors, the effect sizes $f^2$ indicate large effect for *H5* (0.362) and weak effect for *H6* (0.056). The effect sizes $f^2$ indicate medium effect of strain on two outcomes as the values for *H9* and *H10* were 0.279 and 0.255, respectively. The effect size $f^2$ of strain indicates no effect on outcomes *H7* and *H8* as the values were below 0.02.

Calculating the cross-validated redundancy $Q^2$ is another means to assess model's out-of-sample predictive power or predictive relevance (Hair *et al.*, 2019). As a rule of thumb, $Q^2$ values larger than zero for a particular endogenous construct indicate the path model's predictive relevance for that construct (Hair *et al.*, 2019). In the model, all the values were above 0, supporting the predictive relevance of the constructs. The $Q^2$ values for both technostressors work overload and job insecurity were 0.098 and 0.045, respectively, and the $Q^2$ value for strain was 0.452. The $Q^2$ values for the outcomes negative affective well-being, discontinuous intention, cognitive well-being and positive affective well-being were 0.192, 0.205, 0.009 and 0.002, respectively.

Finally, of the control variables, social desirability was related to cognitive well-being, positive affective well-being and negative affective well-being. The demographic controls of gender and age were not significantly related to any construct.

### *4.5.5 Post-hoc Analysis*

In the technostress process, technostressors create a mediating pattern between environmental antecedents and strain. Early research has established that the translation of technostressors into workplace outcomes is through mediation like appraisal and coping (Gaudioso *et al.*, 2017; Lazarus and Folkman, 1987; Pflügner, Maier and Weitzel, 2021). For a deeper interpretation of these findings, the study examined the mediating effect of technostressors (work overload and job insecurity) between antecedents (technology and job characteristics) and strain, in a post-hoc analysis. To estimate the mediating effect, the method suggested by Zhao *et al.*(2010) was followed. For the mediation analysis, if the corresponding indirect effect is significant then mediation is present. However, direct effects must be examined to establish the type of mediation. The mediation effects can be "indirect-only" ("full mediation" in terms of Baron and Kenny (1986), "competitive mediation", or "complementary mediation" ("partial mediation" in terms of Baron and Kenny (1986). Competitive mediation occurs when both the indirect effect and direct effect are significant and point in opposite directions, while complementary mediation occurs when both indirect and direct effect are significant and point in the same direction (Hair *et al.*, 2014).

The results indicate that technostressors provide partial complementary mediation between IT complexity and strain since indirect and direct effects are significant and point in the same direction. The direct effect of feedback on strain is not significant; therefore, the study concludes that technostressors fully mediate the relationship between feedback and strain. The results show that strain also plays a mediating role between technostressors and outcomes. Specifically, strain provides a partial complementary mediation between work overload and outcomes (negative affective well-being and discontinuous intention). Since the direct effect of job insecurity on outcomes (negative affective well-being and discontinuous intention) is not significant, the study concludes that strain fully mediates this relationship. In terms of IT presenteeism and job autonomy, there was no evidence of technostressors providing a mediation effect. Similarly, there was no evidence of strain providing a mediation effect between technostressors and cognitive well-being or positive affective well-being. Table 4.7 details the results of both direct and indirect mediating effects with *t*-values and path-coefficients.

**Table 4.7: Mediating effects**

| Indirect path | Indirect effect ($p_1.p_2$) | Indirect *t*-value | Direct effect ($p_3$) | Direct *t*-value | Mediation |
|---|---|---|---|---|---|
| IT Complexity → Work Overload → Strain | -0.0739 | 2.5691* | -0.1353 | 3.7707*** | Partial Mediation |
| IT Complexity → Job Insecurity → Strain | -0.0338 | 2.1881* | -0.1353 | 3.7707*** | Partial Mediation |
| Feedback → Work Overload → Strain | 0.1197 | 3.9231*** | 0.0333 | 0.7332 | Full Mediation |
| Feedback → Job Insecurity → Strain | 0.0355 | 2.6752** | 0.0333 | 0.7332 | Full Mediation |
| Work Overload → Strain → Negative Affective Well-being | 0.1618 | 3.5838*** | 0.1673 | 2.1715* | Partial Mediation |
| Work Overload → Strain → Discontinuous Intention | 0.1568 | 3.9292*** | 0.1790 | 2.9282** | Partial Mediation |
| Job Insecurity → Strain → Negative Affective Well-being | 0.0644 | 3.0501** | 0.0125 | 0.2292 | Full Mediation |
| Job Insecurity → Strain → Discontinuous Intention | 0.0624 | 3.1667** | 0.0379 | 0.7080 | Full Mediation |

**p*-value < 0.05; ***p*-value < 0.01; ****p*-value < 0.001

## 4.6 Discussion

This study examined technostress from the theoretical perspective of person–environment fit and job characteristics theory in the context of OLMs. Specifically, a research model was proposed to investigate how technology and job characteristics jointly influence technostressors, strain and their outcomes.

First, the relationship between technology characteristics (IT complexity and IT presenteeism) and technostressors (work overload and job insecurity) was analysed. The results indicate that only IT complexity is significantly associated with both technostressors. In contrast, previous literature on technostress shows that in both traditional work and telework settings, IT complexity and work overload tend not to be correlated (Ayyagari *et al.*, 2011; Suh and Lee, 2017). This difference is linked to the competitive nature of OLM work, where increased effort is required to deal with work demands and the complexity of specific technologies. Workers in such platforms frequently need to develop new skills beyond their regular tasks, which in turn may enhance work overload. For example, in platforms like MTurk, workers often develop sophisticated user scripts to secure the best-paying tasks (Berg *et al.*, 2018). The P–E misfit increases when workers are required to spend time and effort meeting work demands imposed by IT, such as to do more in less time.

The results reveal that IT complexity impacts job insecurity. Failure to learn and to manage time places workers at risk of losing well-paying tasks to their counterparts. Moreover, previous technostress studies have focused on the general use of IT (Ayyagari *et al.*, 2011; Suh and Lee, 2017), while this study specifically focuses on platform work-related IT use. In contrast to previous literature, the findings of this study indicate that IT presenteeism showed no significant relationship with technostressors. One possible explanation for this result stems from the higher temporal flexibility these platforms offer. OLM workers have a choice to reschedule tasks at their convenience, unlike in the traditional work environment. A second explanation is that this research indicates the largest group of participants as individuals in their late twenties (24.59%) and mid-thirties (39.89%) with a high level of formal education. These respondents generally exhibit greater familiarity and proficiency with digital technology compared to older participants. According to Vogels (2019), different generations exhibit varying levels of technology usage. Younger users such as millennials rely heavily on digital technology and have positive experiences with its use. Conversely, older users face distinct obstacles when it comes to adopting new technologies, ranging from a lack of confidence in using unfamiliar devices to physical difficulties in manipulating various digital tools. Therefore, IT presenteeism may not be an issue for the sample in this study.

The next aspect of the analysis was the examination of the relationship between job characteristics (job autonomy and feedback) and technostressors. In this study, job autonomy was not significantly related to either technostressor. OLMs facilitate workers with a certain job autonomy, as they are free to set their own schedule and less likely to experience a P–J misfit. This result is in line with previous research findings where there is no association between work overload and job autonomy for teleworkers (Suh and Lee, 2017). One possible explanation for the non-significant relationship is the impact of the COVID-19 pandemic and its repercussions. The data for this study was gathered during the COVID-19 lockdown. The relationship between job autonomy and work overload is contingent on the work environment – the initial phase of the pandemic led to reduced demand and a decline in work opportunities, which gradually recovered over time (Stephany *et al.*, 2020). OLM workers do not possess a traditional worker–employer relationship, as they have a choice as to which tasks to accept. For this reason, workers' job autonomy is less likely to impact job insecurity.

Feedback showed a significant relationship with both work overload and job insecurity. This finding is explained in terms of the feedback mechanism in OLMs, where approval ratings create pressure on workers. For example, if a worker gets two rejections, their approval rating will automatically drop. To address this, workers might work harder and longer to minimise the rejection effect. This effort to catch up with more high-paying HITs can potentially enhance work overload. The feedback will impact job insecurity because low approval ratings can make workers feel easily replaceable. Requesters prefer workers who possess high scores or appear on top in search results due to platform algorithms. Insecurity around ratings can be stressful for workers because algorithms filter work away from workers with low ratings (Wood *et al.*, 2019a). This result is consistent with the OLM literature, which highlights that reputation mechanisms influence the probability of future task selection (Kokkodis and Ipeirotis, 2015).

The results indicate that approximately 55% of the variance in strain is explained by the proposed technostressors. This validates the view that work overload and job insecurity are noteworthy technostressors in OLM. The study investigated the impact of strain on outcomes such as cognitive well-being, positive affective well-being, negative affective well-being and discontinuous intention. The findings indicate that strain has no significant relationship with cognitive well-being or positive affective well-being. This result indicates that the strain of OLM work is less likely to impact cognitive well-being of workers. In contrast, the relationship between strain and worker well-being is more pronounced in traditional forms of work (Witte *et al.*, 2015). The impact of these platforms on cognitive well-being may be low as many workers join these platforms to earn additional income. For others, OLM work represents their primary source of income. Thus, OLM workers are not a homogeneous group. Workers in both categories are likely to experience different outcomes such as life satisfaction, job satisfaction and turnover based on their push and pull motivations and the seriousness with which they regard their work (Brawley, 2017; Keith *et al.*, 2019).

The technostress phenomenon is aligned with research into the dark side of technology, as negative outcomes are likely. However, recent research suggests that technostress can also cultivate positive experiences, such as arousal and challenging situations (Califf and Springer, 2022). The findings indicate the strain due to platform work is less likely to impact positive affective well-being. Despite experiencing strain, workers may demonstrate positive emotions. For example, a worker may experience strain because of HIT rejection but simultaneously be happy to contribute to an exciting project. This builds upon previous research that portrays gig work as a form of emotional labour, where strain may result in dire outcomes for some workers but be quite positive for others, e.g., suppressing emotions versus developing resilience (Ashford *et al.*, 2018; Kaplan *et al.*, 2018). However, strain will directly influence negative affective well-being linked to an increase in unpleasant emotions. Low-paying tasks and rejections, frequent on these platforms, are usually a source of frustration, and may directly influence workers' negative emotions (Ashford *et al.*, 2018; Kaplan *et al.*, 2018). The presence of strain can also provoke behaviours such as discontinuous intention. The study results show that strain is significantly associated with discontinuous intention. In OLMs discontinuous intention may not necessarily result in actual turnover, as there are fewer barriers to quitting than in the traditional setting. Workers can stop working for a specific requester or stop working on the HIT, or in some scenarios, leave the platform altogether (Brawley and Pury, 2016).

These findings suggest that technostress is an evolving concept (Fischer *et al.*, 2021) that needs to be updated as new platforms alter user engagement with their environment. Some of the traditional relationships do not hold in the gig environment, probably because of the unique style of this work environment.

## 4.7 Implications for Theory

This study provides several key research contributions in the domain of OLMs, technostress and IS. First, this study is the first to propose a technostress model in the context of the digital gig economy. It advances an understanding of workers' experiences and well-being in OLMs, an underexplored area. The model provides a foundation with empirical insights to examine the phenomenon of technostress for similar dynamic environments and alternate gig platforms. The current research enhances comprehension of OLMs by going beyond viewing them as an enigmatic phenomenon. Instead, this study builds upon prior studies by carefully examining the various facets of OLMs and how they influence technostress. The results of the present study indicate that the P–E fit theory can provide a valuable understanding of the relevance of gig work experience for workers' well-being. The findings identify IT complexity and feedback as unique characteristics of OLMs, and also a source of technostress. The findings also highlight how OLM work differs from traditional work settings. For example, IT complexity has been shown to have a significant impact on work overload and job insecurity in OLMs.

Second, in the context of technostress, previous IS studies have focused on technology characteristics as an environmental antecedent (Ayyagari *et al.*, 2011). This study expands the technostress literature by investigating the role of job characteristics as an environmental antecedent to determine how they contribute to the technostress process. Specifically, the study finds that negative task feedback prompts perceptions of work overload and job insecurity in OLMs. Previous research has studied the role of technostressors and their impact on work-related outcomes such as job satisfaction, exhaustion and burnout (Ragu-Nathan *et al.*, 2008; Srivastava *et al.*, 2015). However, this study makes a key contribution by expanding technostress outcomes from the subjective well-being perspective. The findings identify negative affective well-being and discontinuous intention as OLM outcomes. Most importantly, prior research has conceptualised technostressors generally as a higher-order construct (aggregated approach), with few studies considering the impact of technostressors at the individual level (disaggregated approach) (Sarabadani *et al.*, 2018; Nastjuk *et al.*, 2023). This research is in line with the recent call to adopt a disaggregated approach to capture the subtlety involved in understanding technostressors. Furthermore, examining technostressors as they relate to individuals enables the development of more nuanced theoretical linkages with important outcomes (Nastjuk *et al.*, 2023).

## 4.8 Implications for Practice

Platform owners or managers and those sourcing crowd-work can use the proposed model to recognise the characteristics that are a source of technostress. Based on the findings, OLMs can take the necessary steps to design their workplace policies and strategies to promote meaningful work. First, the findings indicate that IT complexity was significantly associated with work overload. Platform workers are engaged in multiple tasks as well as non-task-related activities, e.g., monitoring HITs, using scripts, etc. To reduce work overload for workers, requesters can implement several strategies. Requesters should specify task requirements in a way that helps workers to minimise work overload. One option is to create well-designed tasks with clear titles, descriptions, pay and requirements. A second option is to establish reasonable time estimates by setting the time frame for HITs longer than the anticipated completion time. A third option is for requesters to enhance accountability and responsibility by transparently disclosing their identity, thereby enabling workers to spend less time gathering relevant information and verifying the legitimacy of the requester.

As results indicate that IT complexity is related to job insecurity, platforms can develop pre-emptive strategies to mitigate technostress. For example, limiting the number of tasks performed per worker can reduce work overload and increase participation chances. Some platforms have started implementing restrictions that prevent workers from finishing tasks once they reach the platform's limit. For example, MTurk imposes a daily limit of 3800 jobs for workers. At the same time, Prolific employed a mechanism that capped workers' earnings at a specific threshold (Lascău *et al.*, 2022). Meanwhile, platform managers can play a role by ensuring that tasks posted on the platform adhere to realistic guidelines and fair compensation. Additionally, they can provide workers with different types of training to increase the knowledge required to complete work demands.

Second, given the significant and positive relationship between feedback and technostressors, requesters should provide constructive and supportive feedback. Instead of relying on accept or reject notifications, briefly commenting on task performance will improve subsequent task submission and performance. Research suggests that providing feedback during a task enables users to immediately apply the information to the task (Gould *et al.*, 2016; Maior *et al.*, 2018). Requesters should use positive language to encourage workers and clarify task-related questions. Platforms should also take steps to implement positive communication practices. For example, making corrective feedback mandatory after every task and allowing workers to appeal unfair rejections would be useful additions. Finally, platforms must develop efficient attention and time management strategies to relieve IT pressure and strain.

The results indicate that OLM strain is associated with negative affective well-being. Therefore, platforms must identify workers experiencing high levels of negative or low levels of positive emotions to reduce stressors and discourage discontinuation, e.g., allow workers to take frequent breaks without a pay penalty, provide resources and troubleshooting assistance, and arrange regular community/forum events. However, this research is not aimed at criticising these technological work environments. Instead, this research sets a starting point to examine platform workers' health and well-being so that necessary interventions can be designed. By recognising the sources of technostress and taking steps to mitigate its effects, platforms can help the transition to this new form of work, reduce the strain it causes, and maintain worker well-being.

## 4.9 Limitations and Future Research

Like all research, this study is not without limitations that need to be addressed in future studies. The sample may have been biased because the participants were limited to a single platform at a single point in time. The focus of this research is MTurk, but the presence and importance of the factors identified in the model may differ in other platforms. MTurk is a platform with varying tasks, from simple to complex. Some microtasks are short, and a worker may not be exposed to technology for longer than a few minutes, but to earn a decent income they need to spend a long time working on several tasks. As there are many forms of work within the gig economy, the stressors in one context will not necessarily apply in another context. Therefore, the model must be tested in other macro-platform settings for validation, cautiously using results when generalising from one context to another.

This study is cross-sectional in nature which limits the inferences made about causal mechanisms. To advance the causal understanding of how technostressors interact with work characteristics to alter worker outcomes, future research could adopt an experience sampling approach where data is gathered multiple times a day over several days. Such an approach would not only move the understanding from correlation towards causation, but also reveal how daily changes in technostress are linked to changes in state well-being.

Technostress is an established research topic in the IS field. Technostressors may not necessarily always act as a hindrance. In certain situations, they bring personal development and goal attainment through challenge stressors (Benlian, 2020; Tarafdar *et al.*, 2019). Thus, examining how beneficial outcomes can emerge from technostress is worthwhile. Such a line of enquiry is particularly relevant in a gig environment because of the contradictory atmosphere in which it operates. Future research can extend this model by considering job characteristics as antecedents to other technostressors, especially distinguishing between challenge and hindrance technostressors. Another area of future exploration could be to delve into the characteristics of gig workers as they differ in their platform use depending on their motivation (e.g., financial dependence, full-time job, hedonic reasons). Specifically, examining gig worker demographics, personality profiles and computer efficacy as a moderator variable might also provide valuable insights. The study recommends that researchers establish measurement items specific to work environments that better represent OLMs with their unique technostressors.

