Enforced remote working: the impact of digital platform-induced stress and remote working experience on technology exhaustion and subjective wellbeing

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Abstract

The COVID-19 pandemic forced most individuals to work from home. Simultaneously, there has been an uptake of digital platform use for personal purposes. The excessive use of technology for both work and personal activities may cause technostress. Despite the growing interest in technostress, there is a paucity of research on the effects of work and personal technology use in tandem, particularly during a crisis such as the COVID-19 pandemic. Using a sample of 306 employees, this paper addresses this research gap. The findings highlight how both work and personal digital platforms induce technostress during the enforced remote work period, which in turn increases psychological strains such as technology exhaustion and decreases subjective wellbeing. Study results also show that employees with previous remote working experience could better negotiate technostress, whereas those with high resilience experience decreased wellbeing in the presence of technostress-induced technology exhaustion in the enforced remote work context.

Keywords: Technostress, digital platforms, enforce remote work, COVID-19, resilience, subjective wellbeing

1. Introduction

Although the notion of remote work is not new, the COVID-19 pandemic has abruptly transformed the scope and nature of remote work or work from home, which in many cases has been volitional and specific to certain jobs or professions before the pandemic. Accordingly, the pandemic-induced lockdown and social distancing measures imposed by national governments to limit the number of people going to work have forced the vast majority of employed and self-employed individuals to work from home, regardless of prior remote work experience (Waizenegger et al., 2020). Governments in many countries adopted strict lockdown measures during what is known as the first wave of the COVID-19 pandemic, forcing many individuals to stay at home, where they had to find ways to work and entertain themselves and their families. This unique situation—i.e., *enforced remote work*—has increased individuals' use of digital technologies for pleasure and work purposes since the first wave of the pandemic (Zhang et al., 2021).

As such, many individuals were obligated to learn in a short period of time a new way of working, which has created difficulties in maintaining a healthy work-life balance (Carnevale & Hatak, 2020). The intrusiveness and technological complexity of digital platforms has led to changes in the nature, pattern, and duration of work, which have increased uncertainties and challenged individuals' capabilities and competencies (Carnevale & Hatak, 2020). Moreover, the pandemic has induced a growth in technology use not only for work-related purposes but also for entertainment, information seeking, and social interaction (Elia et al., 2021). Consequently, people have relied heavily on technology-mediated social communications (e.g. social media platforms) and entertainments during the pandemic.

These changes in technology use in private settings have been abrupt and disruptive, demanding a high level of resilience and adaptability from users. First of all, an excessive use of technology may cause *technostress* (Afifi et al., 2018; Maier et al., 2015), which is defined

as a situation of stress experienced by an individual due to their use of technology (Brod, 1984; Tarafdar et al., 2007; Salo et al., 2022). The academic literature has established that technology platforms used within occupational contexts can induce technostress (Chandra et al., 2019; Maier et al., 2019). Yet, digital platforms used for personal purposes can also cause stress (Hawk et al., 2019; Lee et al., 2016; Zhang et al., 2016). In remote-working scenarios, people need to manage various digital platforms and applications while simultaneously balancing their work, familial, and social commitments. Further, digital platforms used for personal and social purposes (i.e., social media) may expose users to excessive, contradictory, and confusing information (Kozinets, 2021) and may create social obligations that can also increase stress. For example, a sudden shift to remote work can cause stress in general (Chen & Bonanno, 2020) and particularly technostress due to its enforced nature (Oksanen et al., 2021). Individuals who are not used to work remotely or from home may thus develop a heightened level of technostress if they are suddenly forced to do so.

Technostress can lead to psychological as well as physiological reactions such as techno-exhaustion (Cao & Sun, 2018; Maier et al., 2019) and reduced wellbeing (Islam et al., 2020; Ioannou et al., 2022). The existing literature, however, has not clearly explained the impact of technostress on psychological outcomes in particular, when stress is exacerbated by an enforced or sudden shift to home-based remote work, and when social relations necessarily shift from in-person to online. Furthermore, there has been little empirical research on the joint impact of both work and personal platforms on stress and its resulting effects on exhaustion and wellbeing. In this paper, we aim to *address this gap in the literature by analysing the joint impact of work and personal platform-induced technostress on individuals' psychological outcomes (e.g., techno-exhaustion and subjective wellbeing) in an enforced remote work situation*. Considering the nature of the COVID-19 pandemic, this is the most appropriate context for assessing and analysing the joint impact of work and

personal technology platform use on individuals' stress and wellbeing (Azer et al., 2021; Verma & Gustafsson, 2020). Although COVID-19 is the context for this study, findings can be applied to the current and future work environments that are increasingly characterised by remote working modes.

Although research has addressed various types of stress related to technology use, it remains to be seen what psychological and experiential resources individuals harness to cope with the increasing technostress in sudden and enforced remote work scenarios This leads to the second research objective of this paper: *to explore the roles of individuals' innate psychological resources such as resilience and experiential resources such as prior experience of remote working in dealing with technostress and mitigating its impact on their wellbeing*. By taking a holistic approach in combining the two objectives, we are able to expand our understanding on the effects of both work and personal technology platform use in an enforced remote working context and the role of individual resources.

To achieve these research objectives, we draw upon the stressor-strain-outcome (SSO) model (Ragu-Nathan et al., 2008) to assess the impact of work-platform technostress and personal-platform stress on techno-exhaustion and subjective wellbeing. Our findings suggest that in an enforced remote work (e.g., work-from-home) scenario, an increased use of both forms of technology platforms (work and personal use) lead to technostress, which causes techno-exhaustion and reduces subjective wellbeing. In examining these relationships, the study also contributes by identifying and analysing the moderating role of resilience and remote-work intensity (i.e., experience) before and during the COVID-19 pandemic.

2.0 Literature Review

2.1 Enforced remote work

The nature and impact of remote work conducted outside of more conventional organisational settings varies considerably (Mulki et al., 2009). Remote work is a particular type of flexible

work pattern that denotes working without a fixed spatial or time boundaries (Soga et al., 2022). On one hand, remote work is often appreciated and welcomed by organisations and their employees due to its perceived autonomy and flexibility, which have been argued to enhance employee performance (Kelliher & Anderson, 2010) and wellbeing (Sharma et al., 2020; Charalampous et al., 2019). Nevertheless, remote work often involves a partial to complete transformation of organisational culture and practice, including appropriate technological infrastructure and intervention. The proliferation of various technologies, including digital platforms – which have facilitated and fostered remote working in recent years (Ter Hoeven & Van Zoonen, 2015; Maitland & Thomson, 2014) – poses inherent challenges for workers, such as a tendency toward procrastination, isolation, ineffective communication, and work-home conflicts (Wang et al., 2021; Gajendran & Harrison, 2007; Barsness et al., 2005).

The benefits and challenges of various forms of flexible work patterns including remote work differ widely due to a number of factors such as industry norms, job role, organisational resources, and strategy (Soga et al., 2022; Karkoulian et al., 2016). For instance, its advantages are commonly experienced amongst many IT professionals due to the nature of their jobs, which may not be the case for other professions that offer partial or no scope for virtual work. Further, employees in sales, repair, and maintenance, for example, typically work remotely relative to corporate offices or headquarters, but may not work from home. Hence, not all remote work is meant to be 'work from home.'

This study offers a critical new perspective on remote work by focusing on the nascent concept of enforced work from home brought on by the pandemic (Waizenegger et al., 2020; Zhang et al., 2021). Due to lockdown and social distancing measures, many organisations suddenly shifted to remote work without having any prior experience or preparation (Mariani & Castaldo, 2020). This situation is termed as *enforced remote work*

(Anderson & Kelliher, 2020; Zhang et al., 2021), which indicates that organisations, owing to new requirements and/ or strict advice to "stay home" (or even quarantine), must quickly adopt new digital platforms, change business and communication practices, and provide technical and infrastructural support to their staff (Waizenegger et al., 2020). This context – which differentiates it from pre-COVID remote work such as "flexible remote working" – depicts a sudden, unplanned transition to virtual work, where many employees have been left with limited or no prior training. Further, most needed to contend with suboptimal workspaces in the home, and related challenges such as school and day care closures and unexpected parenting responsibilities (Larson et al., 2020; Verma & Gustafsson, 2020). This enforced *work-from-home* setting generally disrupts the patterns of the entire household, thus increasing worker stress.

Spurred by the Covid-19 crisis, there is a growing body of knowledge on enforced working from home. Waizenegger et al. (2020) adopted a qualitative approach (interviews) and the technology affordance theoretical lens to explore the positive and negative impacts of the COVID-19 pandemic on knowledge workers' team collaboration. Anderson and Kelliher (2020) addressed the pandemic's impact on working mothers and families with kids. Hartner-Tiefenthaler (2021) investigated the role of organisational and supervisor power on employees' voluntary and enforced work behaviour. Walters et al. (2021) studied the impact of enforced working on South African women's productivity in academia. As seen from this brief literature review, there is a dearth of studies on technostress in enforced work contexts.

2.2 Technostress

Technostress has received a significant amount of research interest over the last fifteen years (Chandra et al., 2019; Califf et al., 2020; Tams et al., 2018; Tarafdar et al., 2019, 2010, 2007). Stress in general has been explored as an outcome of the imbalance between external demands and individuals' capabilities and resources in meeting those demands (Tarafdar et

al., 2011; Cooper et al., 2001). How stress is caused by remote work situations (Perry et al., 2018) and the ways work technology often pervades our daily lives have also been examined (Anderson & Kelliher, 2020; Walters et al., 2021). The impact of excessive use of technology, and its resulting pressure and complexities for individuals, has been shown to create tension in both work and personal settings (Tarafdar et al., 2015). In this case, individuals may experience stress when they find themselves unable to accomplish what is expected of them using technologies within a particular environmental context, or when self-imposed goals are not met.