# Chapter 5

# Examining the Role of Time Pressure on Technostress and Work Outcomes

## 5.1 Introduction

In recent years, especially after the pandemic, *online labour markets (OLMs)* have emerged as an established and thriving work practice (De *et al.*, 2020; Williams *et al.*, 2019). OLMs are websites that facilitate interaction between individuals seeking to purchase or sell cognitive work performed remotely often referred to as digital gig platforms e.g., Amazon Mechanical Turk (MTurk)[7] and Upwork (Horton, 2010; Stephany *et al.*, 2020). The McKinsey Global Institute indicates over 162 million US and European platform workers (Manyika *et al.*, 2016), with estimates that more than half of the total US workforce will engage in platform work by 2027 (Zgola, 2021). While some surveys report that three-in-ten gig workers consider this form of work as their full-time job (Anderson *et al.*, 2021), at least 5% of the workers spend 40 hours or more per week on platform activities (Williams *et al.*, 2019).

Despite exponential growth and opportunities, OLMs working conditions are debatable while some present a favourable view, others depict a more pessimistic outlook (Bajwa, Gastaldo, *et al.*, 2018; Durward *et al.*, 2020; Kuhn and Maleki, 2017; Mäntymäki *et al.*, 2019). Alongside economic precarity (Bajwa, Gastaldo, *et al.*, 2018), financial precarity (Berg, 2016), temporal precarity i.e., "losing the capacity to claim and protect private time" exists in these platforms due to uncertainty and insecurity related to their work schedule and pace of work (Lascău *et al.*, 2022; Ugaz, 2022). OLMs are the prime example of accelerated matching and competition through algorithms (Zheng and Wu, 2022), influencing worker behaviour and its potential impact on worker well-being e.g., stress, anxiety, challenge and productivity (Cram *et al.*, 2022). In OLMs, each task is embedded in a multilateral relationship (Zheng and Wu, 2022) and requires an array of technological artefacts to streamline work (Lehdonvirta, 2018). One issue associated with relying on technology for work is technostress which is understudied in OLMs context.

Technostress is defined as the stimulation of stress due to the use of information technology (IT) creating a negative impact on well-being (Tarafdar *et al.*, 2007). In early literature, technology

[7] MTurk is an online labour market where employers (called requesters) recruit employees (called workers) to complete HITs (Human Intelligence Tasks) for remuneration (called a reward) (Hunt and Scheetz, 2019).

characteristics are presented as a source of technostress (Ayyagari *et al.*, 2011). More recent studies indicate job characteristics (Suh and Lee, 2017; Umair *et al.*, 2023), obligation (Raluca and Hanne, 2020), emotions (Califf and Springer, 2022), mindfulness (Pflügner, Maier and Weitzel, 2021) creating technostress. Along the same line, this study proposes expanding the existing technostress research from a time perspective. Time is a central concept and temporal dimensions of work shape workers' everyday lives with its effects on their health, well-being, and work-life balance (Ugaz, 2022). Time plays a crucial role in OLMs where 'time', 'timing' and 'tempo' constitute the basis of work structure and related experience (Tietze and Musson, 2002; Zheng and Wu, 2022). Workers on OLMs tend to operate with a persistent need to do more in less time often described as a "rat race" (Bajwa, Gastaldo, *et al.*, 2018; Jauch, 2020) which is a source of frustration. Hence, this study proposes that the presence of time pressure is defined as "subjective perceptions that the time to complete one's work is not enough or that in order to complete one's work one needs to work faster than usual" (Stiglbauer, 2018, p. 64) acts as an important environmental antecedent leading to technostress.

Information systems (IS) scholars focus on temporal issues to enhance comprehension of IS phenomena. By considering a time aspect, researchers can gain valuable insights into how IS phenomena evolve and transform within the complex and varying socioeconomic environments in which they operate (Venkatesh *et al.*, 2021). Subjective time pressure exists at the intersection of experience of time and social roles, encompassing the perception of time itself as well as the obligations associated with specific roles to be fulfilled within a defined timeframe. Feelings of time pressure are of greatest theoretical and practical concern when they become characteristic of daily work experience (Kleiner, 2014). Time pressure holds significant importance in all organisations, but its implications are particularly pronounced in OLMs. Workers only get paid after the completion of a relevant task often with no guarantee of acceptance once the explicitly requested task has been successfully finished (Halliday, 2021). Stress due to time pressure tends to escalate as employees perceive inadequate support and lack control over their work processes unlike traditional settings (Arnoldi et al., 2021). OLMs serve as intermediaries that equip individuals with the essential tools and experiences that shape their perception and interpretation of time. Individuals use their own resources to assess whether a particular experience aligns with the typical rhythm and cadence of their daily work (Flaherty, 1991; Lehdonvirta, 2018).

From information systems (IS) perspective there is a lack of knowledge on how time pressure relates to technostressors. To investigate this issue, this research draws on technostress literature, which focuses on recently identified challenge technostressors (creating positive impact) and traditionally developed hindrance technostressors (creating negative impact). Time pressure requires effort and hampers individual well-being (Lazarus and Folkman, 1987; Schilbach *et al.*, 2023). Previous research on organisational stress has identified time pressure as a source of stressor that can cause strain (Doef *et al.*, 2000; Karasek, 1979; Silla and Gamero, 2014). Therefore, this study aims to empirically investigate the relationship between time pressure and technostressors. Consequently, technostressors lead to unique work outcomes such as time distortion defined as “time being out of tune with one’s overall experience”(Blom *et al.,* 2021, p. 2) and influencing employee perceptions of meaningful work in OLMs. Specifically, this study aims to address the following research question:

*How does time pressure affect challenge and hindrance technostressors subsequently create an impact on work outcomes in online labour markets (OLMs)?*

Overall, the paper offers the following contributions. First, the study theorises and validates the role of temporal issues as antecedents and outcomes of the technostress process, a perspective which has not previously been considered in prior technostress works. This study shows that time pressure contributes towards hindrance technostress, but also to challenge technostress which has positive connotations. Also, some of the mechanisms involved in the process underlying the positive effects of technostress are not very clear and call for further attention. Second, the study contributes towards the debate on working conditions of OLMs by addressing the role of time pressure in shaping workers’ experiences and outcomes. Technostress in diverse contexts have shown that the condition is tied to the nature of work and that new forms of work call for new sources of technostress (Cram *et al.*, 2022). This research highlights time pressure as a critical source of technostress in OLMs. Limited research has investigated the implications of OLMs on health and technostress. Third, the findings of the study help OLM workers and other stakeholders develop strategies to mitigate technostress as a practical contribution. The data is collected using a large-scale survey from the widely used digital platform MTurk.

## 5.2 Theoretical Background

### *5.2.1 Technostress*

Technostress has emerged as an important research area in IS that represents well-being related effects of IT use on individuals (Cram *et al.*, 2022; Salo *et al.*, 2019). The term was introduced by Brod (1984) and defined as stress experienced due to the use of IT (Tarafdar *et al.*, 2019). The technostress phenomenon is grounded on the *transactional theory of stress,* which suggests that stress occurs when a person perceives that the demands from their environment exceed their available resources, thus posing a threat to their well-being (Lazarus and Folkman, 1987). In IS literature, technostress is presented as a multi-step process consisting of environmental antecedents, technostressors, appraisal and coping and outcomes (Califf *et al.*, 2020).

Environmental antecedents are workplace conditions that have the potential to create stressful situations e.g., technology demands, role demands, task demands, job conditions or policies (Califf *et al.*, 2020). Ayyagari (2011) identified technology characteristics as primary environmental antecedents. However, more recent work on the topic has highlighted other characteristics as environmental antecedents such as organisational climate, mindfulness, and emotions among others (Fischer and Riedl, 2022; Suh and

Lee, 2017). In context of OLMs, algorithmic control (Cram *et al.*, 2022), feedback and job autonomy (Umair *et al.*, 2023) emerged as a key environmental antecedent.

Technostressors are stimuli or demands appraised by individuals as useful or stressful (Califf *et al.*, 2020). Tarafdar (2007) identified technostressors namely overload, invasion, insecurity, uncertainty, and complexity which are well known in the organisational context. Ayyagari *et al.*, (2011) expanded these previously identified technostressors and suggested role ambiguity and work-home conflict as technostressors. In non-organisational context life comparison discrepancy, online discussion conflicts, and privacy and security uncontrollability emerged as technostressors (Salo *et al.*, 2019). Technostressors vary according to the context in which an individual works and an individual can appraise the same stressor differently (Califf *et al.*, 2020).

Once individuals experience technostressors they evaluate the situation and its significance for their well-being through secondary appraisal and coping. The technostress process seems to be linear, but it is a complex and recursive process with an individual moving back and forth several times (Cram *et al.*, 2022; Lazarus and Folkman, 1987; Tarafdar *et al.*, 2019). In this study, attention is not directed towards secondary appraisal and coping. This choice is made in accordance with the common practice in research by focusing on specific elements within the transaction-based model of stress for simplicity (Cram *et al.*, 2022). Technostressors are further associated with adverse outcomes. The short-term effects of technostressors lead to exhaustion and strain while long-term effects include decreased well-being and burnout (Lazarus and Folkman, 1987).

Early IS research investigating the phenomenon of technostress has focused mostly on negative technostressors in the workplace with unintended consequences for workers and their well-being (Benlian, 2020). However, more recent research highlights that not all technostressors are detrimental to the individual, some have the potential to stimulate and encourage individuals in a positive way (Tarafdar *et al.*, 2019). Drawing on the transactional theory of stress Cavanaugh *et al.*, (2000) developed the *challenge–hindrance stressor model* which sets the basis for understanding challenge and hindrance technostressors. Challenge technostressors are defined as work demands or situations that, although stressful, offer potential benefits for an individual's goal attainment. For example, task complexity provides an opportunity to upgrade skills and competence (Benlian, 2020). Hindrance technostressors are defined as work demands or situations that do not offer any potential benefit but rather restrict or impede an individual's goal attainment. For example, invasion implies monitoring of employees which can generate fears of job insecurity (Tarafdar *et al.*, 2019). In technostress context, researchers have started focusing on understanding technostressors that pose challenges (Benlian, 2020; Califf *et al.*, 2020). However, there is a lack of empirical evidence, indicating a potential for further exploration in this area (Cram *et al.*, 2022).

This study particularly focuses on time pressure as an environmental antecedent that can initiate both challenge and hindrance technostressors in OLMs. Time pressure is a subjective experience that induces stress and creates a need to cope with the limited time (Dóci *et al.*, 2020). Time pressure is widely recognised as a significant job demand in work settings (Bakker and Demerouti, 2007; Bunjak *et al.*, 2023; Schilbach *et al.*, 2023). Previous research on organisational stress has identified time pressure as a source of stressor that can cause strain (Doef *et al.*, 2000; Karasek, 1979; Silla and Gamero, 2014). Schilbach *et al.*, (2023) describe that time pressure is made up of quantitative and qualitative work demands and both demands co-exist. As a quantitative work demand time pressure provides insights into speed and amount of work while as a qualitative work demand time pressure underlines the effort needed to execute work (Ohly and Fritz, 1998; Schilbach *et al.*, 2023). With the increase of new and flexible forms of work, technology enables work to engulf personal life, leading to a pervasive sense of time pressure in contemporary work environments (Dóci *et al.*, 2020).

Time pressure is central to the concept of technostress as job characteristics that combine high levels of job responsibility with time pressure may propel individuals to either turn toward or away from IS (Tarafdar *et al.*, 2019; Umair *et al.*, 2023). Yener (2021) found that time management strategies play a moderating role in minimising technostress. In this study, time pressure is conceptualised as playing a dual role, acting as a potential catalyst for both positive and negative effects of technostress in OLMs. Previous organisational stress literature confirms that time pressure has an ambivalent nature (LePine, 2022; Schilbach *et al.*, 2023). When there is no adequate time pressure, it could result in a lack of interest in the task and feelings of monotony (Schmitt *et al.*, 2015) or too much time pressure in work can enhance the threat stressor overload, resulting in adverse effects on performance (Galluch *et al.*, 2015). On the other hand, the presence of time pressure can be straining but may also stimulate experiences related to challenges such as mastery, engagement, success, and personal growth (Benlian, 2020).

### *5.2.2 Technostressors and Work Outcomes*

The early literature on technostress has investigated various well-being outcomes. Researchers unanimously agree that technostressors can influence job satisfaction, turnover intention, organisational commitment, performance, and productivity (Maier, Laumer, Weinert, *et al.*, 2015; Ragu-Nathan *et al.*, 2008; Salo *et al.*, 2022; Tarafdar *et al.*, 2007). However, this study explores unique outcomes related to well-being in OLMs since worker well-being in OLMs is a key metric of platform health and sustainability (Ashford *et al.*, 2018). This study explores time distortion which is defined as “time being out of tune with one’s overall experience” (Blom *et al.*, 2021, p. 2) such that individuals perceive stimuli as lasting for a varied time as compared to the actual time (Hedger *et al.*, 2017). Time distortion is included as an outcome measure because it is identified as the "hallmark" characteristic of addictive behaviours, encompassing excessive technology use (Turel and Cavagnaro, 2019). This choice also aligns with time perception theories that illustrate time distortion as a factor that alters the cognitions and behaviours associated with mentally simulating situations resulting in temporal misperceptions (Tausen, 2022; Turel *et al.*, 2018). Thus, in their subjective experience, people can perceive time distortion either as time being accelerated or decelerated, and time being stagnant (Blom *et al.*, 2021). Time distortion has been explored earlier in online gaming, web-navigation, social media addiction, and e-shopping context that highlights the symptoms can manifest in the form of mood changes, sleep deprivation, social functioning, and work performance impacting well-being (Pelet *et al.*, 1990; Turel *et al.*, 2018; Turel and Cavagnaro, 2019). Time distortion is considered relevant in OLMs context because literature has shown that excessive time spent in terms of computer use is an important risk factor or sign of internet addiction and technostress (Salo *et al.*, 2019; Yener *et al.*, 2021). Similarly, in OLMs time distortion is applicable because they offer micropayments and to earn a decent income workers get engrossed in performing more and more tasks. Time distortion can be influenced by various factors, including the nature of the tasks, the structure of the online environment, or the specific demands and pressures associated with completing tasks on platforms like MTurk (Turel *et al.*, 2018).

Next, how technostressors create an impact on meaningful work as an outcome is explored. It is defined as a positive work-related psychological state reflecting the extent to which workers feel that their work is useful, valuable and worthwhile (Landells and Albrecht, 2019). Research on OLMs has sparked a debate regarding whether work on these platforms should be considered meaningful because of the perceptions of a negative organisational environment including manipulation, undermining employment relationships, disrespect, and low payment (Arnoldi *et al.*, 2021). In the highly competitive environment of OLMs, workers often find themselves investing significant and irrecoverable effort up-front (Ashford *et al.*, 2018). Due to the absence of formal obligations, enforcing work effort can pose a challenge for task requesters (Liu *et al.*, 2023). Moreover, opportunistic behaviours occasionally emerge, such as task requesters exploiting or refusing to provide payment (Ye and Kankanhalli, 2017), which may reduce levels of effort among workers. Since a positive work environment not only impacts workers performance but the quality of work as well so how technostressors form perceptions of meaningful work in OLMs is an important issue worthy of investigation.

## 5.3 Research Model and Hypotheses Development

In this section, the research model and relationships among constructs are presented through hypotheses development. As depicted in Figure 5.1, time pressure is associated with both challenge and hindrance technostressors, which influence various work outcomes in OLMs context.

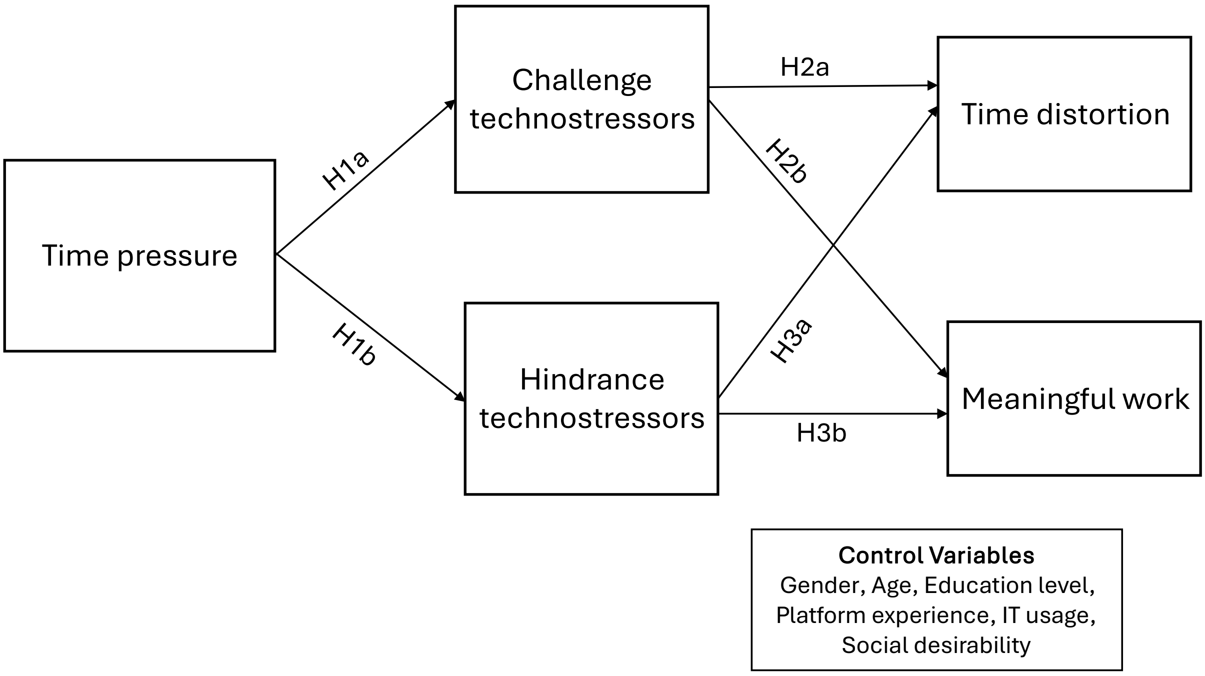


**Figure 5.1: Proposed research model for time and technostress**

### *5.3.1 Time Pressure and Technostressors*

OLMs present a dynamic and multitasking environment where effective management of tasks is crucial as each task is made up of multiple, interrelated subtasks (Lehdonvirta, 2018). Time pressure emerges as a critical factor in OLMs, with each task having a specific duration before expiration, influencing the perception of task authenticity and quality. Submissions within mere seconds may trigger concerns about the potential involvement of automated bots, suggesting a lack of attention to details and elevating the risk of task rejection (Pyo and Maxfield, 2021). This quandary is compounded by the inherent first-come, first-served nature of the environment, intensifying the pressure on workers to quickly complete tasks. Adding to the challenge, the final decision often rests on the requester, introducing an element of unpredictability and the possibility of unfair outcomes for the efforts of workers (Umair *et al.*, 2023). As OLMs workers are completely dependent on IT to perform their work and earn a living, a large portion of the work stress they experience, both good and bad, is likely attributable to their dependence on IT and manifest as technostress.

Previous research in organisational psychology and stress shows mixed findings regarding the relationship between time pressure and stressors. While studies suggest that time pressure presents a negative relationship with stressors (DeVoe and Pfeffer, 2011; Schilbach *et al.*, 2023). Other studies find a positive influence on stressors that motivate individuals to engage in activities that will overcome obstacles to performance (Lepine *et al.*, 2005; Widmer *et al.*, 2012). Although previous research has primarily focused on general stress, such a view of time pressure has the potential to yield insights considering technostress. Consistent with prior literature, perceptions of time pressure are shaped by the environment (Marpuing *et al.*, 2015) and perceived time is highly sensitive to the effects of context

(Kleiner, 2014; Schilbach *et al.,* 2023). Chong *et al.,* (2011) elaborate on the impact of time pressure, suggesting that it can influence a situation by focusing attention on specific informational cues. While time pressure may narrow focus, it doesn't consistently lead individuals to prematurely close their minds or disregard seemingly peripheral cues under intense stress. The outcome depends on whether the perceived time pressure is motivational. Consequently, individuals with limited attention resources may still actively engage in cognitive activities related to the task if motivated to persist. As challenge technostressors are linked to demanding yet attainable goals, the interplay of these technostressors with time pressure may encourage people to employ more effective strategies to achieve their objectives.

The fundamental concept of transactional theory revolves around the idea that individuals, based on the nature of technostressors, evaluate them through an initial appraisal process. This evaluation, in turn, shapes their approach to coping with these technostressors (Lazarus and Folkman, 1987; Tarafdar et al., 2019a). Specifically, individuals who perceive technostressors as potentially beneficial tend to adopt proactive strategies or a problem-solving coping style (Pirkkalainen *et al.*, 2019). In this study, it is hypothesised that time pressure can have a positive impact on challenge technostressors for OLM workers. Due to their reliance on platform income, these workers perceive time pressure as an opportunity to enhance their skills and performance. Thus, even when facing time constraints, technostressors are expected to motivate workers to effectively handle tools and complete workloads, resulting in a form of "good" stress (Benlian, 2020). For example, workers in OLMs utilise software tools and community forums that integrate with platforms, aiding them in evaluating potential HITs. In the course of their tasks, OLM workers may implement strategies such as using dual screens or adopting scripts (e.g., automating the work search, employing scraping/filtering techniques on MTurk to identify specific HITs by ID, and automatically accepting HITs based on specific criteria like minimum pay) (Williams *et al.*, 2019). These approaches enable them to efficiently manage their time, complete tasks in batches, and meet challenging deadlines, as highlighted in the work of Lascău *et al*,. (2022). These proactive approaches to time management allow workers to view time pressure not merely as a hindrance but as a challenge that can be effectively overcome. Hence,

*H1a: In OLMs, time pressure is positively associated with challenge technostressors.*

Likewise, for OLM workers, time pressure will positively influence hindrance technostressors. This is because past research suggests that meeting the ongoing OLM work requirements is relatively difficult as workers rely heavily on the use of technology and platform characteristics such as algorithmic control and inconsistent task completion timings and details amplify technostress (Cram *et al.*, 2022). When an OLM worker is under time pressure to complete a task, and their IT is not performing to their expectations (e.g. slow internet speeds), their perception of stress due to IT (i.e. technostress) may be heightened. Workers who perceive technostressors as potentially menacing tend to adopt a passive coping strategy, such as avoidance or discontinuance (Pirkkalainen *et al.,* 2019). Under intense situations, these technostressors act as hindrances that induce "bad" stress by impeding progress towards goals, often due to issues like restricted access to system resources or system failures (Benlian, 2020).

In OLMs, workers not only have to complete their immediate tasks but also need to organise their workload and manage upcoming tasks, which can be overwhelming. The tools used for finding HITs can contribute to interruption overload—a type of distraction stemming from an excessive number and inappropriate delivery of notifications or alerts (Williams et al., 2019). For instance, workers may face uncertainty in task execution due to missing codes or broken HIT links. In some cases, a task is misleading, requiring the submission of a screenshot or video recording at the very end to exploit workers and collect their sensitive information (Xia *et al.*, 2017) such tasks can be intrusive, leaving workers with limited options, especially after investing considerable time. Additionally, certain tasks may necessitate additional features, such as managing the visual aspects of the HIT browser or engaging in discussions and sharing HITs within the community (Williams *et al.*, 2019). This additional burden, coupled with unclear information and various obstacles, intensifies the experience of hindrance technostressors. Hence,

*H1b: In OLMs, time pressure is positively associated with hindrance technostressors.*

### 5.3.2 Challenge Technostressors and Work Outcomes

Stressful and threatening stimuli have demonstrated to induce time distortion effects, impacting individuals' perception of the duration of these stimuli, leading to either a sense of rapid passage or an experience of prolonged slowness (Hedger *et al.*, 2017). While there is less understanding regarding time distortion effects for positive stimuli, this research anticipates that experiencing a challenge technostressor may also increase time distortion for such stimuli. Tausen *et al.*, (2022) explain that the perception of a fixed time duration varies based on the context in which it is embedded. The way individuals assess a stressor can provide valuable insights into the emotions, behaviour, and decisions related to an event. Additionally, the perceived length of an event is interconnected with assessments of monetary compensation, and this connection is further tied to the impacts of temporal distortions. OLMs are structured in a way that shapes the perception of time, consequently impacting the environment, stressors, and task engagement for workers (Yin *et al.*, 2018). For individuals who are financially reliant on task completion and motivated to maximise their income, the investment of time and effort may fluctuate. This is particularly evident when tasks strike a balance between being challenging and aligning with their skill set (Csikszentmihalyi, 1990). In OLMs the immersive and rewarding nature of the experience may lead workers to lose track of time, especially when engaged in fulfilling activities. For instance, commencing the day with a seamless flow of work, such as securing high-rewarding tasks or participating in activities aligned with one's interests, use of complex yet interesting tools can make the experience enjoyable. Additionally, receiving prompt responses from requesters in the midst of a task without the stress induced by task-related challenges can contribute to a positive engagement. In these instances, workers can become fully engrossed in the task, especially when it comes with clear goals. When encountered with these challenging technostressors, workers may find themselves absorbed and inclined to repeat such experiences, creating a subjective perception that time has passed swiftly and engagingly. Hence, hypothesis is.

*H2a: In OLMs, challenge technostressors are positively associated with time distortion.*

Individuals derive the meaning and value of their work based on cues within their work environment (Landells and Albrecht, 2019). In the context of OLMs, task design, user equipment, and platform interface play pivotal roles in shaping the overall work experience (Williams *et al.*, 2019). The interplay of challenging stressors, combined with feedback from requesters, emerges as a critical factor in enhancing the enjoyment derived from the work. This process cultivates a profound feeling of importance among workers, fostering the belief that their contributions truly matter as OLM workers engage in self-management and act as owners of their own careers (Xiongtao *et al.*, 2021). For example, satisfaction experienced by MTurk workers, who derive joy and excitement from their involvement in unique survey research contributing to a broader goal bringing value to others and themselves. In essence, when tasks and platforms adeptly address workers' inquiries while ensuring fair compensation, the work experience attains a level of meaningfulness. Hence,

*H2b: In OLMs, challenge technostressors are positively associated with meaningful work.*

### *5.3.3 Hindrance Technostressors and Work Outcomes*

OLMs present a paradoxical work environment, offering flexibility and control while simultaneously constraining task availability through algorithms (Keith *et al.*, 2019; Lehdonvirta, 2018). When employees confront monotonous and repetitive tasks, they may perceive time as slowing down. This phenomenon arises from the lack of mental stimulation, creating an illusion of slow-paced time (Hedger *et al.*, 2017). Indeed, cognitive time tends to progress more slowly in stressful situations (e.g., deprivation with limited resources or monotonous tasks), compared to less stressful situations (Turel *et al.*, 2018). Likewise, when looking back on the past, the context in which a previous event unfolded can also impact the way time is perceived (Tausen, 2022). For instance, a worker who has experienced numerous work rejections may have a different time perception based on those past circumstances. Within MTurk, the inclusion of attention check items is a prevalent strategy. However, certain tasks are organised in a way that can be frustrating, as requesters often include too many attention check items without clear descriptions. This lack of clarity can make the worker lose their interest in the task and make the time appear dragging for the task. Similarly, the implementation of algorithms restricting the availability of tasks may contribute to a perceived stretching of time. In such instances, workers must actively engage in searching tasks, particularly the ones paying higher payment to counteract the perception of time being wasted. Therefore, hindrance stressors such as role ambiguity and work hassles can lead to a distorted sense of time. Consequently, hypothesis is that.

*H3a: In OLMs, hindrance technostressors are positively associated with time distortion.*

Work meaningfulness refers to individuals considering the importance and intrinsic value of their work based on their subjective experience (Rosso *et al.*, 2010). Research conducted in organisational contexts suggests that individuals' time and resources are valuable, and workers strive to acquire and protect them. For workers who cannot perceive the meaning of their work, it may be regarded as a form of resource loss (Hobfoll, 2001). The absence of formal obligations within OLMs poses challenges as gig workers acquire necessary resources themselves to obtain recognition and praise for their services (Ashford *et al.*, 2018; Petriglieri *et al.*, 2018). Research on motivation of gig workers has indicated that, beyond financial incentives, gig workers are driven by the desire to enhance and preserve their sense of self (Keith *et al.*, 2019). The interpersonal interaction between gig workers and requesters during service provision plays a crucial role in shaping the meaning of their work. When gig workers encounter negative stressors, like unfair rejections, it raises doubts about the meaning of their work, thereby impeding their ability to derive a sense of meaning from their work (Xiongtao *et al.*, 2021). Characteristics of OLMs such as the presence of fragmented tasks disconnected from the larger work project, rigid review, and rating systems, and having to always be online can be seen as detrimental to meaningful work (Nemkova *et al.*, 2019). Therefore,

*H3b: In OLMs, hindrance technostressors are negatively associated with meaningful work.*

## 5.4 Research Methodology

### *5.4.1 Data Collection*

The data was collected through a survey via MTurk by following the guidelines for conducting behavioural research (Jia *et al.*, 2017; Mason and Suri, 2012). A sample was recruited to perform a survey, which was posted as a human intelligence task (HIT) on MTurk with a clear description. Workers were able to click on a web link which redirected them to the online survey hosted through the Qualtrics platform. The HIT was made available to workers who have completed a varying number of HITs ranging between 500 to 10,000 HITs to increase the chance of participation. The HIT approval rate was set at 98% generally, setting HIT approval rate at 95% can produce high-quality data (Hunt and Scheetz, 2019). A total of 467 responses were received in Qualtrics. However, after eliminating the incomplete responses, respondents who failed the attention check and multiple submission attempts, only 354 responses were suitable for data analysis.

### *5.4.2 Duration and Remuneration*

Before conducting the final survey, a preliminary pilot test was executed. Besides, experienced MTurk workers two researchers reviewed the survey critically. The feedback and suggestions were incorporated in the final survey. The data collection phase spanned two weeks, including weekends in October 2023. To ensure a diverse participant pool, the survey was administered in multiple batches at various times each day, including morning, evening, and night. This strategic timing approach aimed to account for potential variations in the online sample, as highlighted by previous research (Arechar *et al.*, 2017). To determine the compensation rate for the Human Intelligence Task (HIT), careful consideration was given to the estimated time required to complete the task and the US minimum wage. Consequently, a compensation of US$2.50 was set for this 15-minute HIT, aligning with fair remuneration practices.

### *5.4.3 Measures*

The measurement items were adopted from well-established existing literature to enhance validity. However, we slightly modified the wording of the items to fit MTurk platform context. For example, employers and tasks were referred to as requesters and HITs, respectively. Time pressure was measured by self-report, using a 5-item subscale of the Instrument for Stress Oriented Task Analysis (ISTA) (Irmer *et al.*, 2019). Challenge and hindrance technostressors were measured by the items given by Benlian (2020). For time pressure and technostressors a 7-point frequency scale was used ranging from 1 = "never" to 7 = "extremely often". Time distortion was measured by two items given by Pelet, Ettis and Cowart (1990). Meaningful work was measured by May, Gilson and Harter (2004). For time distortion and meaningful work, a 7-point likert scale was used ranging from 1 = "strongly disagree" to 7 = "strongly agree". The measures for all constructs are shown in detail in the Table 8.4.

MTurk platform has frequently been used for data collection over the years. However, worker inattentiveness or data quality is a primary concern while collecting data from the platform. Therefore, appropriate measures were taken to minimise the risk of low-quality data following the guidelines for data collection on MTurk (Aguinis *et al.*, 2021). First, the reCAPTCHA test was used at the start of the survey to identify whether the activity on the screen was produced by a human or a computer program such as a bot. Second, instructed-response items were used to address the issue of spam individuals. Two attention-check items with an obvious correct response were embedded at two different points in the survey.

In this study, several control variables were included within the model that have been shown to potentially influence the hypothesised relationships. Therefore, individuals' gender, age, education level, MTurk platform experience and IT usage were controlled. Given the nature of self-report surveys, there is a concern regarding MTurk workers engaging in self-misrepresentation or displaying socially desirable responses (Kwak *et al.*, 2021). Therefore, to mitigate this concern, social desirability was controlled and measured as a true and false scale given by Reynolds (1982). Overall, controlling these variables enhances the robustness of the study by accounting for potential confounding factors and ensuring the reliability of the findings.

### 5.4.4 *Demographic Profile*

A descriptive analysis to extract the demographic profile of MTurk workers was conducted. The sample included 62.43% men and 37.57% women. The majority of the workers who completed the survey were from the US (92.94%) followed by workers from India and other countries (7%). Table 5.1 shows the demographic profile of participants.

**Table 5.1: Demographic profile of participants (*n*=354)**

| Variable | Category | Frequency (*n*) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 221 | 62.4 |
| | Female | 133 | 37.6 |
| Age | 18-24 years | 15 | 4.2 |
| | 25-30 years | 106 | 29.4 |
| | 31-40 years | 157 | 44.4 |
| | 41-50 years | 39 | 11.0 |
| | 51-60 years | 28 | 7.9 |
| | Greater than 60 | 11 | 3.1 |
| Education Level | Some High School | 1 | 0.3 |
| | High School | 19 | 5.4 |
| | Some College | 17 | 4.8 |
| | Associate degree | 13 | 3.7 |
| | Bachelor's Degree | 242 | 68.4 |
| | Master's Degree | 62 | 17.5 |
| MTurk Experience | Less than 1 year | 18 | 5.1 |
| | 1 to 2 years | 97 | 27.4 |
| | 3 to 4 years | 123 | 34.7 |
| | 5 or more years | 116 | 32.8 |

## 5.5 Data Analysis and Results

Structural equation modelling (SEM) using partial least squares (PLS) was used to test the proposed research model with the help of SmartPLS software (Ringle *et al.*, 2015). The SEM analysis is conducted following a two-stage analytical procedure (Hair *et al.*, 2022). The first stage assessed the measurement model for reliability and validity. The second stage evaluated the structural model to test the research hypotheses.

### 5.5.1 *Measurement Model Assessment*

Reliability, convergent validity, and discriminant validity were tested to validate the measurement model. All constructs in the model were reflective, procedures recommended by Hair *et al.* (2019) were followed. The first step in reflective measurement model assessment involves examining the indicator loadings recommending a threshold value of 0.7. All the outer loadings were above 0.7 value indicating that the construct explains more than 50 per cent of the indicator's variance, thus item reliability is acceptable. Table 5.2 shows item loading and descriptive statistics of each item. In the second step, composite reliability (CR) was used to measure reliability (CR > 0.7). The results indicate that the CR for all the variables is greater than 0.7. In addition, Cronbach's alpha α was used to check the internal consistency reliability (α > 0.7). The results indicate α above the threshold value for all the variables, indicating good internal consistency. The third step involved measuring the convergent validity of each construct measure. For this purpose, average variance extracted (AVE) was used to verify each construct, which in this case was greater than 0.5 for all variables. In sum, the model's convergent validity could be established. Table 5.3 shows construct reliability and validity.