In the information systems (IS) literature, technostress has generally been referred to as the stress caused by *work-related technology* usage. Arnetz and Wiholm (1997) postulated that the excessive use of work-related technologies can lead to fatigue, restlessness, and physical discomfort. Also, as the increased connectivity and ubiquity caused by digital platforms can seamlessly connect individuals with work (Cenamor et al., 2019; Viglia et al., 2018; Fenner & Renn, 2010), sophisticated visual tools such as FaceTime, Microsoft Teams, Slack, and Zoom have been shown to invade people's personal lives.

In detailing the conditions that can lead to technostress within an organisation, Ragu-Nathan et al. (2008) identified five technostress creators: *techno-overload*, *techno-invasion*, *techno-uncertainty*, *techno-insecurity*, and *techno-complexity* (see Table 1). However, the choice of focus in addressing technostress creators is contextual and changes according to the context and job type studied. When researching technostress for gig workers, for instance, Cram et al. (2020) excluded techno-insecurity, and in a study on healthcare workers' technostress, Califf et al. (2020) excluded techno-invasion. Considering the different job roles and/ or contexts addressed in the literature, not all types of technostress are relevant or applicable. Because expertise in technology has not been considered a reason for job insecurity during the COVID period, techno-insecurity in the enforced work-from-home

context is excluded in this study, despite high levels of job loss. That is, techno-insecurity is less relevant in an enforced work-from-home scenario.

Insert Table 1

The study of technostress in organisational settings has considerable currency due to its relationship with important behavioural and psychological outcomes, including job satisfaction, organisational commitment, intention to stay (Ragu-Nathan et al., 2008; Tarafdar et al., 2015; Fuglseth & Sørebø, 2014; Jena, 2015), productivity (Tarafdar et al., 2007), job burnout and job engagement (Srivastava et al., 2015; Khedhaouria & Cucchi, 2019; Maier et al., 2019), technology-related and overall employee performance (Tarafdar et al., 2015), loneliness (Taser et al., 2022), anxiety and fatigue (Salanova et al., 2013), exhaustion (Cao & Sun, 2018), and wellbeing (Nimrod, 2018; Spagnoli et al., 2020; Pfaffinger et al., 2020). Research has also found that frontline service employees' technostress is also negatively related to customer satisfaction and delight (Christ-Brendemühl & Schaarschmidt, 2020).

Yet it is not just the work-related technological platforms that potentially lead to negative psychological outcomes. Frequent internet use for non-work-related purposes has been associated with negative psychological wellbeing (Huang, 2010). Excessive use of digital platforms and social media can produce isolation and cause anxiety (Tarafdar et al., 2019; Cao & Sun, 2018; Karr-Wisniewski & Lu, 2010; Chatzopoulou et al., 2020), body image concerns and dissatisfaction (Tiggemann & Slater, 2013; Ahadzadeh et al., 2017; Chatzopoulou et al., 2020), negative moods (Fardouly & Vartanian, 2015), poor academic performance (Cao et al., 2018), as well as *information and communication overloads* (Lee et al., 2016; Zhang et al., 2016). Information overload occurs when individuals are required to deal with an excessive amount of information that is beyond their capacity to accommodate or process. Communication overload refers to a consequence for individuals who face a strong obligation to engage in communication (Zhang et al., 2016).

Despite growing traction of both work- and personal technology-related technostress in the literature, evidence of both being analysed in tandem remains tenuous. Notably, there is a lack of clarity on the difference between work-induced technostress and personal and social platform-related (e.g. social media) technostress when it happens at the same time. Due to the growing popularity of working from home, both types of technostress studied in tandem hold crucial importance during the COVID-19 pandemic and beyond. This study therefore addresses an area that has received limited scholarly attention.

The COVID-19 pandemic in particular warrants fresh, holistic perspectives and more nuanced terminology and understandings to address the various types of technostress caused by work- and personal technology-related platforms. We argue that technostress, as discussed in the IS literature (Tarafdar et al., 2007, 2010, 2015), can be separated from the types of technostress individuals experience due to excessive use of and exposure to social media-based platforms. We refer to technostress induced by work-related technologies as *work technology platform stress* (WTPS), and technostress induced by personal technologies as *personal technology platform stress* (PTPS). This study thus endeavours to clarify this issue by distinguishing between these two settings.

2.3 Subjective wellbeing and exhaustion

Subjective wellbeing in the context of individual psychology refers to feelings such as happiness and a positive emotional state (Litwin & Shiovitz-Ezra, 2011). Stress creators are found to have a negative impact on individual wellbeing (Verduyn et al., 2017), as they place a high demand on an individual. This is especially relevant in the context of unpredictable events like COVID-19-induced changes, or tasks related to the increased invasion of technology in private life. These conditions are found to increase an individual's sensitivity to daily aggravations and irritation and may result in a negative outlook on life and decrease in subjective wellbeing (Baumann et al., 2005; Penney & Spector, 2005).

As a psychological reaction to technostress, perceived tiredness, and a feeling of being overwhelmed has been studied as *burnout* in the work-related technostress literature (Maier et al., 2019) or *exhaustion* in the social media-related technostress literature (Cao & Sun, 2018). We therefore include exhaustion in our model, as it has been argued that the intrusion of technology in people's lives, due to their excessive use of and reliance on technology (notably in the current COVID-19 scenario), will likely make them feel overwhelmed (Wainzenegger et al., 2020).

In this study, we identify *resilience* as a response mechanism to cope with technostress and/ or minimise its negative impacts. While the negative impact of stressors on a person's physiological and psychological state has been pronounced in scholarship, research has also addressed how the extent of resilience to these stressors can enable the individual to negotiate with external pressures and navigate through disruptive states in different ways (Ponomarov & Holcomb, 2009). As resilience has exhibited a strong association with responses to excessive and disruptive use of technology (Torres & Augusto, 2019), it offers a meaningful and highly relevant conceptual underpinning for this research.

3.0 Theoretical underpinning and hypothesis development

3.1 The stressor-strain-outcome Model

The stressor-strain-outcome (SSO) model (Ragu-Nathan et al., 2008) is used as the theoretical framework of this study. The model enables us to identify the causes (*stressors* or *environmental stimulus*), nature (*strain*), and outcomes (*techno-invasion, overload, insecurity, complexity, and uncertainty*) of technostress.

In this study, *stressor* represents those factors that generate stress. The increased use of digital platforms (i.e. work and personal technology platforms) during enforced work from home are considered as stressors. An important theoretical aspect of the model is the conceptual distinction between two different types of technology used during the pandemic.

First, we focus on work-related (occupational) technology platforms such as Zoom, Slack, Microsoft Teams, and other traditional work-related systems that are being used at home remotely during the pandemic. Second, we include personal technology platforms such as various forms of news, social media, and entertainment platforms that individuals use at home and in contexts outside of work.

We categorise *strain* as the psychological state caused by stressors, where techno-exhaustion is considered as strain. We suggest that technostress emanating from WTPS and PTPS would have an additive effect on technology-related exhaustion in an enforced work-from-home context, such as the COVID-19 period.

Finally, *outcome* refers to the psychological/ behavioural effects of a stressful situation, where subjective wellbeing is considered as an outcome. We further posit that the effects of increased use of work and personal technology-related platforms on technostress and wellbeing are not homogenous for all individuals. Following Salanova et al. (2011), we use the resources-experiences-demands (RED) model to better understand the variable experiences of technostress among individuals. RED suggests that the amount of stress an individual experiences, can be an outcome of the difference between job demands and the scarcity of job and personal resources to cope with those demands. For instance, individuals will appraise a situation and make necessary adjustments in light of their perceptions of the availability and usefulness of those resources (Salanova et al., 2013). In our research context, individuals' work-from-home experiences before and during COVID are considered as *job resources*, and their innate resilience as a *personal resource*.

3.2 Hypotheses development

3.2.1 Increased use of technology and technostress

COVID-19 has forced people to rely heavily on technology to support remote work, keep in contact with friends and family members, gather information and news, and entertain

themselves (e.g. movies, TV series, and game consoles). Even before COVID-19, the demand for flexible work practices supported by digital platforms was appealing to many (Curzi et al., 2020; Kelly et al., 2020). But the pandemic has largely removed the volitional factor from the work-from-home pattern. The COVID-19 emergency has caused sudden and radical changes in work patterns and practices by introducing new technological platforms, replacing face-to-face interaction with virtual meetings and remote collaboration, and increasing the importance and frequency of electronic communications (Carnevale & Hatak, 2020; Carroll & Conboy, 2020; Hartmann & Lussier, 2020; Pan & Zhang, 2020). Many organisations and individuals were not prepared for this transformation (Venkatesh, 2020). As such, workers have been forced to adapt to the new and increased use of technology while also demonstrating their capability and adaptability in delivering at their maximum potential.

While increased technology use at work means that people are able to accomplish more tasks while working remotely during the pandemic, they have also faced the problem of techno-overload. Importantly, when working from home, employees often encounter difficulties in maintaining a work-life balance, which can potentially lead to techno-invasion (McCarthy, 2020; Tarafdar, 2020) . To facilitate this sudden shift of work patterns, new technologies have been introduced and old technologies were upgraded. As technostress is more common when managing new technologies or situations, individuals who need to learn new skills or update their task performance may experience techno-complexity and uncertainty, a challenge that can also affect those more accustomed to technology demands (Shu et al., 2011; Tarafdar et al., 2007). We therefore suggest the following hypothesis:

H1: *Increased use of technology during enforced work from home positively affects work technology platform stress (WTPS).*

As the excessive use of technology for personal reasons – such as when the time it uses exceeds the time planned for it – also leads to technology-related stress, which is associated with cognitive preoccupation (Caplan & High, 2006). This can lead to technology-

induced outcomes related to family, social, and personal conflict (Zheng & Lee, 2016), which may contribute to increased stress among all parties. Specifically, during the pandemic, Google Search Trends revealed a significant increase in digital platform use for personal purposes (e.g. information, entertainment, and social communications, Statista, 2020b). Not surprising is the sharp increase in searches for COVID-19-related information (Husnayain et al., 2020) as well as consumer-related products (Statista, 2020a). On the other side, limited opportunities for indoor activities (due to the closure of cinemas, pubs, restaurants, etc.) and restrictions on public and social gatherings has led to increased use of technology for entertainment purposes (Bunyan & Maitland, 2020). The greater household use of social media, streaming services, computer/ video games, and audio books (Statista, 2020b) may also cause cognitive preoccupation and intervene in the lives of users' family and roommates.