**Table 5.2: Item loadings and descriptive statistics**

| Construct | Item | Loading | Mean | Median | Standard Deviation |
|---|---|---|---|---|---|
| Time pressure | TP1 | 0.849 | 4.774 | 5 | 1.396 |
| | TP2 | 0.853 | 4.734 | 5 | 1.409 |
| | TP3 | 0.844 | 4.460 | 5 | 1.584 |
| | TP4 | 0.866 | 4.540 | 5 | 1.652 |
| | TP5 | 0.859 | 4.966 | 5 | 1.430 |
| Challenge technostressors | CTS1 | 0.840 | 4.924 | 5 | 1.549 |
| | CTS2 | 0.836 | 4.788 | 5 | 1.512 |
| | CTS3 | 0.866 | 4.833 | 5 | 1.580 |
| | CTS4 | 0.857 | 4.819 | 5 | 1.547 |
| | CTS5 | 0.817 | 4.802 | 5 | 1.539 |
| | CTS6 | 0.829 | 4.884 | 5 | 1.494 |
| | CTS7 | 0.868 | 4.805 | 5 | 1.584 |
| | CTS8 | 0.851 | 4.831 | 5 | 1.550 |
| Hindrance technostressors | HTS1 | 0.895 | 4.223 | 5 | 1.676 |
| | HTS2 | 0.851 | 4.195 | 4 | 1.633 |
| | HTS3 | 0.880 | 4.116 | 4 | 1.748 |
| | HTS4 | 0.870 | 4.280 | 5 | 1.688 |
| | HTS5 | 0.885 | 4.331 | 5 | 1.670 |
| | HTS6 | 0.854 | 4.494 | 5 | 1.660 |
| | HTS7 | 0.877 | 4.297 | 4 | 1.676 |
| | HTS8 | 0.858 | 4.282 | 5 | 1.654 |
| Time distortion | TD1 | 0.902 | 5.316 | 6 | 1.210 |
| | TD2 | 0.854 | 4.850 | 5 | 1.599 |
| Meaningful work | MW1 | 0.805 | 5.559 | 6 | 1.170 |
| | MW2 | 0.814 | 5.588 | 6 | 1.211 |
| | MW3 | 0.836 | 5.497 | 6 | 1.265 |
| | MW4 | 0.743 | 5.528 | 6 | 1.067 |
| | MW5 | 0.79 | 5.599 | 6 | 1.113 |

**Table 5.3: Construct reliability and validity**

| | Cronbach's Alpha | Composite Reliability | Average Variance Extracted (AVE) |
|---|---|---|---|
| Time pressure | 0.907 | 0.931 | 0.729 |
| Challenge technostressors | 0.943 | 0.953 | 0.715 |
| Hindrance technostressors | 0.955 | 0.962 | 0.759 |
| Time distortion | 0.706 | 0.871 | 0.771 |
| Meaningful work | 0.859 | 0.898 | 0.637 |

The fourth step was to assess the discriminant validity, which is the extent to which a construct is empirically distinct from other constructs in the model. Traditionally used criteria, as proposed by Fornell and Larcker (1981), is to measure the square root of AVE of each latent variable that should be higher than the correlations among the latent variable. In Table 5.4, Fornell–Larcker criterion off-diagonal values represent the correlation coefficients between potential constructs, and the diagonal values represent the square root of the AVE value of each construct. Cross-loading factors are also used to test a reflective measurement model's discriminant validity. Table 8.5 reports the cross-loading factors among the measured items, indicating that each indicator loading is higher than its cross-loadings. In addition, heterotrait–monotrait ratio (HTMT) of the correlations was utilised to assess further discriminant validity (Henseler et al., 2015) which was within the recommended threshold of 0.90 reported in Note: Numbers in bold are the square root of the AVE value for each variable.

Table 5.5.

**Table 5.4: Discriminant validity using Fornell –Larcker criterion**

| | Time pressure | Technostressors | | Time distortion | Meaningful work |
|---|---|---|---|---|---|
| | | Challenge | Hindrance | | |
| Time pressure | **0.854** | 0.846 | | | |
| Challenge technostressors | 0.728 | **0.738** | | | |
| Hindrance technostressors | 0.799 | 0.451 | **0.871** | | |
| Time distortion | 0.507 | 0.374 | 0.462 | **0.878** | |
| Meaningful work | 0.331 | | 0.286 | 0.54 | **0.798** |

Note: Numbers in bold are the square root of the AVE value for each variable.

**Table 5.5: Heterotrait –monotrait ratio (HTMT)**

| | Time pressure | Challenge technostressors | Hindrance technostressors | Time distortion |
|---|---|---|---|---|
| Challenge technostressors | 0.783 | | | |
| Hindrance technostressors | 0.858 | 0.776 | | |
| Time distortion | 0.632 | 0.545 | 0.562 | |
| Meaningful work | 0.357 | 0.402 | 0.3 | 0.675 |

In summary, results show the data passes reliability and validity evaluation. All the measured variables were tested for common method bias (CMB) since the data were self-reported and collected from a single source. To mitigate potential risks, various procedural measures were implemented in the development of the survey instrument (Podsakoff *et al.*, 2003). These included keeping the questions simple, and concise, and avoiding the double-barrelled question. When designing the questionnaire, the order of items was counter-balanced by keeping the dependent and independent separate and reiterating respondent anonymity along with the exclusive research purpose of the study. Statistically, the extent of common method bias was assessed using two approaches. First, Harman's one-factor test, which was performed by including all items in principal components factor analysis. Evidence for common method bias exists when one factor accounts for most of the covariance (i.e. explained variance >50%). The specified "one factor" explained 23% variance, and hence the data do not indicate evidence of common method bias. Second, CMB was tested based on variance inflation factors (VIF) a full collinearity test, which is considered an effective test for the identification of CMB, as suggested by Kock (2015). The model indicates values lower than 3; thus, the model is considered free of CMB.

### *5.5.2 Structural Model Assessment*

To test the structural model, the path coefficients, the t-values of the variables and their statistical significance (*p*-values) were assessed using the bootstrap re-sampling method with 5000 samples. The results indicate that time pressure was significantly positively associated with both challenge and hindrance technostressors, supporting H1a ($t$=14.75; $p$-value <0.001) and H1b ($t$=17.09; $p$-value

<0.001). In terms of outcomes, challenge technostressors were significantly positively associated with time distortion supporting H2a ($t$= 2.55; $p$-value <0.001) and meaningful work H2b ($t$=2.89; $p$-value <0.001). However, hindrance technostressors were significantly positively associated with time distortion ($t$= 2.06; $p$-value <0.001) supporting hypothesis 3a. While hindrance technostressors showed no significant relationship with meaningful work so H3b was not supported. A summary of results along with path-coefficients, $t$-values and $p$-values is provided in Table 5.6

**Table 5.6: Results for hypotheses**

| | Path | Coefficient | *t*-statistic | *p*-value | Decision |
|---|---|---|---|---|---|
| H1a | Time pressure -> Challenge technostressors | 0.739 | 14.757 | 0.000*** | Supported |
| H1b | Time pressure -> Hindrance technostressors | 0.709 | 17.094 | 0.000*** | Supported |
| H2a | Challenge technostressors -> Time distortion | 0.237 | 2.553 | 0.011* | Supported |
| H2b | Challenge technostressors -> Meaningful work | 0.317 | 2.896 | 0.004** | Supported |
| H3a | Hindrance technostressors -> Time distortion | 0.184 | 2..06 | 0.047* | Supported |
| H3b | Hindrance technostressors-> Meaningful work | 0.021 | 0.209 | 0.835 | Not supported |

*$p$-value < 0.5; **$p$-value < 0.01; ***$p$-value < 0.001

The commonly used measure to evaluate the structural model is the coefficient of determination $R^2$ value, which explains the model's predictive power (Hair *et al.*, 2019). In terms of the model's predictive power ($R^2$), in the model, time pressure explains 54% variance in challenge technostressors and 67% variance in hindrance technostressors. Both challenge and hindrance technostressors explain a variance of 27% on time distortion and 17% variance on meaningful work.

The effects of six control variables were examined including gender, age, education level, MTurk platform experience, IT usage and social desirability on the four endogenous constructs challenge technostressors, hindrance technostressors, time distortion and meaningful work. Age and education level and MTurk platform experience had no significant effect on any of the endogenous constructs. Gender was significantly correlated to hindrance technostressors. IT usage was significantly correlated to meaningful work. While social desirability was significantly correlated with hindrance technostressors and time distortion.

## 5.6 Discussion

This study examined antecedents and consequences of technostress from a time perspective in OLMs. Specifically, a research model was proposed to investigate how time pressure influences challenge and hindrance technostressors and work outcomes. The findings indicate that indeed time pressure acts as a key environmental antecedent that can cause technostress in OLMs. While existing literature in organisational stress and psychology acknowledges the dual nature of time pressure, this research uniquely uncovers its nuanced effects on technostressors.

The study shows that time pressure plays a dual role, acting as a potential catalyst for both positive and negative effects on technostress. Under moderate levels, time pressure positively influences challenge technostressors, offering workers an opportunity to perceive it as a mechanism for skill enhancement and improved performance. Moderate time pressure can facilitate improved financial control. As in OLMs, the efficient completion of tasks is tied to income, enhanced performance ratings, and the establishment of trust with requesters. Conversely, excessive time pressure poses risks, as it can drain energy due to the inherent value of time as a crucial resource that must be utilised carefully. Too much pressure compels workers to expedite task completion, resulting in decreased attention to detail and the likelihood of errors in OLMs. This, in turn, leads to task rejections, increased work overload and technostress.

The results indicate that challenge technostressors can give rise to time distortion effects in OLMs. When individuals encounter challenges their actions require minimal conscious control as they naturally focus their attention on specific stimuli (Hedger *et al.*, 2017). This phenomenon commonly occurs for workers when they engage in fulfilling tasks with responsive requesters, becoming so engrossed in their work that they lose track of time. The intrinsic motivation of workers plays a crucial role in this context. Those who are inherently motivated need no external rewards or goals to motivate them as the activity itself presents engagement and workers experience the effects of time distortion. Similarly, these challenge technostressors that allow workers to achieve their work can produce a sense of joy and positive emotional experience considering their work to be more meaningful.

The findings reveal that hindrance technostressors also contribute to a distorted perception of time within OLMs. It can happen particularly when workers are extrinsically motivated. In OLMs, platforms often offer limited resources, pushing workers to acquire valuable insights from online forums and their own experiences (Petriglieri *et al.*, 2018). Hindrance technostressors, such as tasks with poor design and ambiguity, along with finding difficulty in getting suitable tasks due to qualification restrictions, can induce a time distortion effect, creating a perception that time is passing slowly. Interestingly, hindrance technostressors demonstrated no significant association with meaningful work. This is because most OLM workers view their engagement on these platforms as a full-time occupation. Despite struggling in some aspects of their work such as unfair rejections, and limited control due to algorithms these workers invest considerable time in accessing valuable resources through other activities. Such as participating in informal forums and contributing to the enhancement of the broader worker community. As a result, they derive a sense of meaning from their work.

### *5.6.1 Implications for Research*

This study adds to literature in three important ways. First, this study helps to recast contemporary technostress thinking towards the critical role of temporal issues, both as an input to, and output of IT induced stress. It advances the IS domain by empirically showing that time pressure influences the challenge and hindrance technostressors as an input. While the findings further highlight the effects of technostressors in creating time distortion effects as an output. Therefore, this research present time as key facet shedding light on the nuanced relationship between temporal characteristics and technostress which is under appreciated in technostress literature. Previous research on technostress has mostly considered using time from a methodological perspective (Venkatesh *et al.*, 2021). Also, this research encourages to understand the positive effects of technostress which are still in its incipient stage and call for further attention. The findings can provide a basis for utilising the literature on time to study technostress formation and its mitigation. Second, existing literature on time pressure presents conflicting results, with arguments suggesting a positive, negative, or inverted U-shaped association with outcomes (Schilbach *et al.*, 2023; Schmitt *et al.*, 2015; Widmer *et al.*, 2012). The findings add to this discourse, urging further investigation into the "black box" of time pressure and its impact on outcomes. This will facilitate a deeper understanding of the underlying mechanisms driving the diverse effects of time pressure. This research further enhances the understanding of time distortion effects stemming from positive stimuli, an area typically overshadowed by the prevalent emphasis on distortions caused by negative stimuli. Consequently, the findings in this study provide a foundation for looking deeper into the role of positive stimuli such as challenging technostressors in context of time distortion.

Third, this study adds to the ongoing discussion concerning the working conditions of OLMs by examining the influence of time pressure on workers' experiences and outcomes. In doing so, this research adds depth to the limited research on the implications of OLMs on health and technostress, aligning with the understanding that diverse work contexts introduce novel sources of technostress (Cram et al., 2022). While the focus here is on OLMs, where the IT affordances facilitate the breakdown of work into micro tasks, the findings of this study are equally relevant to both traditional and other IT-driven work environments. As the perception of time pressure and temporal distortions extends beyond individual differences, the sheer amount of time spent working, or even the working conditions provided play a role, such as income influencing individuals' perceptions of the value of their time and employer-imposed time constraints (DeVoe and Pfeffer, 2011). These temporal distortions not only alter the impact of emotional experiences and their associated costs but also prompt individuals to engage in behaviours that add meaning to their work. In summary, this research contributes to the existing knowledge by offering nuanced insights into the complex relationship between time pressure, technostress, and the working conditions experienced by OLM workers.

### *5.6.2 Implications for Practice*

This study offers numerous practical implications for platforms, requesters, workers as well as national and international regulators of OLM work. Time pressure emerges as a crucial factor that can either positively or negatively impact technostressors, making it imperative for each stakeholder to play their roles effectively.

Platforms should invest in measures that help to optimise time and effort for all. For example, designing user-friendly interface by providing more flexibility in features to save time. Given that technostress and time distortion are influenced by various factors, including an individual's biology, psychology, and environment (Schéele *et al.*, 2019; Tarafdar *et al.*, 2019), platforms may benefit from substantial time management training programs for workers and requesters. This training can offer ways to efficiently handle temporal resources, adapting to variations in work patterns. Additionally, it can raise awareness among workers about their individual time distortion tendencies and equip them with skills to reflect on and mitigate these distortions and technostress. Regular training efforts can bridge this gap, fostering more consistent and streamlined work practices. Additionally, platforms should establish policies that enforce accountability and ethical conduct. For instance, removing tasks that do not match their task descriptions and allocated time. By implementing such measures, platforms can contribute to a more conducive and ethical working environment, benefiting all stakeholders involved in the process.

Requesters play a pivotal role in task allocation, and their effectiveness in this regard can significantly impact the way workers perceive technostressors. It is crucial for requesters to strategically manage time, directing pressure towards fostering creativity rather than encouraging unethical behaviours. Tasks should be designed in a way that provides sufficient complexity and responsibility avoiding undue burdens. To address time-sensitive challenges, requesters should offer adequate resources, such as increased control, enabling workers to cope more effectively. Additionally, supporting workers by being accessible during task execution. Requesters can alleviate the time pressure by cultivating a sense of safety by establishing trust relationships with workers, without resorting to punitive measures. These strategies can help to maintain the worker loyalty, foster a collaborative environment and contribute to positive work experience. Platform workers can contribute significantly by being aware of exploitative practices and refusing to participate in them, even if the task offers high pay. They can support their peers by exposing such practices through community forums. Despite challenges, it is crucial for workers to establish their own boundaries regarding when to stop working and practice self-regulation to reduce time pressure. Finally, it is imperative for OLM regulators to assume a crucial role by conducting thorough checks on platforms that neglect fair work practices. Regulations concerning platform-based work should account for the unique labour market dynamics and institutional frameworks in each country. Efforts are required to narrow the gap through the adoption of standardised work practices and collaborative governance structures across various administrative levels. Despite the challenges, legislation must be enacted to establish rules limiting working hours and mandating rest periods, including weekly breaks, and paid annual leave.

## 5.7 Limitations and Future Research

While this study contributes valuable insights, it is essential to acknowledge its limitations which offer avenues for future research. First, the research is cross-sectional, and the data is collected at a single point in time from one platform. Therefore, the generalisability of the findings to other platforms remains uncertain and should be done carefully. As the constructs utilised in the model are time-sensitive and subject to variability, it is important to acknowledge the potential for future changes in terms of work contexts and datasets. Future research should employ a longitudinal study design to provide better inquiry into the proposed relationships by considering multiple platforms. Second, although appropriate measures were taken, and data were collected at different intervals throughout the day there is still a possibility of bias due to self-reported data.

Third, the study focuses on identifying time pressure as an antecedent of technostress and its related outcomes. The model is tailored to the "front end of the transactional theory," emphasising a specific aspect of the multifaceted technostress process (Cram *et al.*, 2022). Future research should expand the model using secondary appraisal and coping processes (e.g., digital resilience), moderating and other variables (time management behaviour) that can further develop the technostress phenomenon. Moreover, in this study, the role of time is explored which is an intricate concept itself. Future studies could examine time-related variables and delve into more detailed components that play an essential role in shaping workers motivations and behaviours e.g., the sensitivity of time to culture could be explored, allowing future research to test and refine the findings of this study in diverse cultural contexts and how culture shapes the technostress process. Moreover, examining the role of temporal personality and its potential in mitigating technostress could enhance the understanding of the technostress.

# Chapter 6

## Conclusion and Future Research

*New technology is not good or evil in and of itself. It's all about how people choose to use it.*

David Wong

The present thesis has aimed to build an understanding of how uniquely technostress is experienced by platform workers and how it relates to their well-being. As IT use can involve diverse types of interactions and encompass various dimensions focusing solely on aspects like the duration of IT use may not effectively uncover the diverse range of technostress experiences (Mehtälä *et al.*, 2023). The emergence of OLMs is not solely a byproduct of digital transformation. Instead, it is the result of how technologies interact with existing institutional structures, conditions, and management ideologies, shaping new practices in how people conduct their working lives. Similarly, the impact of the gig economy on the structures of work cannot be solely attributed to technological possibilities. Rather, it is rooted in the concrete practices adopted by its users, reflecting a multifaceted interplay of factors beyond technology alone (Lehdonvirta, 2018). The present thesis aims to pay special attention to the different environment layers such as job and temporal characteristics involved in creating technostress, going beyond notions of general IT use. In doing so, the research focuses on identifying antecedents and consequences of technostress in a novel context of online labour markets. Below, the findings of each article within the thesis are discussed.

Article 1 aimed at examining the concept of technostress through the perspective of changing nature of work including three major forms of work traditional work, telework and platform work. Prior research on technostress confirms that its manifestation is context-specific, highlighting the need to investigate novel sources of technostress in light of emerging forms of work (Cram *et al.*, 2022). Similarly, technostress is an evolving phenomenon, with the emergence of new types of IS and their usage, which continually reveal novel aspects of stress (Tarafdar *et al.*, 2019). Accordingly, other research poses the question of whether the existing concept of technostress remains current. They emphasise the need for additional quantitative investigations into the dimensionality of technostress, urging a perspective that acknowledges the current state of affairs (Fischer *et al.*, 2019, 2021). Hence, there arises a necessity to adjust the antecedents and consequences of technostress to align with the evolving social-technical developments that unfold with the advancement of digital transformation (Becker, 2021).

Article 1 address the research question: *How have the antecedents and consequences of technostress evolved with the changing nature of work*? It provides insights into the new developments related to technostress in the IS field. The findings particularly highlight that, in terms of antecedents, the concept is not solely limited to technology, as predominantly observed in traditional work contexts. In platform work context job characteristics and algorithmic control emerged as significant contributors to technostress (Cram *et al.*, 2022; Umair *et al.*, 2023). In addition, the studies now broaden their scope by investigating technostress from perspectives such as organisational climate, emotions, IT mindfulness, and obligation (Califf and Springer, 2022; Fischer and Riedl, 2022; Raluca and Hanne, 2020; Salo *et al.*, 2022). Researchers highlight the significance of additional technostressors, techno-reliability, techno-interruptions and techno-isolation (Becker and Lanzl, 2023; Mirowska and Bakici, 2023), in the context of telework, alongside the typically classified five technostressors: techno-complexity, techno-invasion, techno-overload, techno-uncertainty, and techno-insecurity. Furthermore, it is highlighted that the negative experiences associated with the overflowing and interrupting nature of notifications can also be distinguished from techno-overload and overdependence (Mehtälä *et al.*, 2023). In terms of outcomes technostress can manifest in various forms, including physiological symptoms, job-related outcomes, IS use-related outcomes, well-being related outcomes, psychological reactions, and behavioural attitudes depending on the context of use (Tarafdar *et al.*, 2019).

Article 2 examined OLMs-specific technology (IT complexity and IT presenteeism) and job characteristics (autonomy and feedback) as environmental antecedents. Work overload and job insecurity are taken as technostressors. While technostress outcomes included subjective well-being and discontinuous intention. The theoretical perspective to investigate technostress adopted in this paper is person–technology (P–T) fit and person–job (P–J) fit perspective that is aligned with Ayyagari *et al.*, (2011) work. The article addresses the research question: *Do the technology and job characteristics of online labour markets influence strain, and is this relationship mediated by technology-induced stressors*? The findings indicate that considering technology characteristics only IT complexity is significantly associated with both technostressors. In contrast, previous literature on technostress shows that in both traditional work and telework settings, IT complexity and work overload tend not to be correlated. This difference is linked to the competitive nature of OLM work, where increased effort is required to deal with work demands and the complexity of specific technologies. Moreover, previous technostress studies have focused on the general use of IT (Ayyagari *et al.*, 2011; Suh and Lee, 2017), while the current study specifically focuses on platform work-related IT use.

In terms of job characteristics, feedback showed a significant relationship with both technostressors. This means that the feedback mechanism in OLMs, where approval ratings create pressure on workers plays a key role. The findings indicate that technostressors provide partial complementary mediation between IT complexity and strain while technostressors fully mediate the relationship between feedback and strain. Strain provides a partial complementary mediation between work overload and outcomes (negative affective well-being and discontinuous intention) while strain fully mediates this relationship if job insecurity and outcomes are taken into account. The results are consistent with other OLM literature in terms of demographics and show that workers in OLMs hold high formal education. Also, it can be agreed that the flexibility and autonomy provided by these platforms have some advantages over traditional forms of work as workers have a choice to schedule their own work.

Article 3 explores the antecedents and consequences of technostress from a time perspective. Particularly, time pressure acts as a key environmental antecedent in OLMs. In addition, this study explores how challenge and hindrance technostressors can influence unique well-being outcomes such as time distortion and meaningful work. The paper addresses the research question: *How does time pressure affect challenge and hindrance technostressors subsequently creating an impact on work outcomes in online labour markets (OLMs)*? This research shows that time pressure plays a dual role, acting as a potential catalyst for both positive and negative effects of technostress in OLMs. Time pressure is significantly positively related to both challenge and hindrance technostressors. The findings also show that challenge and hindrance technostressors can create a time distortion effect in OLMs. Intrinsic and extrinsic motivation plays a key role in such platforms. However, despite experiencing hindrance technostressors the workers in OLMs consider their work important and meaningful. This is because most OLM workers view their engagement on these platforms as a full-time occupation. Despite struggling in some aspects of their work such as unfair rejections, and limited control due to algorithms these workers invest considerable time in accessing valuable resources through activities like participating in informal forums and contributing to the enhancement of the broader worker community. As a result, they derive a sense of meaning from their work.

## 6.1 Core Contributions

### *6.1.1 Theoretical Contributions*

This thesis presents three distinct research articles, each making unique contributions to the understanding of technostress and its dynamic interaction with well-being in OLMs. This section provides a summary of the consolidated contributions within this crucial relationship. Particularly, this thesis adds to the technostress phenomenon in various ways including antecedents and consequences, role of strain, challenge, and hindrance technostressors and approaches to study technostress. Research on technostress underlines the persistent knowledge gap despite extensive research efforts (Benlian, 2020; Califf *et al.*, 2020; Cram *et al.*, 2022; Nastjuk *et al.*, 2023; Tarafdar *et al.*, 2019). In response to this call for exploration, the presented thesis adopts a multifaceted approach to examining technostress, recognising the need to address this gap from diverse perspectives.

The three environmental systems form the core of technostress process the social system, the psychological system (the individual), and the physical-technological system. The interaction of these systems represents the environmental factors when technology-related stressful situations or technostressors materialise (Califf, 2022). Based on this in terms of environmental antecedents, this research introduces job characteristics and temporal characteristics as key environmental antecedents going beyond the traditional conceptualisation of technology characteristics. In doing so, the concept of technostress is examined within a novel context where digital tools and algorithmic control are reshaping how organisations establish work rules, monitor worker activities, provide feedback, and enforce compliance (Cram *et al.*, 2022). These platforms also stimulate speed and acceleration by shaping the spatial and temporal structuring of work (Zheng and Wu, 2022). Therefore, contextualising job and temporal characterises in technostress process further enhances this understanding. In terms of technology characteristics, the research also validates the previous relationships in this new context and identifies how the results vary from traditional studies.

In terms of consequences, the research expands technostress research from a well-being perspective. Prior research studies well-being as a broad concept (overall well-being) or focuses on particular aspects of well-being such as job satisfaction, burnout. This research specifically focuses on understanding subjective well-being and its related dimensions. Therefore, it investigates cognitive well-being, and job-related affective well-being (positive affective well-being and negative affective well-being). Turnover intention is commonly regarded as an outcome of technostress. This research also considers turnover by examining discontinuous intention in OLMs. As in OLMs discontinuous intention may not necessarily result in actual turnover, as there are fewer barriers to quitting than in the traditional setting. Workers can stop working for a specific requester or stop working on the HIT, or in some scenarios, leave the platform altogether (Brawley and Pury, 2016; Umair *et al.*, 2023). Furthermore, the research examines unique well-being variables such as time distortion and meaningful work as outcomes of technostress. Studying these concepts is crucial as they can significantly impact well-being, and meaningful work may serve as a more effective promoter of well-being (Bailey *et al.*, 2019; Turel *et al.*, 2018).

The research also makes contribution to enhance the understanding of the technostress phenomenon by addressing the research issues raised. While the majority of technostress research tends to treat strain and outcomes as interchangeable (Pflügner, Maier and Weitzel, 2021; Tarafdar *et al.*, 2019), a limited number of studies have regarded strain as a distinct concept (Ayyagari *et al.*, 2011; Maier, Laumer, Weinert, *et al.*, 2015). This research highlights the role of strain, which is often overlooked, by demonstrating its mediating role between technostressors and outcomes. This approach aligns with the argument for studying this construct as it best encapsulates the felt experiences (Sarabadani *et al.*, 2018). Similarly, sections of this research highlight the positive role of technostressors by examining challenge technostressors in OLMs. Furthermore, in its examination of technostress, the research employs both aggregated and disaggregated approaches to comprehend the nuances involved in the technostress process.

### 6.1.2 Practical Contributions

The research offers practical implications for platform owners, managers, requesters, and various stakeholders engaged in online work. Based on the findings, OLMs can take the necessary steps to design their workplace policies and strategies to promote meaningful work. Platforms should actively monitor the tasks posted on their platforms to ensure they meet standard criteria, including clear descriptions and fair pay. Tasks lacking adequate details or offering inappropriate completion times and pay should be reverted. One alternative to manual task review by platform operators is to harness a platform's managerial automation capabilities. This involves validating task instructions before they are live using prototype tasks (Berg *et al.*, 2018). Also, platforms must take time to verify active user accounts to identify the spam requester and workers. This will ensure that work overload is reduced as workers may spend less time authenticating the task. In terms of reducing technostressors pre-emptive strategies must be taken such as limiting the number of tasks performed per worker can reduce competition, increase participation chances, and overcome the role played by algorithms.

Platforms should also take steps to implement positive communication practices. For example, making corrective feedback mandatory after every task and allowing workers to appeal unfair rejections would be useful additions. Hence, platforms should conduct surveys to identify workers experiencing difficulties, aiming to reduce stressors and discourage discontinuation. Strategies such as allowing workers to take frequent breaks without a pay penalty, providing resources and troubleshooting assistance, and organising regular community/forum events can be implemented to support worker well-being and alleviate technostressors. Platforms may benefit from substantial time management training programs for workers and requesters. This training can offer ways to efficiently handle temporal resources, adapting to variations in work patterns. Regular training programs are essential for minimising fear associated with platform-related tools, algorithms, and atmosphere. One approach is to emphasise the use of algorithms for making better decisions. For instance, workers should not face penalties for declining certain tasks or choosing not to work at specific times. Additionally, in case of technical issues with tasks or the platform itself, workers should not bear the cost of lost time or work. Highlighting the effectiveness of transparent algorithmic control mechanisms can increase workers' intention to continue platform work. For example, disclosing screening procedures and the exact criteria for automatic worker deactivation can be effective strategies (Wiener *et al.*, 2023).

Since technostress cannot be entirely controlled or eliminated, personal development is encouraged at all levels (Pirkkalainen *et al.*, 2017). Stich *et al.* (2017) demonstrated that participants experienced lower levels of distress when using computer-mediated communication that aligned with their preferences for their current task. Hence, sharing preferences with others is crucial to minimise technostress. Overall, the aim of this research is not to criticise OLMs but to utilise these platforms for the betterment of all involved.

## 6.2 Limitations

Like every research, this thesis is not without limitations. Each research article provides its own set of limitations. This section summarises these limitations. First, this thesis has employed a cross-sectional survey design and is quantitative in nature. Although appropriate measures were taken there is still a possibility of bias due to self-reported data. Longitudinal study design may provide better inquiry of the proposed relationships. Second, the data is collected from a single platform. Online platforms both digital and physical run on common principles, but each of them has characteristics that differentiate the two types of work. Therefore, the generalisability of the findings to other platforms remains uncertain and should be done carefully. Also, the technostressors in one context may not necessarily apply in a similar way. In identifying the antecedents and consequences the research is tailored to the "front end of the transactional theory," (Cram *et al.*, 2022) emphasising a specific aspect of the multifaceted technostress process outlined. However, technostress process further includes secondary appraisal and coping processes which need attention as well. Moreover, the items used to measure technostress are adapted from traditional work contexts which might have not fully captured the concepts in the new context. Therefore, new items and updated scales should be developed and used for further research.

## 6.3 Recommendations for Future Research

Although this thesis plays a role in extending the technostress phenomenon there is still a research gap and further promising avenues that need attention. Below, are some ideas that can contribute to advancing this field.

### *6.3.1 Algorithmic Control and Technostress*

A defining characteristic of contemporary work is the integration of algorithms and human labour, a phenomenon known as "algorithmic work" (Tarafdar *et al.*, 2023). Research has shown algorithmic control as a significant work-related demand, placing workers under considerable stress that can adversely affect their well-being and behaviour, particularly within platform contexts employing algorithms (Cram *et al.*, 2022). These findings provide a solid foundation for further investigation; however, there remains a considerable scope for exploration. Technostress, a complex and multi-layered phenomenon, presents numerous facets that require deeper examination. Particularly regarding the impact of algorithms within such work environments, key areas of inquiry include focusing on the sub-processes of technostress such as how workers appraise algorithms and their role in decision-making processes, as well as the coping mechanisms employed during this interaction.

The future research agenda should prioritise investigating the intricate relationship between digital platforms, algorithms, and worker well-being. Such exploration holds the potential to offer valuable insights into how algorithmic control influences labour conditions and worker autonomy, shedding light on its pivotal role in shaping future work. With this in mind, special attention should be paid to the ethical considerations of algorithmic decision-making (Vukmirovic *et al.*, 2023). Li *et al.*, (2023) analysis of algorithmic management and its mechanisms from a stress appraisal perspective on work engagement represents a significant step forward. As they highlight, future research could also delve into the specific algorithmic characteristics and features (e.g., platform-based ratings and location tracking) that are associated with technostressors, including elements of algorithmic control transparency and privacy. However, there remains a need for further research to elucidate the paradoxical effects of algorithmic management, explaining its impacts on technostress.

Algorithms are not limited to platforms alone; the rapid advancement of artificial intelligence (AI) and "algorithmic intelligence" is permeating various work contexts. It is imperative to investigate these negative experiences associated with the use of new-age technologies, as algorithmic intelligence increasingly influences users' personalities, judgments, emotions, and behaviours (Turel *et al.*, 2019). For instance, the deployment of enterprise bots to aid in work presents challenges for workers, including inconvenience, loss of privacy, and social isolation (Verma and Singh, 2023). A deeper understanding of how individuals respond at a micro-level to algorithmic control is essential. This understanding can inform the design of algorithms, tailoring them to maximise benefits and mitigate shortcomings. This research can shed light on crucial aspects of the human-algorithm interaction, guiding the development of more ethical and user-friendly algorithms. Therefore, related to algorithms it is worth exploring.

*How algorithmic fairness impacts technostress and whether such experiences lead to unethical practices and intentions to violate systems in platforms?*

### 6.3.2 Job Characteristics and Technostress

As work environments evolve, so do the characteristics of jobs within them. Previous literature has established that job characteristics play a crucial role in generating technostress, both in telework and platform contexts (Suh and Lee, 2017; Umair *et al.*, 2023). However, the applicability of these job characteristics leading to technostress varies depending on the specific context. For instance, in telework settings, Suh and Lee (2017) identified task interdependence as a key characteristic contributing to technostress, whereas in platform-based work, Umair *et al.*, (2023) highlighted feedback as a primary characteristic. Both studies highlighted the importance of job autonomy in examining technostress. However, traditional job characteristics such as skill variety, task identity, task significance, autonomy, and feedback may not fully capture the dimensions influencing employee responses in new work environments. In context of platforms, task clarity emerges as a significant antecedent impacting work performance and effort (Liu *et al.*, 2023). While, task significance, task identity and skill variety have been found to have limited relevance in platforms (Umair *et al.*, 2023). Liu *et al* (2023) in their research suggest looking beyond the five traditional job characteristics with factors such as specialisation and problem-solving abilities which may also influence outcomes.

Understanding these evolving job characteristics is crucial for effectively managing technostress and optimising performance in these new work environments. Therefore, it is proposed to study.