Simultaneously, the COVID-19 lockdown restricted any means of meeting people outside the household, where limited social interactions created considerable distress for many. Technology has been an effective tool for adapting to this "new normal" during this period, and helped overcome such distress (Dey et al., 2020; Sheth, 2020). As people are being forced to lead isolated lives, their perceived loneliness has increased their dependency on technology for companionship and human connection (Kuem et al., 2020). Individuals were far more likely to exchange information through social media during the pandemic (Nabity-Grover et al., 2020), as confirmed in UK data showing close to a 40 percent increase in social media usage and a nearly 35 percent increase in messaging services like Facebook and WhatsApp (Statista, 2020b).

This increased use of technology is also accompanied by information overload, activity interruption, and other pressures related to communication use. For instance, voice and video calls, messages, and notifications can interrupt an individual's offline communications and other activities or put them under an obligation to respond while they

may have other priorities. Even when being done for information, entertainment, or social communication purposes (Brooks et al., 2017; Cao and Sun, 2018; Tarafdar et al., 2019), constant digital platform connectivity has led to techno-invasion in other work habits (Waizenegger et al., 2016). A large amount of information in different forms can also pose a cognitive challenge that pushes people beyond their capability to process it, which may lead to excessive stimulation and fatigue (La Torre et al., 2019). A substantial amount of information and communication overload in home-based work settings can increase stress related to personal technology platform usage. We therefore hypothesise as follows:

H2: *Increased use of technology for personal use during enforced work from home positively affects personal technology platform stress (PTPS).*

3.2.2 Work technology and personal technology platform technostress and techno-exhaustion

The extant literature has suggested that technostress causes *strain*, resulting in negative psychological or behavioural reactions among users (Ayyagary et al., 2011; Tarafdar et al., 2010). One aversive and unconscious psychological reaction to stressful situations caused by technology use is *exhaustion*, which is experienced as a feeling of tiredness or lack of energy (Ayyagary et al., 2011; Maier et al., 2015). Even in general terms, remote work can cause stress to employees due to physical, operational and affinity distances (Soga et al., 2021). Nevertheless, remote work was originally shaped by practices embedded in an organisational setting, which traditionally gave users time to adapt to new technologies or procedures. As quick adjustment to technology has become necessary under conditions of pandemic-induced crises, individuals must effectively manage work demands without a period of adjustment. Learning and making new technology work while meeting the job demands at the same time leads to *fatigue* (Richter, 2020).

During the pandemic, employees face challenge to learn new technological platforms, while they have simultaneously felt exhausted and burnout due to working in isolation (Laker et al., 2022). Change in pandemic-induced work patterns has created the need for frequent

virtual meetings that demand much engagement and commitment, thus creating 'Zoom fatigue' (Fosslien & West Duffy, 2020; Feldman & Mazmanian, 2020). A person may be expected to feel such fatigue from techno-overload, as they generally need to work more and at a faster rate. When an increased or excessive use of work-related technology platforms also invades their home space and personal life, or when the technology increases in complexity, people may experience *techno-exhaustion* (Ayyagari et al., 2011; Weinert et al., 2014). Based on these arguments, we hypothesise the following:

H3: *Work technology platform stress (WTPS) during enforced work-from-home positively affects techno-exhaustion.*

With technology platforms serving as the most important and potentially the only avenue to garner information during the COVID-19 period, a huge amount of information is continually being produced, diffused, and updated at a rapid rate. Both the amount and speed of information that needs to be processed under any circumstances can cause information anxiety and overload (Wurman, 1988). During the COVID-19 period, however, due to restrictions on social gatherings, the increased flow of technology used to check on loved ones, prevent boredom, and stay in touch with friends can lead to *communication overload*. The literature has alluded to individuals' psychological tension caused by the processing of excessive information (Cao & Sun, 2018; Karr-Wisniewski & Lu, 2010; Zhang et al., 2016) that is not always pleasant or appreciated, particularly during difficult times (Sarker & Sahay, 2004). The extraordinary times of the COVID-19 pandemic has certainly led to an unprecedented level of information and communication demand for many individuals. Likewise, responding to excessive communication can necessitate additional efforts, which may lead to exhaustion. We thus propose the following hypothesis:

H4: *Personal technology platform stress (PTPS) during enforced work from home positively affects techno-exhaustion.*

3.2.3 Techno-exhaustion and subjective wellbeing

Subjective wellbeing has been defined as "a person's cognitive and affective evaluation of his or her life" (Diener et al., 2002, p. 63). For most people, experiencing a high level of subjective wellbeing is an end in itself (Verduyn et al., 2017). Additionally, higher subjective wellbeing leads to improved personal and work-related outcomes, and enhances social relationships, life satisfaction, productivity, and success (Verduyn et al., 2017; Boehm et al., 2011; Lyubomsirsky et al., 2005; Diener et al., 2002). Due to the COVID-19-induced work-from-home requirement, the need for new technological tools has left people with very few choices but do their best under very difficult circumstances. Also, the continuous flow of distressing images and negative information related to the pandemic, and the related needs for communicating with friends and family, causes higher levels of techno-exhaustion. As the pandemic is defined by its unrelenting uncertainties, difficulties, and tragedies, ongoing technology dependence and related learning curves can also create psychological *fragility* as well as exhaustion. Feeling both overextended and fragile, an individual would further experience reduced subjective wellbeing (Nimrod, 2018; Pavot & Diener, 2008). We thus hypothesise as follows:

H5: *Techno-exhaustion during enforced work from home period negatively affects individual's subjective wellbeing.*

3.2.4 The moderating effect of remote work intensity

As the remote work setting generally blurs the boundaries between work and family domains, boundaries management skills are needed to cope with work-related stress and familial relations (Fonner & Stache, 2012). The situation becomes even more challenging if individuals have to constantly readjust their work patterns (Clark, 2000). Further, even during an enforced remote work situation, the extent of remote working requirements varies due to professional differences and changing needs.

We suggest that in enforced work-from-home scenarios, such as that induced by COVID-19, those with limited opportunities to accomplish their work remotely due to the

nature of their profession or tasks could face new challenges. The increasing use of work-related technology at home would be more stressful for workers who need to spend time to learn new skills and new technologies, but still could not finish all their tasks remotely. In contrast, people who are able to get much of their work done remotely at home would feel less exhausted by the increasing use of work-related technologies at home. In other words, because the increasing use of technology would help them get their work done, those who are able to get a vast majority of their work done remotely at home are less likely to be exhausted by the increasing use of technology. In contrast, if they need to engage in work-related technology at home in a situation where they cannot accomplish a lot of work remotely, they will likely feel that the increasing use of work-related technology was unnecessary and not beneficial, leading to stress related to technology. We therefore suggest that the intensity of remote working would have a moderating effect on the inter-relationship between increase in work related technology use and WTPS, and hypothesise:

***H6**: The effect of increasing work-related technology use on work-technology platform stress (WTPS) is moderated by the intensity of remote working during enforced work from home, such that the effect is stronger for individuals with less-intense remote work during the enforced remote work period.*

As the COVID-19 pandemic has made work from home necessary for many individuals (Anderson & Kelliher, 2020), they face numerous challenges in the form of role and work environment adjustment, increased distance between individuals and their organisation, support at work, and work-family conflict (Gajendran & Harrison, 2007). The sudden and disruptive shift to work-from-home setups may appear as highly uncertain and ambiguous in terms of impact, where early encounters with work from home as a new mode may be experienced as surprising and uncomfortable for individuals, especially for those with no prior experience. While their adaptability and adjustment to a new work mode is naturally influenced by the amount of experience they have had with it (Gajendran & Harrison, 2007; Raghuram et al., 2001), the increased use of work-technology platforms in remote work

scenarios may not discount or ease the use of personal-technology platforms. That is, those who face enforced technology-enabled work from home may have to simultaneously deal with extensive technology for personal use. During COVID-19, technology tools have emerged not only as a mode of work but also in many instances, as the only way to be entertained and connected to family, friends, and the outside world (Dey et al., 2020).

In terms of adapting to changes in daily life patterns, when individuals encounter new, surprising, and uncertain situations, they often seek to establish control in managing these challenges (Baumeister, 1984). In the first stage of adjustment, they may focus on alleviating immediate problems, and their attention could be drawn to task-related challenges (Argyris, 1985). Those with prior experience in remote work will find it less challenging to deal with various technological demands, including the ones emanating from their increased use of personal digital platforms. For those with less experience in remote working, the personal technology overload and need for constant connectedness may complicate their work adjustment due to time constraints, job intensity, or cognitive capacity demand. This will in turn exacerbate the impact of increased use of personal technology on personal platform-based technostress. Accordingly, we hypothesise the moderating role of remote working intensity on the inter-relationship between increasing use of personal technological platform and PTPS as follows:

H7*: The effect of increasing personal technology platform use during enforced work from home on personal technology platform stress (PTPS) is moderated by remote working intensity before the enforced remote work period, such that the effect is stronger for individuals with less-intense remote work before the enforced remote work period.*

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3.2.5 The moderating effect of resilience

The key psychological task for most people during the pandemic has been to minimise their level of stress/ distress (Chen & Bonanno, 2020). *Psychological resilience* is defined as the ability of a person to recover, rebound, adjust, or even thrive following misfortune, change, or adversity (Garcia-Dia et al., 2013). As a key personal resource for helping reduce the

impact of distress, people with high resilience can more effectively regulate the impact of stressors on their wellbeing. Such resilience negatively moderates the impact of technology exhaustion, and thus reduces stress levels in the work domain (Jin et al., 2020, Chen & Bonanno, 2020; Tarafdar et al., 2019; Torres & Augusto, 2019).