*How can job characteristics moderate the relationship between technostress and perceived work effort?*

### 6.3.3 Time and Technostress

The literature on IS acknowledges the critical importance of considering technical, human, and environmental factors when studying problematic and addictive patterns of technology use (Califf *et al.*, 2020; Salo *et al.*, 2022; Tarafdar *et al.*, 2019; Turel *et al.*, 2019). Temporality, a concept central to this discussion, encompasses an individual's subjective experience of time, including their relationship with time and their reactions to it (Ballard and Seibold, 2006). However, while technostress literature recognises the significance of time, it often oversimplifies this complex and nuanced aspect. In technostress literature, time is primarily viewed in terms of duration. This includes methodologies that collect data at two different points in time or measure the duration of exposure to stress or pressure to complete tasks within a given timeframe. However, time extends far beyond mere duration and encompasses various dimensions that impact our interactions with technology. The problem with this approach is that when aggregate stress over a large time period or many encounters, temporal and contextual fluctuations are overlooked in way. Keeping emphasises on a single unit of time may distort the complex changing person environment relationship (Lazarus 1990). Lazarus' transactional theory of stress offers a foundational framework for understanding technostress which mentions temporal aspects as environmental antecedent but a deeper meaning to these aspects remains unclear. For instance, time can influence with aspects such as pace, rhythm, velocity, speed, just-in-time responses, on-time delivery, completion rates, time management, planning, time pressure, and temporal congruity (Ballard and Seibold, 2006; Conboy *et al.*, 2018; O'Connor *et al.*, 2022). Other than the focus on time aspects that relate to organising and structuring a key focus on 'temporal personality' to capture and explain 'temporal fit' in organisational activities is important (Ancona *et al.*, 2001). These temporal aspects find relevance within work contexts, especially in platform-based environments (Graham and Anwar, 2020). A gap remains in fully addressing the complex interplay between temporal perspective within gig work practices and its effects on workers' experiences (Zheng and Wu, 2022). Understanding and analysing these temporal aspects are crucial for comprehensively examining the dynamics of technology use and its effects on individuals and organisations. Therefore, it is worth exploring.

*How do temporal characteristics such as pace of work, speed, rhythm, and work scheduling create an impact on technostress and its related outcomes?*

### 6.3.4 Culture and Technostress

The direct examination of culture's impact on technostress remains underexplored in current literature. While certain studies touch upon aspects that are either directly or indirectly related to culture, a further investigation in this area is still needed. It is asserted that organisational culture can impact the operation of an organisation as a whole and at the individual level (Wang *et al.*, 2008) For example, Fischer and Reidel's (2022) research examines the organisational climate within the context of technostress, a concept deeply rooted in an organisation's culture. They highlight that the social context in the organisation and in particular organisational culture and climate are crucial in facilitating adaptation to technological innovations. Existing research has predominantly focused on surface-level traits such as age, gender, education, and computer confidence. While Krishnan(2017) explored the role of personality and espoused culture linked to technostress, which are considered deep-level traits. The findings explain that individuals with diverse espoused cultural values will perceive technostress creators differently. Ma and Turel (2019) demonstrate that cultural differences, particularly dimensions such as power distance and masculinity, can also explain the formation of technostress. Future studies could explicitly theorise the cultural dimension within the context of technostress. One potential avenue is to explore culture at an individual level, which would contribute to understanding how deep-level traits impact various aspects of technostress (Krishnan, 2017; Srivastava *et al.*, 2015). Similarly, societal cultures vary in their perceptions of time, with different cultures placing varying degrees of emphasis on the past, present, and future. It would be valuable to explore the joint effect of an individual's subjective perception of time and their cultural or organisational view of time on the experiences of stress (Eldor *et al.*, 2017). Therefore, the following question is proposed.

*How can culture create an impact on technostressors and what strategies do people with varying cultures adopt to minimise technostress?*

### *6.3.5 Methodological Advancements in Technostress*

Traditionally, research on technostress has primarily employed quantitative methodology i.e., cross-sectional surveys. As interest in the topic continues to increase, there is a transition towards the utilisation of qualitative approaches and other methods although their application remains limited. Salo *et al*., (2019) suggest qualitative approaches offer significant benefits in the context of technostress for three main reasons. Firstly, they enable the discovery of a wide range of insights into previously unexplored topics. Secondly, they facilitate the identification of connections between IT characteristics and user perceptions. Lastly, they allow for the development of context-specific explanations of IT use and its real-life consequences. Alternatively, Claiff *et al.*, (2020) advocate for a mixed-method approach to comprehensively understand the phenomenon of technostress, which integrates elements from both quantitative and qualitative methodologies. Such mixed-method designs are favoured for three key reasons. Firstly, they offer the flexibility to address both confirmatory and explanatory research questions effectively. Secondly, they enable researchers to draw stronger inferences compared to using a single method or view. Lastly, they facilitate the generation of a broader range of divergent and complementary perspectives (Venkatesh *et al.*, 2016). Neuro-IS approach to measure neurobiological outcomes of technostress are measured using physiological assessment including cortisol levels, blood pressure, and pupil dilation (Riedl *et al.*, 2012). In a recent study, IT-mediated interruptions were found to disrupt employees' flow, as demonstrated by a NeuroIS laboratory experiment. The field of biology provides a valuable knowledge base for investigating technostress phenomena (Nadj *et al.*, 2023). Additionally, there are limited experimental studies available (Galluch *et al.*, 2015; Tams *et al.*, 2018). However, adopting complementary methodological approaches can further assist researchers in expanding the existing insights (Braamt *et al.*, 2021; Fischer and Riedl, 2017). For example, Benlian (2020) advocates for the use of longitudinal methods like experience sampling methodology (ESM), involving repeated measurements of the same participants to measure technostress experiences. ESM focuses on assessing variables that demonstrate significant within-person variation over the short term, which might be overlooked in cross-sectional surveys. Most technostress research adopts the between-person perspective which has limitations in terms of causality. These designs don't necessarily have to last for several days or months; could instead cover just a single day. Aggregate findings can be reported on stressful IS use situations and responses over multiple daily measurements through surveys and diary studies (Tarafdar *et al.*, 2019). Future research should consider intervention studies or design-oriented approaches to investigate causal relationships and alleviate stress in human-computer interaction, while also assisting users in developing effective coping strategies(Braamt *et al.*, 2021; Pflügner, 2022). Therefore, it will be worth exploring.

*How do technostressors evolve over time, and what coping mechanisms are acquired and employed over an extended duration?*

### *6.3.6 Amalgamated vs Disaggregated Approach in Technostress*

Technostress refers to the stress caused by ICT in various ways. Tarafdar (2007) provides a rigorous and theoretical conceptualisation of technostress. She empirically presents this phenomenon into five key dimensions: techno-overload, techno-complexity, techno-invasion, techno-uncertainty, and techno-insecurity. Ragu-Nathan *et al.* (2008) termed these dimensions as "technostress creators." Empirical research has adopted two distinct approaches to explore how technostress creators influence outcomes (Sarabadani *et al.*, 2018). The predominant approach, as employed by Tarafdar (2007) and Ragu-Nathan *et al.*, (2008), treats technostress creators as a superordinate construct with multiple dimensions affecting outcomes at an aggregate level. Conversely, other studies have examined the impact of technostress creators at the individual (disaggregated) level (Califf *et al.*, 2020; Fischer and Riedl, 2022; Nastjuk *et al.*, 2023; Suh and Lee, 2017; Umair *et al.*, 2023). Nastjuk *et al.*, (2023) in their meta-analysis explain in detail that each approach offers unique advantages: the aggregate approach reduces empirical and nomological complexity, whereas the disaggregated approach acknowledges the empirical and nomological specificity of individual technostress creators. While valid variance in one technostress creator may not be adequately captured by an aggregate construct, nuances in different technostress-related outcomes could be overlooked. In recent times, this differentiation has gained significant attention in research due to inconsistent technostress findings. Consequently, empirical evidence pinpointing when the five key technostress creators should be examined as an aggregate construct versus individually is essential for informing future studies. However, such evidence supporting either aggregated or disaggregated treatment of the technostress construct is scarce and mixed, highlighting the necessity for rigorous empirical research to address this question across multiple studies (Nastjuk *et al.,* 2023; Sarabadani *et al.,* 2018). Therefore, the following question is suggested.

*How do differences between aggregated and disaggregated technostress constructs affect their relationships with technostress outcomes?*

### 6.3.7 Positive Technostress

While much of the focus in technostress research revolves around its negative implications, it is important to recognise that not all stressors are harmful to individuals (Tarafdar *et al.*, 2019). The two distinct terms that describe stress are termed as 'Eustress' and 'Distress' (Selye, 1956). Eustress involves stress that presents a challenge or opportunity, while distress refers to stress that poses a threat or hindrance. In their seminal work titled "The technostress trifecta - techno eustress, techno distress, and design: Theoretical directions and an agenda for research," Tarafdar *et al.,* (2019) reintroduced the idea of exploring technostress through the lenses of eustress and distress. They emphasised moving beyond the conventional focus on negative outcomes to consider a positive view of technostress, highlighting its potential to serve as motivation for positive outcomes. Additionally, they highlighted the importance of expanding the role of IS in mitigating the negative effects of technostress through appropriate design and understanding its positive effects. Since then, researchers have begun to focus on understanding the various ways in which positive technostress emerges. Benlian (2020) studied the challenge of technostressors in context of work-home spill over, Califf *et al.,* (2020) explored them in the healthcare context, while Cram *et al.,* (Cram *et al.*, 2022) examine them in the context of Uber drivers. However, currently, our understanding remains fragmented, and there is still much more to uncover regarding the underlying mechanisms of this phenomenon (Tarafdar *et al.*, 2019). Future research should investigate the sub-processes involved in the technostress process, such as appraisal and coping mechanisms and other moderating variables (Cram *et al.*, 2022). Hence, the study proposes to investigate.

*What are the underlying appraisal and coping mechanisms that result in challenge technostressors and what moderating factors strengthen this relationship?*

### 6.3.8 Multidisciplinary Approach and Usage Context in Technostress

The foundation of the technostress draws from theories in organisational psychology and stress. For instance, Lazarus' transactional theory of stress (1966) serves as a prominent framework, emphasising key psychological stress factors. In addition to these theories, many foundational concepts stem from various disciplines such as psychology, management, and industrial-organisational psychology (Edwards and Cooper, 1990; Tarafdar *et al.*, 2019; Umair *et al.*, 2023). Furthermore, research in IS contributes significantly to our comprehension of technostress, particularly in terms of its design, implementation, and utilisation. Hence, the concept of technostress is regarded as multidisciplinary due to its integration of complementary elements and the establishment of a theoretical connection between IS and psychological stress literature (Orlikowski and Barley, 2001; Tarafdar *et al.*, 2019). As a result, future research should strive to draw from and inform its investigations by incorporating perspectives from both IS and non-IS literature. This approach will significantly contribute to the conceptual enrichment of the technostress theory and the broader understanding of stress phenomena (Salazar-Concha *et al.*, 2021; Tarafdar *et al.*, 2019).

The concept of technostress is an ever-evolving phenomenon, driven by the continual emergence of new types of IS, which encompass new devices and applications (Tarafdar *et al.*, 2019). These ongoing developments constantly unveil novel aspects of technostress. Furthermore, the modern workplace has undergone significant changes, particularly in the aftermath of the pandemic, giving rise to new work environments. In light of these dynamics, it is crucial to broaden research efforts across various contexts, including different platforms and work arrangements such as hybrid and telework setups (De *et al.*, 2020). This expansion is necessary to pinpoint the key differences in the experience of technostress across diverse settings. By exploring technostress within these varied contexts, researchers can gain a deeper understanding of its nuances and develop effective strategies for managing it in the evolving digital workplace. Much of the technostress research has traditionally focused on the organisational context. However, in recent years, there has been an expansion of its scope to include non-organisational contexts, particularly social media use (Salo *et al.*, 2019; Yuan *et al.*, 2023). Additionally, there has been a shift in research focus from non-voluntary use of IT to exploring voluntary IT use for hedonic purposes, such as gamification (Braamt *et al.*, 2021). In the context of platforms, future studies are encouraged to investigate whether workers experience and respond to technostress differently based on the specific platform they use(Cram *et al.*, 2022; Umair *et al.*, 2023). An area of increasing attention post-pandemic is online learning experiences (Sharma and Gupta, 2023). Moreover, as technology becomes increasingly ubiquitous, its impact is not limited to adults; adolescents also experience technostress. However, it is crucial to approach comparisons between adults and adolescents with care due to differences in their perception IT characteristics, technostressors and strains (Mehtälä *et al.*, 2023). The general rise in the development of IS for consumers highlights the need for technostress research. Therefore, future research should look into the underlying mechanisms of technostress for different technologies and usage settings, in order to better understand and address its implications across diverse contexts (Braamt *et al.*, 2021; Tarafdar *et al.*, 2019; Yuan *et al.*, 2023). Given the evolving work environments and technologies, it is also crucial to consider updating the development of instruments aimed at measuring the technostress as acknowledged in research referred to as the digital stressors scale (Fischer *et al.*, 2021). It is necessary because certain traditional technostressors may no longer be as relevant today; for instance, system crashes are less common compared to older times, while contemporary concerns such as online surveillance may be more applicable as technostressors in new contexts. Therefore, it is proposed to study.

*What new challenges arise in technostress research due to the evolving nature of IT artefacts and changing working environments?*

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# Appendices

### Table 8.1: Construct and items used in Chapter 4

| Construct | Source and Response Scale | Items and their codes |
|---|---|---|
| IT Complexity† | (Ayyagari *et al.*, 2011)<br>1 – Strongly Disagree and 7 – Strongly Agree | ITC1. Learning to use ICTs is easy for me.<br>ITC2. ICTs are easy to use.<br>ITC3. It is easy to get results that I desire from ICTs. |
| IT Presenteeism | (Ayyagari *et al.*, 2011)<br>1 – Strongly Disagree and 7 – Strongly Agree | ITP1. The use of ICTs enables others to have access to me.<br>ITP2. ICTs make me accessible to others.<br>ITP3. The use of ICTs enables me to be in touch with others.<br>ITP4. ICTs enable me to access others. |
| Job Autonomy | (Ahuja *et al.*, 2006)<br>1 – Strongly Disagree and 7 – Strongly Agree | AU1. I control the content of my job. *<br>AU2. I have a lot of freedom to decide how I perform assigned tasks. *<br>AU3. I set my own schedule for completing assigned tasks.<br>AU4. I have the authority to initiate projects at my job. |
| Feedback | (Steelman *et al.*, 2004)<br>1 – Strongly Disagree and 7 – Strongly Agree | UF1. When I do not meet deadlines, my requesters let me know.<br>UF2. My requesters tell me when my work performance does not meet standards.<br>UF3. On those occasions when my job performance falls below what is expected, my requesters let me know.<br>UF4. On those occasions when I make a mistake at work, my requesters tell me. |
| Work overload | (Ayyagari *et al.*, 2011)<br>1 – Strongly Disagree and 7 – Strongly Agree | WO1. ICTs create many more requests, problems or complaints in my job than I would otherwise experience.<br>WO2. I feel busy or rushed due to ICTs.<br>WO3. I feel pressured due to ICTs. |
| Job Insecurity | (Ayyagari *et al.*, 2011)<br>1– Strongly Disagree and 7 – Strongly Agree | JI1. ICTs will advance to an extent where my present job can be performed by a less skilled individual.<br>JI2. I am worried that new ICTs may pose a threat to my job.<br>JI3. I believe that ICTs make it easier for other people to perform my work activities. * |
| Strain | (Ayyagari *et al.*, 2011)<br>1 – Never and 7 Daily | STR1. I feel drained from activities that require me to use ICTs.<br>STR2. I feel tired from my ICT activities.<br>STR3. Working all day with ICTs is a strain for me.<br>STR4. I feel burned out from my ICT activities. |
| Cognitive Well-being | (Diener *et al*., 1985)<br>1 – Strongly Disagree and 7 – Strongly Agree | CW1. In most ways my life is close to my ideal.<br>CW2. The conditions of my life are excellent.<br>CW3. I am satisfied with my life.<br>CW4. So far, I have gotten the important things I want in life.<br>CW5. If I could live my life over, I would change almost nothing. |
| Positive Affective Well-being | (Anderson *et al.*, 2015)<br>1 – Never and 5 – Extremely often or always | PA1. My job made me feel at ease.<br>PA2. My job made me feel grateful.<br>PA3. My job made me feel enthusiastic.<br>PA4. My job made me feel happy.<br>PA5. My job made me feel proud |
| Negative Affective well-being | (Anderson *et al.*, 2015)<br>1 – Never and 5 – Extremely often or always | NA1. My job made me feel frustrated.<br>NA2. My job made me feel angry.<br>NA3. My job made me feel anxious.<br>NA4. My job made me feel fatigued.<br>NA5. My job made me feel bored. |
| Discontinuous Intention | (Turel, 2014)<br>1 – Not at all and 7 – To a very large extent | DI1. I intend to stop using MTurk in the next 3 months.<br>DI2. I predict I would stop using MTurk in the next 3 months.<br>DI3. I plan to stop using MTurk in the next 3 months. |
| Instructed-Response Item | (Aguinis *et al.*, 2021)<br>1 – Strongly Disagree and 7 – Strongly Agree<br>True or False | Please select neither agree nor disagree to demonstrate your attention.<br><br>This HIT you are working on is an audio transcription HIT. |
| Data Quality | (Brawley, 2017)<br>Yes – my data is good! or no | Were you serious and honest about your responses? (Answer will not affect payment). |

Note: *Indicates the items removed from analysis.
Note: † “IT Complexity” measures are reverse coded (i.e., higher scores on these items imply lower complexity).

**Table 8.2: Results of independent t-test on first 50 and last 50 responses in Chapter 4**

| Item | t-statistic | p-value | 95% confidence low-bound | 95% confidence high-bound |
|---|---|---|---|---|
| ITC1 | 0.106146 | 0.9159 | -0.35864 | 0.398644 |
| ITC2 | -0.82246 | 0.414798 | -0.55094 | 0.230938 |
| ITC3 | -1.44769 | 0.154073 | -0.52539 | 0.085389 |
| ITP1 | 0.889001 | 0.378346 | -0.2521 | 0.652097 |
| ITP2 | -0.18884 | 0.850995 | -0.46566 | 0.385657 |
| ITP3 | 1.196903 | 0.237103 | -0.19011 | 0.750114 |
| ITP4 | 0.449281 | 0.65521 | -0.27783 | 0.437829 |
| AU1 | 0.281638 | 0.779407 | -0.49082 | 0.650824 |
| AU2 | 1.875486 | 0.066691 | -0.03432 | 0.994318 |
| AU3 | 0.821479 | 0.415353 | -0.34711 | 0.827109 |
| AU4 | 1.457256 | 0.151425 | -0.20467 | 1.284667 |
| UF1 | 1.099944 | 0.276731 | -0.33079 | 1.130792 |
| UF2 | -0.19381 | 0.847129 | -0.68214 | 0.562141 |
| UF3 | -0.36062 | 0.71993 | -0.7887 | 0.548698 |
| UF4 | 0.82945 | 0.410872 | -0.34147 | 0.821467 |
| WO1 | 1.11378 | 0.270807 | -0.32171 | 1.121713 |
| WO2 | -0.20938 | 0.835023 | -0.84784 | 0.687836 |
| WO3 | 0.897992 | 0.373581 | -0.42087 | 1.100871 |
| JI1 | 0.898332 | 0.373402 | -0.39584 | 1.035843 |
| JI2 | 0.541676 | 0.590496 | -0.54198 | 0.941984 |
| JI3 | -1.07034 | 0.289712 | -0.97836 | 0.298356 |
| STR1 | 1.779812 | 0.081309 | -0.07487 | 1.234875 |
| STR2 | 0.652753 | 0.516966 | -0.41572 | 0.815723 |
| STR3 | 0.449163 | 0.655294 | -0.48637 | 0.766366 |
| STR4 | 0.86607 | 0.390672 | -0.36969 | 0.929694 |
| CW1 | 0.553207 | 0.582637 | -0.47387 | 0.833867 |
| CW2 | 0.988252 | 0.327884 | -0.33071 | 0.970708 |
| CW3 | 0.671334 | 0.50516 | -0.47842 | 0.958417 |
| CW4 | 1.101877 | 0.275898 | -0.29656 | 1.016559 |
| CW5 | 1.643727 | 0.106635 | -0.16025 | 1.600252 |
| PA1 | 0.000001 | 0.999998 | -0.36313 | 0.363133 |
| PA2 | 0.498729 | 0.620202 | -0.30294 | 0.502939 |
| PA3 | 0.632535 | 0.529978 | -0.30478 | 0.584783 |
| PA4 | 0.192377 | 0.848242 | -0.37784 | 0.45784 |
| PA5 | 0.090003 | 0.928652 | -0.42656 | 0.466558 |
| NA1 | 0.735147 | 0.465754 | -0.20803 | 0.448028 |
| NA2 | 0.100525 | 0.920338 | -0.37982 | 0.419818 |
| NA3 | 1.088434 | 0.281728 | -0.20311 | 0.683112 |
| NA4 | -0.17786 | 0.859568 | -0.49195 | 0.411952 |
| NA5 | -0.10266 | 0.918649 | -0.41149 | 0.371486 |
| DI1 | 1.420142 | 0.161898 | -0.21583 | 1.255827 |
| DI2 | 1.237437 | 0.221822 | -0.24959 | 1.049593 |
| DI3 | 1.531414 | 0.132098 | -0.16236 | 1.202362 |

**Table 8.3: Cross-loadings between items and constructs in Chapter 4**

| | IT Complexity | IT Presenteeism | Autonomy | Feedback | Work Overload | Job Insecurity | Strain | Cognitive Well-being | Positive Affective Well-being | Negative Affective Well-being | Discontinuous Intention |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ITC1 | **0.891** | 0.514 | 0.161 | 0.009 | -0.182 | -0.109 | -0.240 | 0.083 | 0.152 | -0.155 | -0.140 |
| ITC2 | **0.914** | 0.520 | 0.165 | -0.016 | -0.189 | -0.150 | -0.251 | 0.104 | 0.146 | -0.164 | -0.183 |
| ITC3 | **0.879** | 0.472 | 0.207 | -0.004 | -0.195 | -0.171 | -0.269 | 0.099 | 0.143 | -0.199 | -0.225 |
| ITP1 | 0.436 | **0.728** | 0.145 | 0.012 | -0.054 | 0.032 | -0.053 | 0.008 | 0.102 | -0.052 | -0.086 |
| ITP2 | 0.508 | **0.833** | 0.155 | 0.028 | -0.126 | -0.062 | -0.107 | 0.015 | 0.097 | -0.100 | -0.171 |
| ITP3 | 0.537 | **0.902** | 0.125 | -0.012 | -0.210 | -0.102 | -0.199 | -0.041 | 0.033 | -0.075 | -0.308 |
| ITP4 | 0.423 | **0.889** | 0.113 | 0.029 | -0.179 | -0.058 | -0.163 | -0.023 | 0.046 | -0.074 | -0.142 |
| AU3 | 0.192 | 0.176 | **0.852** | -0.022 | -0.058 | -0.026 | -0.036 | 0.111 | 0.150 | -0.133 | -0.100 |
| AU4 | 0.158 | 0.088 | **0.885** | 0.095 | -0.060 | -0.037 | 0.003 | 0.239 | 0.165 | -0.127 | -0.002 |
| UF1 | -0.059 | -0.113 | 0.081 | **0.825** | 0.341 | 0.212 | 0.279 | 0.247 | 0.289 | 0.072 | 0.317 |
| UF2 | 0.016 | 0.089 | -0.011 | **0.81** | 0.146 | 0.169 | 0.132 | 0.056 | 0.076 | 0.091 | 0.094 |
| UF3 | 0.082 | 0.134 | 0.039 | **0.808** | 0.112 | 0.084 | 0.058 | 0.157 | 0.150 | 0.044 | 0.079 |
| UF4 | 0.025 | 0.092 | 2E-04 | **0.821** | 0.138 | 0.128 | 0.086 | 0.065 | 0.111 | 0.082 | 0.108 |
| WO1 | -0.254 | -0.248 | -0.058 | 0.275 | **0.889** | 0.524 | 0.632 | 0.084 | 0.129 | 0.369 | 0.500 |
| WO2 | -0.140 | -0.129 | -0.032 | 0.237 | **0.924** | 0.582 | 0.609 | -0.014 | 0.023 | 0.410 | 0.377 |
| WO3 | -0.182 | -0.157 | -0.094 | 0.231 | **0.939** | 0.599 | 0.676 | -0.027 | -0.021 | 0.475 | 0.409 |
| JI1 | -0.095 | -0.026 | 0.051 | 0.17 | 0.485 | **0.870** | 0.435 | -0.012 | -0.027 | 0.261 | 0.253 |
| JI2 | -0.187 | -0.109 | -0.098 | 0.193 | 0.614 | **0.923** | 0.575 | -0.053 | -0.021 | 0.375 | 0.371 |
| STR1 | -0.280 | -0.198 | -0.001 | 0.215 | 0.674 | 0.543 | **0.937** | -0.091 | -0.034 | 0.509 | 0.478 |
| STR2 | -0.243 | -0.143 | -0.006 | 0.21 | 0.659 | 0.541 | **0.951** | -0.130 | -0.076 | 0.491 | 0.431 |
| STR3 | -0.241 | -0.158 | -0.015 | 0.181 | 0.643 | 0.507 | **0.939** | -0.093 | -0.069 | 0.529 | 0.431 |
| STR4 | -0.303 | -0.175 | -0.045 | 0.191 | 0.644 | 0.551 | **0.928** | -0.092 | -0.060 | 0.531 | 0.492 |
| CW1 | 0.114 | -0.018 | 0.181 | 0.165 | 0.007 | -0.075 | -0.089 | **0.942** | 0.559 | -0.333 | 0.117 |
| CW2 | 0.102 | -0.002 | 0.237 | 0.137 | -0.010 | -0.079 | -0.139 | **0.914** | 0.505 | -0.332 | 0.124 |
| CW3 | 0.118 | -0.013 | 0.157 | 0.146 | -0.007 | -0.059 | -0.122 | **0.931** | 0.563 | -0.364 | 0.122 |
| CW4 | 0.105 | 0.042 | 0.203 | 0.169 | -0.011 | -0.031 | -0.111 | **0.883** | 0.484 | -0.328 | 0.132 |
| CW5 | 0.047 | -0.091 | 0.150 | 0.218 | 0.087 | 0.063 | -0.031 | **0.815** | 0.483 | -0.251 | 0.213 |
| PA1 | 0.120 | 0.024 | 0.195 | 0.134 | -0.016 | -0.003 | -0.063 | 0.515 | **0.810** | -0.393 | 0.128 |
| PA2 | 0.140 | 0.08 | 0.148 | 0.215 | 0.025 | -0.019 | -0.050 | 0.414 | **0.788** | -0.285 | 0.050 |
| PA3 | 0.177 | 0.093 | 0.164 | 0.184 | 0.010 | -0.045 | -0.109 | 0.485 | **0.891** | -0.390 | 0.011 |
| PA4 | 0.113 | 0.067 | 0.143 | 0.203 | 0.038 | -0.041 | -0.085 | 0.543 | **0.898** | -0.395 | 0.105 |
| PA5 | 0.151 | 0.012 | 0.128 | 0.233 | 0.154 | 0.004 | 0.049 | 0.502 | **0.868** | -0.259 | 0.170 |
| NA1 | -0.175 | -0.074 | -0.118 | 0.034 | 0.343 | 0.264 | 0.432 | -0.337 | -0.448 | **0.853** | 0.253 |
| NA2 | -0.261 | -0.155 | -0.170 | 0.130 | 0.454 | 0.316 | 0.478 | -0.221 | -0.223 | **0.832** | 0.414 |
| NA3 | -0.132 | -0.069 | -0.141 | 0.102 | 0.416 | 0.306 | 0.447 | -0.256 | -0.233 | **0.815** | 0.282 |
| NA4 | -0.154 | -0.053 | -0.097 | 0.127 | 0.374 | 0.322 | 0.522 | -0.341 | -0.332 | **0.850** | 0.229 |
| NA5 | -0.038 | -0.003 | -0.072 | -0.064 | 0.232 | 0.246 | 0.307 | -0.285 | -0.450 | **0.671** | 0.181 |
| DI1 | -0.189 | -0.215 | -0.043 | 0.225 | 0.413 | 0.297 | 0.435 | 0.156 | 0.121 | 0.293 | **0.929** |
| DI2 | -0.186 | -0.22 | -0.040 | 0.23 | 0.472 | 0.354 | 0.475 | 0.136 | 0.084 | 0.359 | **0.942** |
| DI3 | -0.206 | -0.241 | -0.072 | 0.193 | 0.433 | 0.344 | 0.460 | 0.155 | 0.099 | 0.297 | **0.936** |

**Table 8.4: Constructs and items used in Chapter 5**

| Construct | Item code | Item |
|---|---|---|
| Time pressure | Considering MTurk work answer the following questions | |
| | TP1 | How often are you pressed for time? |
| | TP2 | How often do you have to work faster than normal in order to complete your work? |
| | TP3 | How often must you miss or delay a break because of having too much work to do? |
| | TP4 | How often must you finish work later because of having too much to do? |
| | TP5 | How often is a fast pace of work, required of you? |
| Challenge technostressors | How often did you experience the following stressful demands induced or mediated by ICTs in your work? | |
| | CTS1 | Complete a lot of work with ICT. |
| | CTS2 | Accomplish lots of work tasks with ICT. |
| | CTS3 | Work fast with ICT. |
| | CTS4 | Work at a rapid pace with ICT to complete all of my tasks. |
| | CTS5 | Learn new ICT skills and abilities. |
| | CTS6 | Use a broad set of ICT skills and abilities. |
| | CTS7 | Solve complex problems with ICT. |
| | CTS8 | Multitask assigned tasks/projects with ICT. |
| Hindrance technostressors | How often did you experience the following stressful demands induced or mediated by ICTs in your work? | |
| | HTS1 | Encounter major troubles or hassles (e.g., breakdown, crash, malfunctions) with ICT. |
| | HTS2 | Work with constraints imposed by ICT (e.g., lack of features, slow response times, security-related demands) to complete work tasks. |
| | HTS3 | Having inadequate/insufficient ICT resources (e.g., available devices or applications) to accomplish tasks. |
| | HTS4 | Cope with uncertainties about skills and abilities in using ICT. |
| | HTS5 | Get to grips with complex/unclear ICT functionalities and corresponding instructions or documentations. |
| | HTS6 | Change work procedures to adapt to new ICT. |
| | HTS7 | Handle conflicting expectations about using ICT for being available and responsive. |
| | HTS8 | Deal with interruptions and distractions caused by ICT. |
| Time distortion | TD1 | Time seems to go by very quickly when I use MTurk. |
| | TD2 | When I use MTurk, I tend to lose track of time. |
| Meaningful work | MW1 | MTurk activities are significant to me. |
| | MW2 | The work I do on MTurk is meaningful to me. |
| | MW3 | MTurk activities are personally meaningful to me. |
| | MW4 | The work I do on MTurk is worthwhile. |
| | MW5 | I feel that the work I do on MTurk is valuable. |

Note: Participants were instructed that for the purpose of this study references to your ‘job’ and your ‘work’ referred to the use of MTurk.

**Table 8.5: Cross-loadings between items and constructs in Chapter 5**

| | **Time pressure** | **Challenge technostressors** | **Hindrance technostressors** | **Time distortion** | **Meaningful work** |
|---|---|---|---|---|---|
| TP1 | **0.849** | 0.615 | 0.646 | 0.457 | 0.254 |
| TP2 | **0.853** | 0.663 | 0.660 | 0.421 | 0.334 |
| TP3 | **0.844** | 0.592 | 0.675 | 0.428 | 0.263 |
| TP4 | **0.866** | 0.584 | 0.744 | 0.443 | 0.253 |
| TP5 | **0.859** | 0.652 | 0.687 | 0.419 | 0.310 |
| CTS1 | 0.603 | **0.840** | 0.605 | 0.401 | 0.255 |
| CTS2 | 0.562 | **0.836** | 0.553 | 0.349 | 0.268 |
| CTS3 | 0.609 | **0.866** | 0.623 | 0.369 | 0.308 |
| CTS4 | 0.609 | **0.857** | 0.605 | 0.312 | 0.284 |
| CTS5 | 0.618 | **0.817** | 0.658 | 0.407 | 0.440 |
| CTS6 | 0.558 | **0.829** | 0.613 | 0.374 | 0.289 |
| CTS7 | 0.672 | **0.868** | 0.673 | 0.419 | 0.343 |
| CTS8 | 0.671 | **0.851** | 0.649 | 0.406 | 0.319 |
| HTS1 | 0.734 | 0.622 | **0.895** | 0.425 | 0.212 |
| HTS2 | 0.656 | 0.615 | **0.851** | 0.405 | 0.213 |
| HTS3 | 0.726 | 0.645 | **0.880** | 0.401 | 0.269 |
| HTS4 | 0.705 | 0.622 | **0.870** | 0.381 | 0.249 |
| HTS5 | 0.673 | 0.637 | **0.885** | 0.404 | 0.233 |
| HTS6 | 0.685 | 0.673 | **0.854** | 0.404 | 0.292 |
| HTS7 | 0.706 | 0.695 | **0.877** | 0.401 | 0.298 |
| HTS8 | 0.682 | 0.638 | **0.858** | 0.402 | 0.230 |
| TD1 | 0.464 | 0.441 | 0.421 | **0.902** | 0.568 |
| TD2 | 0.425 | 0.344 | 0.390 | **0.854** | 0.363 |
| MW1 | 0.372 | 0.368 | 0.295 | 0.450 | **0.805** |
| MW2 | 0.260 | 0.278 | 0.229 | 0.414 | **0.814** |
| MW3 | 0.310 | 0.328 | 0.300 | 0.471 | **0.836** |
| MW4 | 0.150 | 0.248 | 0.112 | 0.413 | **0.743** |
| MW5 | 0.170 | 0.237 | 0.152 | 0.394 | **0.790** |

**Table 8.6: List of IS journals selected for literature reviews**

| |
|---|
| Information Systems |
| MIS Quarterly Executive |
| MIS Quarterly |
| European Journal of Information Systems |
| Information and Management |
| Information Systems Journal |
| Information Systems Research |
| Journal of the Association for Information Systems |
| Journal of Information Technology |
| Journal of Management Information Systems |
| Journal of Strategic Information Systems |
| Management Science |
| Computers in Human Behavior |
| Information Technology and People |
| Internet Research |
| Information and Organization |
| Information and Society |
| Information Systems Frontiers |
| Journal of Computer-Mediated Communication |
| Journal of the Association for Information Science and Technology (JASIST) |
| Human-Computer Interaction |
| Behaviour and Information Technology |
| Communications of the Association for Information Systems |
| Information Systems and e-business Management |
| Information Systems Management |