In the COVID-19 scenario, however, where individuals are experiencing high levels of intrusion from intensified technology use on both the work and personal fronts, even those with high resilience may struggle to maintain their wellbeing. To manage techno-exhaustion, highly resilient people will employ active coping strategies (Li & Nishikawa, 2012) that may include seeking technical support or developing their own technical capacity and skills (Tarafdar et al., 2019). Resilience is not just a personality trait but is also affected by interpersonal and environmental factors (Waugh & Koster, 2015). Due to COVID-19 restrictions, the usual organisational IT support is likely disrupted or provided in a different way. That disruption could have encouraged or required extra efforts from highly resilient individuals, who often take initiatives to successfully tackle, endure, and emerge from environmental threats (Block et al., 1980). Nevertheless, their continuous efforts to actively cope with the increasing use of technology at both work and on personal fronts can make remote work unmanageable, where those with high resilience may experience decreased subjective wellbeing caused by technology-related exhaustion. We thus hypothesise that resilience can moderate the relation between techno-exhaustion and wellbeing:

H8: Resilience moderates the effect of techno-exhaustion on subjective wellbeing such that techno-exhaustion has a stronger negative effect for individuals with high resilience.

As discussed, prior experience with remote work helps individuals gain control of the situation and adapt efficiently in work-from-home situations. Remote working includes consecutive experience with relevant technology that can facilitate a successful transition (Anderson & Kelliher, 2020; Wang et al., 2021). Research has indeed confirmed that in the absence of prior experience in remote working and related technology, individuals often

struggle to cope with the excessive intrusion of technology (Charalampous et al., 2021; Anderson & Kelliher, 2020) at work and in private life. Along with the demanding enforced work-from-home situations and family/ work conflicts (Van Bakel et al., 2018), this complex situation taxes individuals' time management demands as well as their cognitive abilities, ultimately affecting their wellbeing.

The literature has also shown that individuals with strong resilience are normally capable of overcoming or managing challenges (Crane & Searle, 2016), and they can apply organisational learning for better work engagement (Malik & Garg, 2020). People with strong resilience, with or without prior experience, are thus more likely to proactively resolve their difficulties. Individuals with high resilience do not necessarily need to rely on experiential resources for their wellbeing, however, as they naturally tend to navigate their way out of a crisis situation. Using active coping strategies, they can either actively seek support from their organisations or self-learn the necessary technology. In the absence of experience as a resource on which to rely, they may also seek support from their social circles. That is, resilient individuals are more likely to be innovative and capable of exploring various means to cope with difficult situations, and they tend to have fewer psychological impacts such as anxiety (Li & Miller, 2017). In the absence of any support, their resilience can serve as a source of wellbeing, where they will often use their innate psychological capacities to deal with the situation. In trying to adapt, those with high resilience will try to make the most of available resources to manage the situation, minimise the impact of techno-exhaustion, and thus achieve wellbeing. We therefore posit:

H9: Resilience moderates the effect of remote work intensity on subjective wellbeing before the enforced remote work period, such that the effect is stronger for individuals with less-intense remote work experience before the enforced work-from-home period.

4.0 Method

This study applies a survey-based quantitative research approach, following the research thread of technostress (Cao & Sun, 2018; Tarafdar et al., 2010).

4.1 Survey measures and data collection

To ensure content validity, the survey measures used in this research are adapted from the existing literature – except for measures to capture changes in the use of technology platforms for work and personal purposes, as well as the percentage of work from home performed before and during COVID, which are measured on a self-reporting scale through the percentage increase. WTPS is measured as developed by Ragu-Nathan et al. (2008). WTPS is conceptualised as a superordinate second-order construct (reflective first-order and reflective second-order construct) as used by Maier et al. (2015, 2019). PTPS is measured by eight items as used by Cao and Sun (2018), which include the measurement of information and communication overloads.

An exploratory factor analysis using the principal component method is conducted on the WTPS and PTPS scales (see Appendix B) to ensure the items were loading on the factors as conceptualised by Ragu-Nathan et al. (2008) and Cao and Sun (2018). The results show five factors where all the eight items of PTPS scale loaded on one factor in concurrence with Cao and Sun (2018), and rest of the work technostress items loaded on four factors as designed by Ragu-Nathan et al. (2008). The techno-exhaustion and resilience constructs are adapted from Maier et al. (2015) and Hua et al. (2018), respectively. The measures for subjective wellbeing, the dependent variable, are adapted from Steinfield (2008), where four items out of the suggested eight items loaded with loading more than 0.6 and were thus retained. All items are measured using a seven-point Likert scale ranging from strongly disagree to strongly agree. Appendix A shows the scale measures and item loadings.

After conducting a pilot test to check the suitability of the items and to ensure the respondents' understanding, the final survey was conducted via Prolific in July 2020. The survey has screening questions about the nationality, residence country, and employment status to ensure responses received were only from British nationals who were employed. The sample comprised British respondents living and working in the UK, who were employed (full-time, part-time, and self-employed) before and during the survey time period. A total of 47 percent of the respondents in our dataset had no prior remote working experience, and for 84 percent the respondents, less than half of their work could be done remotely prior to COVID-19. We received 309 responses in total, out of which three responses were excluded from people who were out of work due to COVID-19. A total of 306 responses were therefore used (see Table 2).

Insert Table 2

5.0 Results

The data were analysed following the partial least squares (PLS) method and SmartPLS 3.3.2 (Ringle et al., 2015). PLS-SEM was chosen because it is less restrictive for skewed variable distributions and is suitable to calculate consistent estimates, even in the case of complex models (Hair et al., 2011). PLS-SEM is also considered relevant and appropriate in similar studies such as Maier et al. (2019).

5.1 Common method bias

To check for common methods bias (CMB), Harman's single factor test was used. The results indicate that one factor explains only 25.2 percent of the variance, which confirms that there is no CMB influence in the sample. Additionally, the method adopted by Williams et al. (2003) was followed to determine the extent of CMB by including a CMB factor in the model. All the remaining factors were transformed into several single-item constructs, and a

ratio of R^2 with a CMB factor to R^2 without a CMB factor was compared. The ratio is 1:326, indicating no CMB influence.

5.2 Measurement model-reliability, convergent and discriminant validity

The Cronbach's alpha value and item loadings are used to assess the internal consistency reliability as suggested by Hair et al. (2017) and Czakon et al. (2020). Table 3 shows that the Cronbach's alpha value for all constructs is above the threshold of 0.7, and the loading for most of the items are above 0.6, confirming the reliability of the measures. The items with loading less than 0.6 are retained, as the overall average variance extracted and composite reliability are at acceptable levels. The convergent validity of the constructs is tested using composite reliability (CR) and the AVE (Fornell & Larcker, 1981). As can be seen in the correlation table in Table 3, the AVE is higher than the 0.5 threshold, and the CR is higher than the 0.7 threshold, thus establishing the convergent validity (Henseler et al., 2015). Discriminant validity is evaluated by comparing the AVE and variance shared among the constructs. Table 3 shows that all the square roots of the AVE are greater than the corresponding construct correlations (Fornell & Larcker, 1981), thus establishing the discriminant validity. The Heterotrait-Monotrait (HTMT) ratio is also used to further ensure the discriminant validity (Henseler et al., 2015). The use of the absolute HTMT 0.85 criterion indicates that discriminant validity is not an issue in this research. All the correlations are below 0.85 threshold, where the bootstrapping approach indicates that the HTMT is significantly different from 1, confirming the discriminant validity.

Insert Table 3

5.3 Structural model

To evaluate the structural model, we use the coefficient of determination (R^2), the significance levels of each path coefficient, and the standardised root mean square residual (SRMR). Figure 1 shows the results of the structural model. As can be seen in Table 4, the R^2

value of main endogenous variables is moderate, indicating sufficient explanatory power (Hair et al., 2017). SRMR value – which reflects the difference between the observed and the predicted correlation as an absolute measure of fit for the model is 0.091 – is less than the recommended value of 0.10 (Hu & Bentler, 1999), suggesting a good fit for the model.

Insert Table 4

Figure 1 and Table 5 present the results of the hypothesis testing of the basic model. The results show that the increase in technology use for work has a significant positive effect on the WTPS, thus supporting H1. Likewise, the increase in technology use for personal use has a positive and significant effect on PTPS, thus supporting H2. WTPS and PTPS also has a positive and significant effect on techno-exhaustion, thereby supporting H3 and H4. Comparison of the path coefficient value, however, shows that PTPS has a higher influence on techno-exhaustion than WTPS. Techno-exhaustion shows a significant negative influence on subjective wellbeing, thus supporting H5.

Insert Figure 1

Insert Table 5

The product indicator approach is used to test the moderating effect of remote working before and during the pandemic. As seen in Table 6 and Figure 2, the percentage of remote work performed during COVID-19 negatively moderates the positive effect of increasing work-related technology use on WTPS, in that the effect is stronger for individuals who performed a low percentage of remote working during the pandemic, supporting H6. As shown in Table 6 and figure 3, the positive effect of increasing personal use of technology during COVID-19 on PTPS is negatively moderated by the remote work percentage before COVID-19, in that the effect is stronger for individuals who had a low percentage of remote work before COVID-19, thereby supporting H7.

Insert Figures 2 and 3

As seen in Table 6 and figure 4, resilience is shown to negatively moderate the impact of techno-exhaustion on subjective wellbeing, in that techno-exhaustion has a strong negative influence on subjective wellbeing of individuals with high personal resilience, thereby supporting H8. Furthermore, as shown in figure 5, resilience negatively moderates the impact of remote work experience before COVID-19 on subjective wellbeing, thus supporting H9.

Insert Table 6

Insert Figures 4 and 5

6.0 Discussion

The outcome of the analysis is summarised in Table 7. This study contributes to the technostress literature by analysing the simultaneous effects of both work and personal technology platform stress on techno-exhaustion and subjective wellbeing. It acknowledges that technostress and its impact would not be same for all individuals, after evaluating the impact of personal resource (resilience) and job resource (remote working experience before and during a crisis situation. The COVID-19 pandemic creates a unique crisis situation when employed and self-employed individuals experience work technology platform stress (WTPS) and personal technology platform stress (PTPS) in the same setting (i.e. the home environment). But the current literature on technostress (Tarafdar et al., 2019; Khedhaouria & Cucchi, 2019; Korzynski et al., 2020; Yener et al., 2020) has offered little in terms of comparative assessment of these two different types of technostress. Drawing on theoretical lenses of the stressor-strain-outcome (Ragu-Nathan et al., 2008) and resource-experiences-demands models (Salanova et al., 2011), we address this research gap by merging the two parallel but related streams of research on technostress. We argue that this approach warrants significant attention during the COVID-19-induced crisis period, due to enforced work-from-home practices and the blurred boundary between personal and work settings it has created.

The results indicate that in an enforced work-from-home situation, increase in the use of technology for work enhances the impact of WTPS.

On the personal level, an increase in the use of technology for personal information and communication purposes is found to increase the impact of PTPS. Results also show that during the crisis period – where individuals experience a sudden increase in technology use for both work and personal purposes – the increased intensity, intrusion, and influx of technology has worked as an antecedent/ stressor for both WTPS and PTPS. Accordingly, we concur with the literature proposing that personal technostress exacerbates the intensity and frequency of use of technology (Cao & Sun, 2018), and technology-related perceptions (Kim & Kankanhalli, 2009; Zheng & Lee, 2016), information access (Ayyagari et al., 2011; Weinert et al., 2014), and the need to communicate continuously.

To further explain the interactive experience of work and personal technology stress, we test the impact of remote working experience as a job resource. Results show that individuals who had a low percentage of remote work during COVID 19 experience high WPTS due to an increased use of work platforms. The extant literature has posited that autonomy and flexibility are considered to be advantages of the remote working mode (Gajendran & Harrison, 2007), and control and domain clarity are the prerequisites of better job performance during a remote working situation (Fonner & Stache, 2012; Clark, 2000). During COVID-19, however, people may have had to continuously oscillate between the office-based and remote work setups. Under these circumstances, they likely experience a constrained sense of autonomy or less control of the situation as well as a lack of clarity in managing the home domain. They may have also experienced a change in technology setup and a continuous need to adjust to that, which increases their WTPS.

These findings present the impact of remote work experience and related stressors during the uncertain and dynamic environment of the COVID-19 pandemic, a crisis that has

induced enforced remote work requirements. The prior literature has largely investigated the issue within the spectrum of pre-planned remote working set ups, which gives the worker time to plan and clarity of domain. In this study, however, prior experience of remote working is considered as a resource that facilitates better adjustment to that setting (Raghuram et al., 2001). Prior experience of technology is also considered herein to enhance technology adaption, as it reduces the impact of technostress due to technology extensivity. Our results show that, when respondents experience technostress from both work and personal platforms and have no or low prior remote work experience, their PTPS increases due to an enhanced use in personal technology. As noted above, almost half of the study sample had no prior remote working experience, and less than half of their work could be done remotely prior to COVID-19. This finding offers novel insights into the impact of prior remote work experience, as the literature has only analysed the remote working experience as a resource in the work scenario context (Gajendran & Harrison, 2007; Raghuram et al., 2001). In our research, however, the lack of prior remote working experience reveals higher levels of personal technology platform stress, which extends the application of remote working experience into the personal life domain.

The tandem effect of both types of technostress is a new contribution in the field of technostress research. The results suggest that in an enforced work-from-home situation, where individuals face extreme reliance on technology for both work and personal purposes, WTPS and PTPS induce techno-exhaustion. While this concurs with two distinct streams of work and personal technostress research (Cao & Sun, 2018; La Torre et al., 2019; Salanova et al., 2013; Tarafdar et al., 2019, 2020; Zheng & Lee, 2016;), our results further confirm that PTPS has a higher effect on techno-exhaustion than WTPS. A plausible explanation for this outcome could be the participants' priority for work technology platforms over personal technology platforms. It can be argued in this context that, individuals consider the use of

work-related technology as a mandatory part of their lives, while they relegate personal technology to a volitional option.

The onslaught of distressing images and negative information related to the COVID-19 crises in conjunction with new work/ family communication needs can cause techno-exhaustion. In these crisis situations, however, some individuals will value their jobs and strive to meet work technology demands and might feel less exhausted in the process. But if they feel the new personal technology demands are unnecessary or unreasonable, they may feel too exhausted to cope. As such, we speculate that the multiplicity of personal technology usages has many complex forms, such as different types of social media and communication and entertainment technology as well as its implications (individual, familial, and social) as compared to the work-related use of technological platforms.

Specifically, reduced, or increased productivity, reduced job satisfaction, and burnout are considered as the outcome of work-related technostress, while discontinuance intension, exhaustion, and negative emotions are the outcomes of personal technostress (LaTorre et al., 2019). What should be considered in a crisis situation, we concur, is the impact technostress exerts on subjective wellbeing, where individuals dealing with several enforced adjustments may feel a lack of control over their situation. This can affect self-perception of life quality, work performance, and psychological states. In evaluating subjective wellbeing as an outcome construct of the SSO model, this study contributes to the existing technostress literature. Results reveal the ways in which individuals' subjective wellbeing is negatively affected due to increased techno-exhaustion during the COVID-19 period. It further confirms that exhaustion caused by technology use can significantly affect people's quality of life and subjective wellbeing. While experiencing so many worries and difficulties during the COVID-19 period – many of which are unprecedented and severe – people may have considered that an excessive use of technology could diminish their wellbeing and exacerbate

their problems. To further understand the heterogeneity in impacts of techno-exhaustion on subjective wellbeing, we study the moderating role of resilience as a personal resource.

The literature states that resilience negatively moderates the impact of exhaustion on wellbeing, as highly resilient individuals in stressful situations experience less impact on their wellbeing (Chen & Bonanno, 2020; Jin et al., 2020; Tarafdar et al., 2019; Torres & Augusto, 2019). Interestingly, in contrast to the extant literature, our results show that in the context of COVID-19 enforced work from home, individuals with high resilience can experience a stronger negative impact of techno-exhaustion on their subjective wellbeing. This could be explained by the nature of highly resilient individuals as explored in this study, who might blame techno-exhaustion for their situational wellbeing problems during COVID-19. They will often plough on (even in the most challenging situations), adapt, keep functioning, and give their best in challenging conditions. As such, in enforced work-from-home situations, workers who must make significant adjustments to deal with challenges are likely to have high techno-exhaustion and reduced wellbeing. They also tend to use active coping strategies such as technical skill enhancement and support from their organisation, which hasn't necessarily abundant in the COVID-19 situation. After all, managers are also dealing with the extreme challenges posed by the pandemic. Ironically, the natural resilience of workers in this case may undermine their ability to deal with unavoidable uses of technology and associated exhaustion during COVID-19, thereby negatively affecting their subjective wellbeing and quality of life.

The study shows how resilience negatively moderates the impact of prior remote working experience on wellbeing, which implies that individuals with low or no prior remote working experience use their innate resilience to achieve and sustain subjective wellbeing during the current COVID-19-induced technostress environment. Prior remote working experience has also been acknowledged as an added resource that helps individuals adapt and

perform well in the remote working environment (Gajendra & Harrison, 2007). Especially when technology becomes the only facilitator of the remote work setup, prior remote working experience will inherently include previous experience with relevant technology. This can then help them adjust smoothly to the enforced remote working setup during COVID-19, where they face technology intrusion in both their work and personal life. In the absence of prior remote working experience, innate resilience thus works as a buffer and bridge between efforts to gain control of the situation and the coping strategies used to reduce the impact of technostress (Jin et al., 2020; Leipold & Greve, 2009; Tarafdar et al., 2019).

6.1 Theoretical contributions

This study is one of the first to examine work-related and personal platform technostress in tandem. Thus far, scholarly works have generally maintained a separate focus on each technostress type. Although our research was conducted during the COVID-19 pandemic (which continues to be a global crises), the theoretical implications for and the importance of assessing both types of technostress simultaneously are immense. Increasing remote work and work-from-home scenarios (Delanoeije et al., 2019; Kreiner et al., 2009; Sarker & Sahay, 2004) that expose individuals to both forms of technostress warrant our taking them into account simultaneously. This is particularly crucial in environmental conditions triggered by sudden crises (e.g. natural disasters and widespread political emergencies). Furthermore, as individuals often use the same technology for both work and personal purposes (Brooks, 2015; Tarafdar et al., 2015), they may face both types of technostress. Our model enables future researchers to develop a clearer and wider comprehension of the technostress construct by assessing work-related and personal technostress jointly.

This research posits the increased use of technology for various purposes (e.g. work, entertainment, information, and communication) is an antecedent to technostress. Subsequently, we measure techno-exhaustion as a psychological reaction to both work-

related and personal technology platforms. We argue that psychological strain in the form of techno-exhaustion has a strong impact on subjective wellbeing and hence can be considered as an outcome of both WTPS and PTPS.

The current literature on work-related technostress has largely addressed work-related outcomes, such as employee commitment (Ragu-Nathan et al., 2008), productivity (Tarafdar et al., 2007), innovation (Chandra et al., 2019; Tarafdar et al., 2015), job burnout and engagement (Srivastava et al., 2015), overall employee performance (Tarafdar et al., 2015), and employees' psychological states related to burnout and exhaustion (Ayyagari et al., 2011; Maier et al., 2015). And although work-related stress is strongly connected with reduced wellbeing, its impact on employees' subjective wellbeing has not received adequate research attention (Carayon et al., 1999; Sonnentag & Frese, 2013). While excessive use of IT has been found to negatively affect employees' job satisfaction (Tarafdar et al., 2015), an indicator of wellbeing, this research further identifies the positive impact of WTPS on techno-exhaustion, which leads to decreased subjective wellbeing. As such, the study empirically tests and explains the extent to which work-related technostress leads to a decrease in subjective wellbeing, an approach that advances the study of technostress.