**Table 8.7: Articles recorded under appropriate labels for literature review**

| Type of work | Articles | Environmental antecedents | Technostressors | | Strain | Outcomes |
|---|---|---|---|---|---|---|
| | | | ***Challenge technostressors*** | ***Hindrance technostressors*** | | |
| **Traditional work** | (Whelan and Turel, 2024) | | | (in)ability to use smartphone for non-work reasons in workplace | Strain manifest in the form of work life conflict | |
| | (Wong *et al.*, 2024) | | | ICT enabled work during non-working hours (WNWHs) | | Work exhaustion, non-work exhaustion, In role job performance, organisational citizenship behaviours |
| | (Thunberg *et al.*, 2023) | | | Techno-complexity, techno-uncertainty, and techno-insecurity and role overload | | Productivity |
| | (Hurbean *et al.*, 2023) | Instant messenger (IM) use at work | | Work interruption, technology overload and technological complexity | | Work performance |
| | (Yu, Chen, *et al.*, 2023) | | | Incongruent information overload, Incongruent interruption overload | | Productivity |
| | (Truța *et al.*, 2023) | Use of technology (job demand) | | | | Well-being at work (academics) |
| | (Müller *et al.*, 2023) | Shared mental models of ICTs (ICT SMM) | | Information overload | Techno-frustration | |
| | (Yazdanmehr *et al.*, 2023)* | Information security policies (ISPs) | Perceived challenge includes job workload, work pace, job complexity, job responsibility | Perceived Hindrance includes role uncertainty, role conflict, resource inadequacies, administrative hassles, job insecurity | | Intention to violate ISP violation |
| | (Chiu *et al.*, 2023) | | | Two categories of techno-insecurity: job-related (techno-overload, techno-invasion) and technology-related (techno | | Moral disengagement, deviance |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | complexity, techno-uncertainty) as technostress creators | | |
| | (Oksa *et al.*, 2022) | | | Professional social media (PSM) invasion, work exhaustion and work engagement | Work exhaustion and work engagement | PSM-enabled productivity |
| | (Maier *et al.*, 2022) | | | Trial-period technostress creators- IT characteristics (perceived difficulty of use, unreliability, personalisation complexity) Change characteristics (transition costs, habit disruption, incompatibility) and Intrusive characteristics (monitoring, privacy concerns) | | Intention to reject IT, user satisfaction |
| | (Yu, Zhong, *et al.*, 2023) | | Excessive social media usage behaviour of employees at work | Overload | Emotional exhaustion | Job performance |
| | (Hwang *et al.*, 2022) | | | Security technostress creators (overload, uncertainty, and complexity) | | Strains (organisational commitment compliance intention) |
| | (Pirkkalainen *et al.*, 2022) | Distal and proximal IT use | | IT insecurity, fear of missing out, IT use autonomy and involvement facilitation | | Problematic IT use |
| | (Harris *et al.*, 2022) | | | Techno-overload and techno-invasion | | Turnover intentions, work-family conflict, and family burnout |
| | (Shadbad and Biros, 2022) | | | Technostress, techno-unreliability | Strain | Violation to ISP (information security policy) |
| | (Fischer and Riedl, 2022) | Organisational climate of innovation | | Perceived uncertainty and perceived unreliability | | User satisfaction, job satisfaction |
| | (Ma *et al.*, 2021) | | | Technostressors | | Emotional exhaustion, work life balance |
| | (Pflügner, Maier and Weitzel, 2021) | IT Mindfulness | | Technostressors | | Job burnout |
| | (Maier *et al.*, 2021)* | | Challenge (IS use) stressors | Hindrance (IS use) stressors | | Use behaviours (routine use and innovative use) |
| | (Yener *et al.*, 2021) | | | Technostress | | Contextual performance, task performance, burnout |
| | (Korzynski *et al.*, 2021) | | | Technostress | | |

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|---|---|---|---|---|---|---|
| | (Tams *et al.*, 2022) | | | Perceived interruption overload, work life conflict | | Work-related technology usage |
| | (Benlian, 2020) | | Daily TD challenge stressors (TCS) | Daily TD hindrance stressors (THS) | | Partner satisfaction |
| | (Califf *et al.*, 2020)* | | Challenge technostressors (usefulness, technology support, involvement facilitation) | Hindrance technostressors (unreliability, complexity, uncertainty, insecurity, overload) | | Job satisfaction, turnover intention, attrition |
| | (Goetz and Boehm, 2020) | | | Technological insecurity | | General health |
| | (Zhao *et al.*, 2020)* | ICTs to accomplish work | | Techno-complexity, techno-invasion, techno-overload, techno-uncertainty, and techno-complexity | | ICT enabled productivity |
| | (Wang *et al.*, 2020) | | | Technostress | | Burnout, perceived performance |
| | (Güğerçin, 2020) | | | Techno-overload, invasion, complexity | | Cyberslacking/cyberloafing |
| | (Pirkkalainen *et al.*, 2019)* | | | Technostress creators (techno-overload, techno-invasion, techno-complexity, techno-insecurity) | | IT-enabled productivity |
| | (Maier *et al.*, 2019) | Conditions of IS | | Technostress | Techno-strain | |
| | (Stich *et al.*, 2019b)* | | | Email load | | Workload stress (psychological strain, negative emotions, and organisational commitment) |
| | (Chen and Wei, 2019) | | | Information overload, social overload | | Enterprise social media -related strain |
| | (Hwang and Cha, 2018)* | | | Security-related technostress creators (overload, complexity, and uncertainty of information security technology), security-related role stress (role conflict and role ambiguity) | | Compliance intention |
| | (Cao *et al.*, 2018) | Excessive social media use at work | | Information, communication and social overload | Social media exhaustion | Job performance |
| | (Jena, 2015) | | | Technostressors creators and inhibitors | | Job satisfaction, commitment, negative affectivity and productivity |
| | (Harris *et al.*, 2015) | | | Technology overload (information overload, communication overload, and system feature overload) | | Work family conflict |

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|---|---|---|---|---|---|---|
| | (Galluch *et al.*, 2015)* | Stressors created by ICT-enabled interruptions as two variables: quantity of interruptions and message profile | | Overload and conflict | Strain | |
| | (Fuglseth and Sørebø, 2014) | | | Technostress creators (Techno-overload, Techno-invasion, Techno-complexity, Techno-insecurity) and technostress inhibitors (technical support provision, literacy facilitation and involvement facilitation) | Strain (employee satisfaction with ICT use) | Employee intention to extend the use of ICT |
| | (D'Arcy, Herath, *et al.*, 2014)* | | | Overload, complexity and uncertainty | | Violation intention |
| | (Yan *et al.*, 2013) | | | Technostressors (work overload and role ambiguity) | Strain | |
| **Telework** | (Banerjee and Gupta, 2024) | | | Techno-overload, techno-invasion, role-conflict | | Perceived effectiveness at work |
| | (Singh and Verma, 2023) | COVID awareness and attitude toward mandatory telework | | | | Technology anxiety |
| | (Verma and Singh, 2023) | Willingness to use Enterprise Bots (EB) | | EB-induced overload | | Telework productivity |
| | (Meier *et al.*, 2023) | | ICT, work, and family related challenge stressors | ICT, work, and family, family related hindrance stressors | | Telework success |
| | (Dutta and Mishra, 2023) | | | Techno-overload, techno-complexity, and techno-invasion | | Stress at work |
| | (Azpíroz-Dorronsoro *et al.*, 2023) | | | Technostressors | | emotional exhaustion and the work-family conflict |
| | (Mirowska and Bakici, 2023) | ICT changes communication, limitations of ICT-enabled work settings ICT reduces informal exchanges | | Techno-isolation | Strain (short term outcomes) | Distal outcomes |
| | (Becker and Lanzl, 2023) | Digital technologies | | Techno-invasion, techno-interruptions, techno overload | | Work-family conflict |
| | (Ma *et al.*, 2023) | IT characteristics (information relevance, information equivocality, | | | | Technostress |

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| | | the pace of change, and invasion of privacy) | | | | |
| | (Andrulli and Gerards, 2023) | New ways of working | | Techno-overload, techno-invasion, techno-complexity, techno-insecurity, techno-uncertainty | | Job-related affective wellbeing |
| | (Taser *et al.*, 2022) | E-work life | | Technostress and loneliness | | Remote workers flow experiences |
| | (Suh and Lee, 2017) | IT characteristics (IT complexity, IT presenteeism, pace of IT change) Job characteristics (job autonomy and task interdependence) | | Work overload, invasion of privacy and role ambiguity | Strain | Job satisfaction |
| **Platform work** | (Cram *et al.*, 2022) | algorithmic control (gatekeeping and guiding) | challenge technostressors | threat technostressors | | continuance intentions and workaround use |
| | (Umair *et al.*, 2023) | IT characteristics (IT complexity IT presenteeism) Job characteristics (job autonomy and Feedback) | | Work overload Job insecurity | Strain | Subjective well-being- cognitive well-being, affective well-being (positive affective well-being, negative affective well-being) and discontinuous intention |

Note papers marked with * sign show that they have addressed other concepts as well which are not included such as appraisal and coping.

## Table 8.8: Articles related to technostress in contexts other than work

| Context | Articles | Antecedents | Technostressors | Appraisal and coping | Consequences |
|---|---|---|---|---|---|
| Online live streaming learning (OLSL) | (Fu *et al.*, 2023) | Techno-overload, techno-uncertainty, and techno-complexity, techno-coolness, techno-escapism | | Task oriented, approach, task-oriented avoidance, IS-oriented approach, and IS-oriented avoidance coping strategy | Cyber slacking and active participation |
| Older adults' psychological and behavioral responses to technology-driven stressors. | (Cheng *et al.*, 2023) | Perceived uncertainty of COVID, Self-efficacy, Familiarity of smartphones | Elderly's technology-driven challenge stressors (task load time pressure, task complexity, personal accomplishment), elderly's technology-driven hindrance stressors (malfunction frequency, resource inadequacy, task ambiguity, ICT-enabled interruptions) | | Strain (technology anxiety), avoidance behaviours (information avoidance and social avoidance) |
| Online car-hailing platforms, such as Uber and Lyft | (Li, Lu, *et al.*, 2023) | Algorithmic monitoring and Algorithmic fairness | | Challenge and hindrance appraisal | Work engagement |
| Technology-enhanced learning (TEL) in higher education | (Sharma and Gupta, 2023) | Technical support provision involvement facilitation | | Challenge appraisal and harm appraisal, academic planning, and efficacy (Problem-focused coping), general emotional support, emotional venting (emotion-focused coping), academic disengagement, continuation commitment | Students' learning satisfaction and performance |
| Information system security policies | (Jeon *et al.*, 2023) | | Technostress | Emotional reaction and coping | Intentions to comply with information systems security policies |
| Early adolescents use of IT | (Mehtälä *et al.*, 2023) | online social (media) behaviour, notification-driven behaviour, social distancing, and online education behaviour, and gameplay and other aspects of IT use behaviour | | | Physical strain and exhaustion |
| Video conferencing fatigue | (Anh *et al.*, 2023) | | Complexity, pattern adaptation | | Video conferencing fatigue, Continuance use intention, user satisfaction, communication efficiency |

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| Social network sites (SNS) | (Fakhfakh and Fatma, 2023) | | | Perception of information overload, social overload, communication overload | Perception of work overload, dissatisfaction towards SNS, Job performance, discontinuous usage intention |
| Personal IT ensembles (PITEs) usage | (Hu *et al.*, 2023) | Ubiquitous technical connectivity, Ubiquitous interpersonal connectivity | Information overload, communication overload, life invasion, privacy invasion | | Technology exhaustion, reluctant to try new ITs |
| Social networking sites (SNS) | (Whelan *et al.*, 2022) | | | social overload, disclosure, pattern, complexity, uncertainty, invasion | Student vitality, satisfaction with academic life, academic achievement |
| Videoconferencing technologies (virtual context) | (Vidolov, 2022) | Technology affordances | | | Emotions, Zoom fatigue (interactive exhaustion) |
| Repeated IT interruptions | (Weinert *et al.*, 2022) | Repeated IT interruption (habituation and sensitization) | | | Physiological arousal, psychological exhaustion, and behavioural task performance. |
| Service industries during the pandemic | (Tuan, 2022) | Dispositional and interpersonal mindfulness | | Regulatory focus (prevention focus, promotion focus) proactive coping of technostress | |
| Instant messaging fatigue | (Sun and Lee, 2022) | | | Communication overload, social overload | IM fatigue, technostress, discontinuous usage intention |
| Online learning | (James *et al.*, 2022) | Online learning intensity (tool frequency) | | technology overload (information, communication, and system feature overload) | Academic emotions, personal performance |
| ICT users | (Sriwidharmanely *et al.*, 2022) | Role of positive performance feedback | | Techno-stressors, i.e. complexity, system errors, and work-overload | Task performance |
| Interruptions mediated by mobile devices | (Tams *et al.*, 2022) | Technology-mediated (T-M) interruptions | Role based stress | | Use of mobile technology for work |
| Formal communication in the context of IT-enabled change | (Tsai and Compeau, 2021) | New IT (i.e., performance expectancy, effort expectancy) | Emotional responses to the new IT (i.e., anxiety and enthusiasm) | Coping intention (i.e., intention to seek instrumental and emotional support) | |
| Technostress operationalised as information and communication technology (ICT) demands | (Stadin *et al.*, 2021) | | | | |
| Social network sites (SNSs) | (Cheikh-Ammar, 2020) | | SNS overload, privacy threat | Escape and SNS wellbeing (regulatory focus) | SNS strain, SNS enjoyment |
| Social networking sites (SNSs) | (Masood *et al.*, 2020) | Extensive SNS use social-comparison, self-presentation, socialization, information seeking, enjoyment) | | | Cognitive distraction, academic performance |
| Mobile application users | (Salo *et al.*, 2020) | | | Problem-focused strategies (fixing the IT, adjusting own use to the IT, restraining until updates, switching the IT) Emotion-focused strategies (empathizing with the IT provider, downplaying the problem/IT, | |

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| | | | | blaming the IT/oneself, online/offline venting) and appraisals | |
| ICT use-meta-analysis | (Karimikia *et al.*, 2021) | IT use | | | Stress |
| Social media users | (Dai *et al.*, 2020) | | Perceived information overload | | Fatigue, frustration and dissatisfaction, Information avoidance intention |
| Smartphone-based social networking sites | (Masood *et al.*, 2021) | | Smartphone based SNS at night | | Poor sleep quality, failure of self-control regarding social media, and guilt as factors of strain |
| Social media fatigue | (Malik *et al.*, 2021) | Privacy concerns, social comparison, Self-disclosure, Intensity of MIM Use, Fear of missing out | | | Fatigue, academic performance |
| Excessive SNS Use | (Luqman *et al.*, 2020) | Excessive social, hedonic, and cognitive use | Technology-family, work and personal friction | | Strain, Discontinuance Intention |
| Social networking sites | (Tarafdar *et al.*, 2020) | | Complexity, Uncertainty, Invasion, disclosure, pattern and social overload | | SNS distraction |
| ICT's technostress in experimental design | (Sumiyana and Sriwidharmanely, 2020) | | | technostress | End-user performance, end-user satisfaction |
| Smart home assistants (SHAs) | (Benlian *et al.*, 2020) | Technology characteristics (unintentional voice activation, high presenteeism, and low user anonymity), anthropomorphic design | | Privacy invasion | Strain and interpersonal conflicts |
| Students' academic usage of mobile devices | (Qi, 2019) | | Technostress creators (techno-overload, invasion, complexity) | | Academic performance |
| Social media fatigue | (Xiao and Mou, 2019) | Social media characteristics of anonymity, flexibility, and presenteeism | Privacy invasion and invasion of life, | | Social media fatigue |
| Social networking sites | (Zhang *et al.*, 2019) | | Role stress (role overload, role conflict) | | Self-disclosure |
| Mobile shoppers | (Chen *et al.*, 2019) | | perceived information overload and perceived intrusiveness | Primary and secondary appraisal, coping strategies | Discontinuance behaviour |
| Social networking services | (Salo *et al.*, 2019) | SNS characteristics (push notification features, multipurpose functionality, real-time information renewability, self-disclosure features, information cue paucity) | SNS stressors- SNS overdependence, overload, Life comparison discrepancy, online discussion conflict, privacy, and security uncontrollability | | Strains related to well-being (concentration problems, sleep problems, identity problems, and social relation problems) |

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|---|---|---|---|---|---|
| Mobile social networking sites | (Cao *et al.*, 2018) | Excessive SNS use and cognitive emotional preoccupation | Life invasion, techno invasion and privacy invasion | | Academic performance |
| Social media users | (Cao and Yu, 2019) | | Information overload, communication overload, social overload | | Exhaustion, regret, discontinuous intention |
| Experimental task design | (Tams *et al.*, 2018) | Technology -mediated interruptions | Perceived mental work overload | | Task performance |
| Mobile social networking sites | (Zheng and Lee, 2016) | Excessive use | Technology-family, work and personal conflict | | Strain |
| Social and technology overload on psychological well-being in adults | (Choi and Lim, 2016) | | | Social and technology overload | Psychological wellbeing, SNS addiction |
| Social networking service fatigue | (Lee, Son, *et al.*, 2016) | SNS characteristics (information relevance, information equivocality), System characteristics (system pace of change, system complexity) | | Information, communication and system feature overload | SNS fatigue (i.e., strain) |
| Mobile phone user | (Lee, Chang, *et al.*, 2016) | | | | Technostress |
| Social networking services | (Maier, Laumer, Weinert, *et al.*, 2015) | | SNS stress creators (complexity, uncertainty, invasion, disclosure, pattern, and social overload) and switching stress creators (transition cost, sunk cost, replacement overload) | | Discontinuous usage intention and discontinuous usage behaviour |
| Smartphone usage | (Lee *et al.*, 2014) | | | Technostress | |