The extant literature on remote working has viewed prior remote working experience as a resource that facilitates individuals to adjust in the new environment and get the most benefit out of flexible working environments (Raghuram et al., 2001; Gajendran & Harrison, 2007). Yet prior research has evaluated remote work and techno stress in exclusivity – i.e. where remote working is considered the only mode of work and technostress occurs only due to work-related technologies. Our research is among the first studies to combine both work and personal platform technostress in tandem. It also considers the environment wherein stable remote work, some individuals due to the nature of their job must work both in-office and remotely. In this scenario, we find that not only prior experience of remote working but

also the percentage of remote work performed during the current scenario will affect people's technostress differently. This study thus contributes to the overall research stream of remote working and technostress by establishing that the effect of remote working environment and experience on technostress is not homogenous, as the context should be deeply considered.

Similarly, resilience as a psychological ability is well researched in the work environment and stress domain. As resilience has always been considered as a positive ability – in enabling the regulation of stress and related exhaustion impact on an individual's wellbeing – our research confirms the relevance and importance of resilience in the time of crisis to deal with the impact of technostress (Chen & Bonanno, 2020; Oksanen et al., 2021). This research also enriches the research domain by establishing contradictory results that, highly resilient individuals can experience a stronger negative impact of techno-exhaustion on their subjective wellbeing in the context of remote working and technostress, which arises from both work and personal technology platform usage. We call for further research in the area of resilience and technostress in a remote working environment. Future research should look at the impact of resilience in a longitudinal study in the context of sudden crises as characterised by COVID-19 pandemic, which has a lasting influence on individuals' ability to deal with technostress. Further, Tarafdar et al. (2019) distinguished between the two forms of technostress and *techno-eustress,* which considers how individuals may view technology as a useful or exciting challenge. In acknowledging this valuable contribution to the topic, future researchers could also investigate whether these highly resilient individuals (as we found in our research) may perceive the utility and challenges of mastering their technology, and how these perspectives may sustain or restrain techno-exhaustion.

6.2 Practical implications

This research has practical implications for various stakeholders such as end-users, organisations, and technology developers. Its potential applications for practice are especially

meaningful, considering that the COVID-19 pandemic is still raging in most countries, and the fear of continual waves is justifiably strong. Even as the world is slowly recovering from the effects of pandemic, work practices such as increased work from home has now become a norm in many sectors. The following measures can be taken in the event of the new rounds of lockdown, in light of ongoing social distancing measures and the new sort of permanent work-from-home setup in several domains as an outcome of the pandemic. As some of the measures are context-independent, they can be followed beyond the COVID-19 period.

Due to technology being the primary or only tool available for work and personal entertainment, information, and communication purposes during the pandemic, the boundary between work-related and personal use of technology continues to be blurred. Many people who have been excessive with their personal use of technology have found it has invaded their work time too, therefore causing stress. As suggested by Tarafdar (2020), the human brain is not going to evolve to meet such digital demands anytime soon. This means that IT is only going to become more essential to everyday lives, so it is important to learn "IT distancing" both at work and at a personal level. This will become timelier and more important in the post-COVID era, as work from home is now the "new normal" in many sectors, and long working hours for people working from home is the trend. This new norm exposes individuals with constant use of technology in tandem for both work and personal use, meaning that will reinforce the value of learning "IT distancing" well into the future.

Organisations ought to take extra measures to mitigate the impact of technostress during possible lockdown and other restrictive measures (e.g. work from home) now and in the future. Since exclusively working from home or flexible working setups are slowly becoming accepted in many sectors – including the ones without flexible working before – organisations should have standard measures about flexible working hours, less intrusive technology use, notably by avoiding or minimising the use of more personal and intrusive

communication tools, such as WhatsApp, text messaging, and voice calls. Zoom and Microsoft Teams have necessarily become popular since the advent of COVID-19. These tools allow people to join according to their own convenience, where they do not have to receive a call while doing something else. Unlike Skype, Zoom and Microsoft Teams give users greater liberty about joining and leaving a call, while also making them even more dependent on their technology.

In alignment with the existing literature (Stich et al., 2017; Tarafdar et al., 2015), it can be argued that organisations should arrange adequate training and peer-to-peer support to reduce work-related technostress. They could further adopt appropriate human resource policies to discourage the use of emails and other forms of communication beyond office hours. Measures should also be in place to help employees deal with work pressure and time management so that they do not feel overwhelmed and obliged to work beyond office hours. Finally, considering the extraordinary scope of the pandemic, managers should show flexibility and strong empathy in dealing with employees, many of whom are experiencing problems or even calamity far beyond work-technology stressors and challenges.

6.3 Limitations and future research

This research has limitations that suggest directions for future research. First, being a cross-sectional study, it does not capture different states of technostress and their outcomes at different levels of the COVID-19 period, which has rapidly evolved and is dynamic by nature. In focusing on individuals' work settings, it does not investigate how shared purpose or comradery among workers facing serious challenges may impact resilience and coping strategies. More research on how individuals develop adaptive behaviours when encountering stress is therefore warranted. Finally, the extent of work technology platform stress and personal technology platforms related to enforced work from home can be expected to vary

depending upon family/household size and circumstances, the organisational position, and the extent of perceived job security, which can be explored in future research.

7. Conclusion

Technology use during the COVID-19 pandemic has had different impacts on individuals' psychological states. This paper develops and validates a theoretical model to assess both work-related and personal technostress and their impact on psychological states and subjective wellbeing. During a time when information systems and management research are delving into COVID-19-induced technology use and its outcomes, we offer strong conceptual insights and practical implications that enable a better understanding on how to assess and address the different ways in which individuals' stress and wellbeing are affected by technology use during the pandemic.

While the extent and severity of the pandemic are gradually receding, individuals and organisations are contemplating life and work beyond the COVID-19 period. What is now widely known as the "new normal" has introduced unexpected measures in our lives, which individuals and organisations are likely to learn from. Enforced work from home and the ability to cope with resulting disruptions can be cited as notable "lessons" that can potentially redefine organisational and individual lives in the years to come. The findings of this paper offer useful implications in this regard, beyond this pandemic, in the event of crisis situations such as natural disasters, wars, and civil unrest, and even the next pandemic that can trigger enforced work from home.

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Table 1. Technostressors, adapted from Tarafdar et al., 2007

Technostressors	Definitions
Techno-invasion	Techno-invasion is the stressor where an individual feels non-work time to be invaded by work demands.
Techno-overload	Techno-overload occurs when an individual faces excessive use of technology.
Techno-insecurity	The feeling of insecurity that individuals face when they feel that others may know more about new technologies than they do.
Techno-complexity	The stressor is caused by individuals' experience because they have to constantly learn how to use new technological applications and/or find it difficult to understand/disruptive.
Techno-uncertainty	Techno-uncertainty occurs when individuals are unsure about the new technological applications and their use.

Table 2. **Sample characteristics**

Demographics		**Frequency**	**Percentage**
Gender	Male	111	36.3
	Female	195	63.7
Age	Less than 30 years old	143	46.7
	Aged 30 years and above	163	53.3
Marital status	Single	148	48.4
	Married or in a domestic partnership	139	45.4
	Widowed	2	0.7
	Divorced	11	3.6
	Separated	6	2
Employment status	Full-time	286	93.46
	Part-time	3	0.98
	Self-employed	17	5.55
Percentage of respondents with remote working experience before COVID-19.	• 52.9% of the respondents were working remotely (at least 1% of their work) [47.1% were not working remotely] • 4.2% of the respondents were doing 100% of their work remotely		
Percentage of respondents with remote working experience during COVID-19.	• 83.0% of the respondents were working remotely (at least 1% of their work) [17% were not working remotely] • 57.2% of the respondents were doing 100% of their work remotely		

Table 3: Correlations among study variables

	1	2	3	4	5	6	7	8	9	10	11	12	Composite Reliability (CR)	Average Variance Extracted (AVE)	Cronbach's alpha (CA)	Mean	SD
1. Techno-exhaustion	**.86**												.92	.74	.92	5.46	1.58
2. Increase use of non-work tech.	.35	-											-	-	-	See note	See note
3. Increase use of work tech.	.24	.38	-										-	-	-	41.45	36.48
4. Personal platform tech. stress	.63	.48	.19	**.75**									.91	.56	.91	5.26	1.35
5. Remote work during COVID-19	.16	.06	.49	.11	-								-	-	-	72.18	40.59
6. Remote work before COVID-19	.02	.07	-.05	.07	.20	-							-	-	-	12.44	24.79
7. Resilience	-.23	.09	.06	-.14	.04	-.01	**.70**						.88	.57	.89	5.30	0.85
8. Techno-complexity	.45	.18	.23	.31	.06	-.08	-.15	**.70**					.85	.65	.85	5.49	1.24
9. Techno-invasion	.53	.43	.49	.54	.28	-.04	-.06	.49	**.71**				.80	.50	.80	6.98	1.41
10. Techno-overload	.50	.34	.38	.40	.19	-.05	-.04	.65	.62	**.81**			.90	.66	.90	6.26	1.43
11. Techno-uncertainty	.39	.22	.31	.41	.17	-.13	-.04	.48	.49	.67	**.86**		.89	.74	.89	5.47	1.65
12. Subjective wellbeing	-.41	-.23	-.17	-.29	-.01	.04	.39	-.23	-.31	-.15	-.17	**.72**	.81	.52	.81	5.52	1.23

Notes: increase use of non-work technology use has three dimensions: increase use of technology for information (mean: 38.384 and SD: 29.036), increase use of technology for entertainment (mean: 48.833 and SD: 29.611), and increase use of technology for social interactions (mean: 48.661 and SD: 30.575)

Table 4. Model fit criteria

	R square	SRMR
WTPS	0.268	**0.091**
PTPS	0.196	
Techno-exhaustion	0.436	
Subjective wellbeing	0.242	

Table 5. Path analysis results

Hypothesis	Relationship	Path Coefficient	t-value	Sig.	Support
H1	Increase in technology use for work during COVID → WTPS	0.446	4.828	0.000	Yes
H2	Increase in technology use for personal purpose during COVID → PTPS	0.404	6.642	0.000	Yes
H3	WTPS → techno-exhaustion	0.327	5.109	0.000	Yes
H4	PTPS → techno-exhaustion	0.410	6.809	0.000	Yes
H5	Techno-exhaustion → subjective wellbeing	-0.263	4.265	0.000	Yes

Table 6. Moderation analysis results

Hypothesis	Moderating Relationship	Path Coefficient	t-value	Sig.	Support
H6	Remote working during COVID * Increase in technology use for work during COVID → WTPS	-0.359	3.586	0.000	Yes
H7	Remote working before COVID * Increase in technology use for personal purpose during COVID → PTPS	-0.193	2.678	0.007	Yes
H8	Resilience * techno-exhaustion → subjective wellbeing	-0.187	3.281	0.000	Yes
H9	Resilience * Remote working before COVID → subjective wellbeing	-0.143	2.775	0.000	Yes

Table 7. Statistical support for the hypotheses

Hypothesis	Description	Result
H1	Increased use of technology during enforced work from home positively affects work technology platform stress (WTPS).	Supported
H2	Increased use of technology for personal use during enforced work from home positively affects personal technology platform stress (PTPS).	Supported
H3	Work technology platform stress (WTPS) during enforced work from home positively affects techno-exhaustion.	Supported
H4	Personal technology platform technostress (PTPS) during enforced work from home positively affects techno-exhaustion.	Supported
H5	Techno-exhaustion during enforced work from home period negatively affects individual's subjective wellbeing.	Supported
H6	The effect of increasing work-related technology use on work technology platform stress is moderated by the intensity of remote working during enforced work-from-home, such that the effect is stronger for individuals who have limited remote working opportunities.	Supported
H7	The effect of increasing personal technology platform use during the enforced work-from-home on personal technology platform stress (PTPS) is moderated by remote working intensity before the enforced work-from-home period, such that the effect is stronger for individuals engaged in limited remote work.	Supported
H8	Resilience moderates the effect of techno-exhaustion on subjective wellbeing such that techno-exhaustion has a stronger negative effect for individuals with high resilience.	Supported
H9	Resilience moderates the effect of remote work intensity on subjective wellbeing before the enforced work-from-home period, where individuals' resilience with low or no previous remote working experience positively affects subjective wellbeing.	Supported

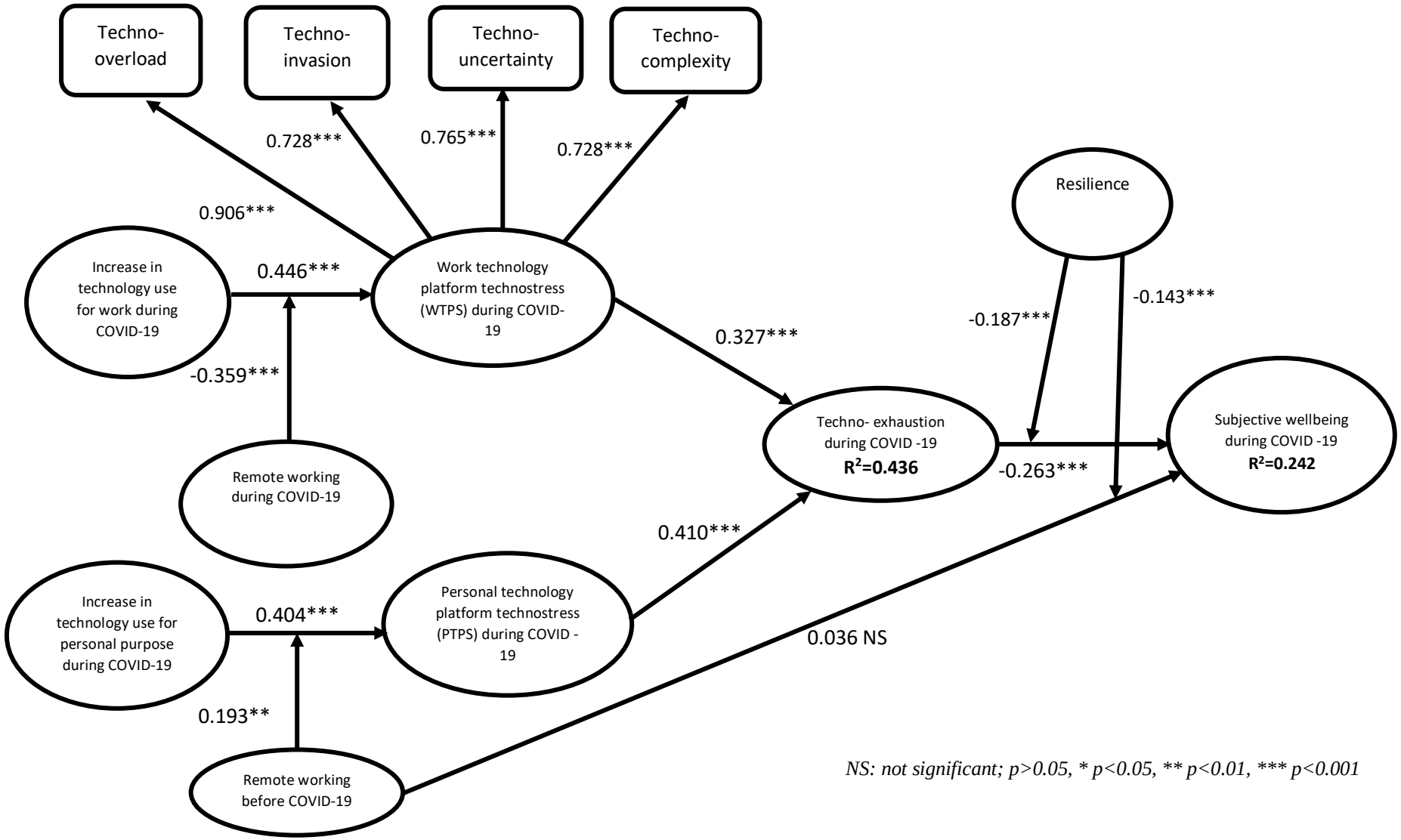

Figure 1. Structural model results

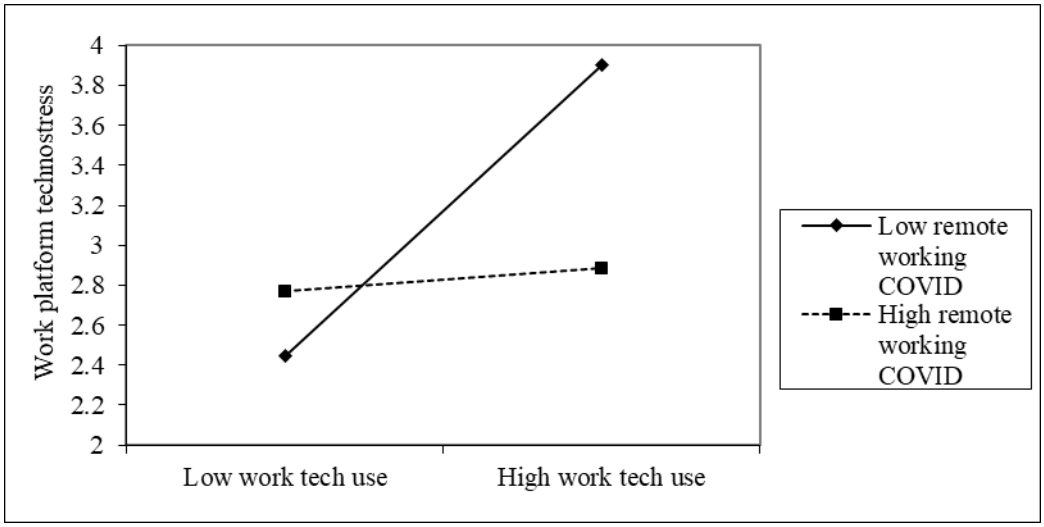

Figure 2. Moderation effect of remote work intensity during COVID-19 on impact of increased use of work technology on work platform technostress

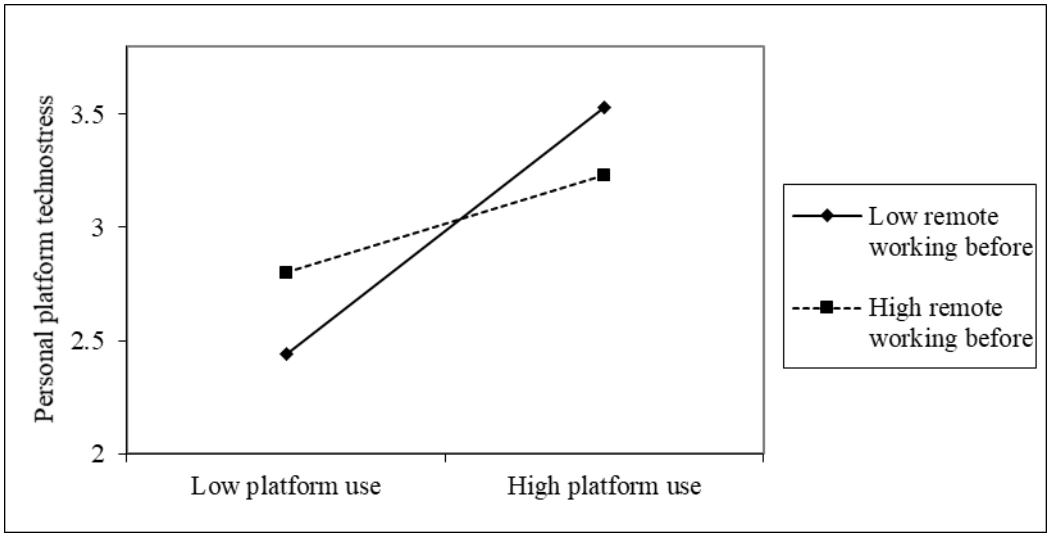

Figure 3. Moderation effect of remote work experience before COVID-19 on impact of increase use of personal technology on personal platform technostress

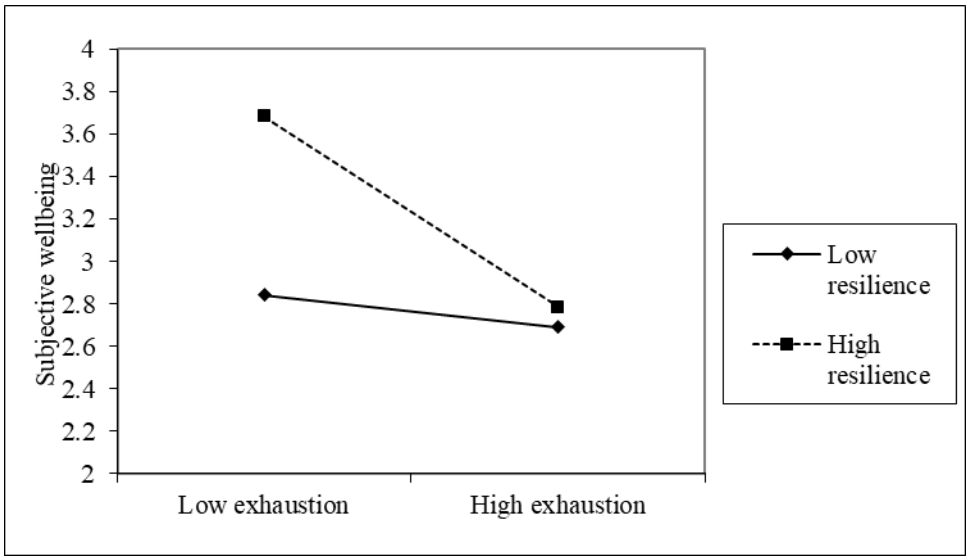

Figure 4. Moderation effect of resilience on impact of techno-exhaustion on subjective wellbeing

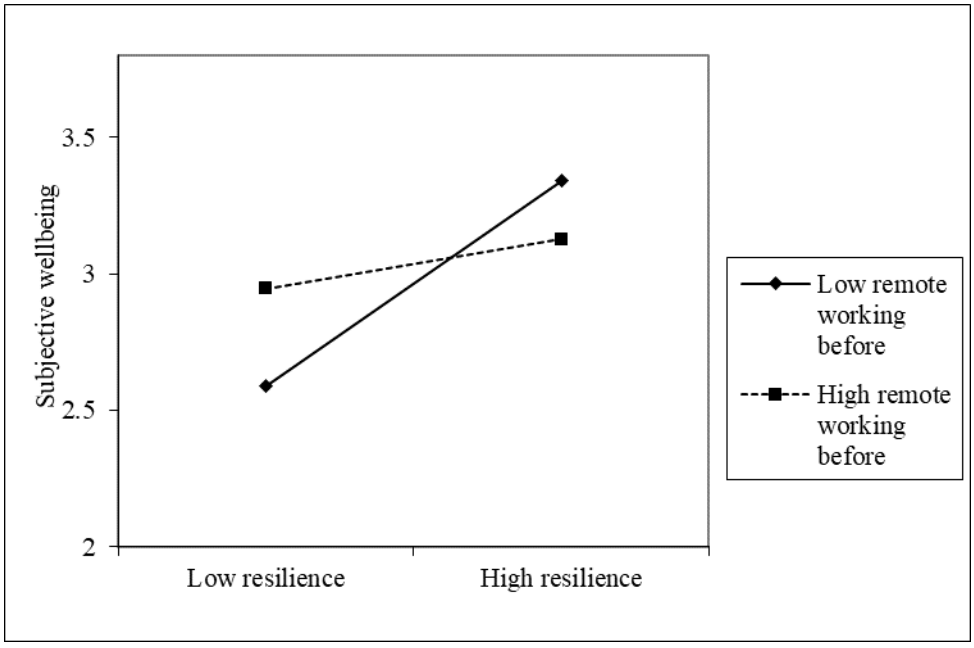

Figure 5. Moderation effect of resilience on impact of remote working experience before COVID-19 on subjective wellbeing

Appendix A: Items and CFA results

Construct	Items	Item loading
Techno-complexity	I did not have enough knowledge about the new technologies to handle my job satisfactorily.	0.813
	I did not find enough time to study and upgrade my technology skills.	0.872
	I often found it too complex for me to understand and use new technologies.	0.725
Techno-uncertainty	There were new developments in the technologies we use in our organisation.	0.801
	There were constant changes in computer software in our organisation.	0.921
	There were frequent upgrades in computer networks in our organisation.	0.849
Techno-invasion	I spent less time with my family because of increased use of technology at work.	0.750
	I was in touch with my work even during my vacation due to this increased reliance on technology.	0.579
	I had to sacrifice my weekend time to keep current on new technologies.	0.673
	I felt my personal life is being invaded by this increased use of technology due to COVID- 19 induced work from home situation.	0.817
Techno-overload	I was forced to work much faster with the new technology	0.754
	The technology I used for work forced me to do more work than I can handle.	0.839
	The technology I used for work forced me to work with very tight time schedules	0.828
	I was forced to change my work habits to adapt to new technologies.	0.775
	I had a higher workload because of increased technology complexity.	0.845
Personal platform technostress	I was often distracted by the excessive amount of (COVID-19- related) information on various technological platforms.	0.644
	I was overwhelmed by the amount of (COVID-19-related) information that I process on a daily basis due to use of technology.	0.768
	I received too many messages from friends and family due to use of technology (e.g. smartphones, social media).	0.677
	I felt as if I had to send more messages to friends and family through various technology than I want to send.	0.850
	I felt that I generally received too many notifications on new postings, push messages, and news feeds, due to use of technologies such as smartphones and social media.	0.724
	I often felt overloaded with online communication.	0.818
	I received more communication messages and news from friends and family due to use of technology (e.g. social media, smartphones).	0.722
	I felt my personal life is being invaded by this increased use of technology during the COVID-19 period.	0.737
Techno-exhaustion	I felt drained from activities that require me to use technology.	0.879
	I felt tired from technology led online activities including streaming, news, social media etc.	0.875
	I found using technology is a strain for me.	0.802
	I felt burned out from my technology use (e.g. online meetings, remote working, social media use)	0.887
Subjective wellbeing	In most ways my life was same as normal time (before the COVID-19 period).	0.670
	Overall, I was satisfied with my life.	0.713
	The conditions of my life during COVID-19 were excellent.	0.805
	I got the important things that I wanted	0.690
Resilience	I am able to adapt to change.	0.816
	I can deal with whatever comes.	0.757
	I can cope with stress that can strengthen me.	0.661
	I tend to bounce back after hardship	0.642

	I can achieve goals despite hardship	0.703
	I can stay focused under pressure	0.669
	I think of myself as a strong person	0.584
	I can handle unpleasant feelings	0.789
Increase in technology use for work during COVID-19	How much of your technology use for work purposes has increased during the COVID-19 period? [Percentage (%) increased during the COVID-19 period]	NA
Increase in technology use for personal use during COVID-19	How much of your technology use for information purposes (news, Government website, social media for information purpose i.e. following news about COVID-19, Government advice, tracking COVID-19 situation, information on lockdown etc.)? [Percentage (%) increased during the COVID-19 period]	NA
	How much of your technology use for entertainment purposes has increased during the COVID-19 period (e.g. streaming services like Netflix, BBC I player etc., social media for entertainment purpose)? [Percentage (%) increased during the COVID-19 period]	NA
	How much of your technology use for social purposes has increased during the COVID-19 period such as using video calling services, messaging services, social media to connect with family, friends and for work (FB, twitter, Instagram)? [Percentage (%) increased during the COVID-19 period]	NA
Remote working before COVID-19	What percentage of your work was done remotely before COVID-19?	NA
Remote working during COVID-19	What percentage of your work was done remotely during COVID-19?	NA

Appendix B: EFA results

Items	Component				
	1	2	3	4	5
PTechnoStress_6	0.830	0.049	0.121	0.180	0.153
PTechnoStress_2	0.756	-0.012	0.063	0.022	0.136
PTechnoStress_1	0.747	-0.002	0.021	-0.035	-0.036
PTechnoStress_5	0.737	0.142	0.122	0.215	0.127
PTechnoStress_7	0.731	0.102	0.195	0.036	-0.012
PTechnoStress_4	0.731	0.242	0.111	0.175	-0.047
PTechnoStress_8	0.721	0.104	0.000	0.251	0.105
PTechnoStress_3	0.717	0.226	0.020	0.189	0.039
Techover_3	0.105	0.810	0.196	0.179	0.228
Techover_2	0.116	0.806	0.121	0.185	0.307
Techover_1	0.110	0.803	0.194	0.096	0.144
Techover_5	0.177	0.769	0.213	0.195	0.240
Techover_4	0.154	0.741	0.389	0.123	0.101
TechUncertainty_3	0.156	0.236	0.846	0.129	0.125
TechUncertainty_1	0.117	0.240	0.839	0.115	0.093
TechUncertainty_2	0.144	0.308	0.793	0.168	0.221
TechInvasion_3	0.081	0.157	0.053	0.829	0.183
TechInvasion_4	0.276	0.225	0.179	0.753	0.107
TechInvasion_2	0.214	0.053	0.173	0.752	0.041
TechInvasion_1	0.164	0.378	0.045	0.736	0.150
TechComplex_1	0.126	0.240	0.180	0.105	0.811
TechComplex_3	0.039	0.245	0.035	0.191	0.810
TechComplex_2	0.102	0.293	0.211	0.108	0.784

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization