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Digital workplace technology intensity: qualitative insights on employee wellbeing impacts of digital workplace job demands

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Introduction: Digital workplace technologies are powerful enablers in modern organizations but can also threaten employee wellbeing. Drawing on the Job Demands-Resources (JD-R) model, this study explores digital workplace job demands, including hyperconnectivity and overload, and their association with health impairment.

Methods: Using a qualitative approach, semi-structured interviews were conducted with 14 employees to capture their experiences of these phenomena. A Critical Realist Reflexive Thematic Analysis was employed to investigate tendencies among digital workers and to draw theoretical links that might reveal underlying mechanisms.

Results: Five overarching themes were identified: hyperconnectivity, techno-overwhelm, digital workplace hassles, Fear of Missing Out, and techno-strain. A connecting thread between these themes is the new concept we label Digital Workplace Technology Intensity, mirroring the dynamics of the existing construct of work intensity.

Discussion: The findings extend JD-R theory by highlighting the wellbeing challenges posed by digital workplace job demands. They emphasize the need for organizations to address the mental and physical health ramifications of the dark side of digital working.

KEYWORDS

digital workplace, job demands, hyperconnectivity, overload, work stress, work intensity, critical realism, Reflexive Thematic Analysis

1 Introduction

Digital workplaces have become a central feature of work inside modern organizations, especially in context of widespread hybrid work practices post pandemic (Mićić and Mastilo, 2022). Effective digital workplace experiences have been shown to improve collaboration and productivity, raise employee satisfaction, reduce costs and increase innovation (Attaran et al., 2020; Dery et al., 2017). With hybrid work styles increasingly the norm (Hilberath et al., 2020), the digital workplace enables greater flexibility and autonomy for workers (Rakovic et al., 2022). However, an array of job demands can arise for workers specifically in relation to the digital workplace, such as overload and hyperconnectivity, leading to negative wellbeing outcomes including stress and burnout (Marsh et al., 2022). Therefore, optimizing the wellbeing of digital workers necessitates an understanding of the job demands they experience in the digital workplace, as well as requisite resources to cope with them (e.g., Scholze and Hecker, 2023, 2024). Indeed, as digital working increasingly becomes "the new normal" (Agrawal et al., 2023, p. 11) for workers, the need to understand and mitigate digital workplace job demands (DWJDs) appears ever more urgent.

In response, a literature has developed—sometimes referred to as the dark side of the digital workplace - that seeks to identify DWJDs such as overload and hyperconnectivity, along with wellbeing implications and mitigation strategies (Marsh et al., 2022). However, much remains to be understood about the way that digital workplace-related job demands should be delineated (e.g., Scholze and Hecker, 2024; Ruiner et al., 2023). This presents an opportunity for organizational psychology to advance understanding of modern work contexts and furnish organizations with insights for protecting worker wellbeing in the hybrid work age. It is especially important given burgeoning mental and physical health threats for digital workers and the cost implications this has at both societal and organizational levels (Johnson et al., 2020).

The existence of an array of DWJDs that can negatively impact on employee health is evidenced in a predominantly quantitative dark side literature (Marsh et al., 2022). However, it also largely obscures workers' lived experiences of dark side phenomena such as technology-related stress, overload and anxiety experienced in the digital workplace. This constrains both the identification of potential causal mechanisms as well as the discovery of novel and fruitful directions for dark side researchers to pursue. In addition, although the identification and evidencing of specific digital workplace-related job demands has so far proved a productive area of study (ibid.) much remains to be done in terms of clearly defining them and distinguishing them from generalized job demands.

Responding to this need to uncover deeper insights and potential new directions, we gathered interview data from 14 working individuals to answer research questions regarding workers' perceptions and experiences of the DWJDs, the tendencies that can be inferred from them, and the mechanisms that may underlie them. By engaging with DWJDs from a qualitative angle we also act on Wilhelmy and Köhler's (2022) timely insight on the underutilization of qualitative research among organizational psychologists to probe novel phenomena.

By analyzing the data using a Critical Realist Reflexive Thematic Analysis, a theoretically innovative application, we make several contributions to the literature. Firstly, by identifying a new Digital Workplace Technology Intensity construct (DWTI), we elucidate how DWJDs such as hyperconnectivity and overload contribute to technostress in modern technological workplaces. Indeed, by investigating what lies beneath technostress qualitatively, we add specific insight on the burden that DWJDs can place on workers. Secondly, our in-depth analysis reveals how affective as well as mental costs are levied by DWJDs, revealing the emotional intensity experienced by digital workers. Thirdly, our findings emphasize the mental and physical health impacts that can result from DWJDs, in the form of techno-strain, which have previously received limited attention; this further evidences the health impairment route within the Job Demands-Resources model.

2 Background

2.1 Theoretical foundations

The theoretical lens through which we focus our qualitative investigation of the dark side of digital working is the Job Demands-Resources model (JD-R) which has been widely adopted in the occupational stress literature (Bakker and Demerouti, 2017). It integrates positive characteristics of jobs, referred to as job resources (e.g., autonomy, goal clarity) and negative characteristics, referred to as job demands (e.g., job insecurity, conflict); the latter require sustained effort from employees leading to physical or psychological costs (Schaufeli and Taris, 2014). JD-R provides a framework to understand the impact of DWJDs on worker wellbeing, an area in which it has already demonstrated considerable utility (Marsh et al., 2022).

The JD-R model describes two processes by which negative or positive employee health and wellbeing outcomes are arrived at. In the first - the health impairment process—high job demands and/or lack of resources over a long period can lead to burnout and health problems; in the second—the motivational process—job resources are positively related to engagement and good performance (Krohne, 2002). The health impairment pathway of the JD-R model is particularly pertinent to our exploration of the adverse effects of digital working. According to this pathway, prolonged exposure to excessive job demands may lead to difficulties balancing work and family (Vaziri et al., 2022), chronic stress and subsequent health-related issues (e.g., De Beer et al., 2016) as well as fatigue, burnout and higher turnover intentions (Liyanti, 2024). In the dark side domain specifically, it has been used to explore the effect of technology-related stress and overload on burnout and health (e.g., Day et al., 2012). Scholze and Hecker (2024) have highlighted its utility for understanding the impacts of digitization on employees. In a recent review of the technostress literature, Pansini et al. (2023) elucidate ways in which ICT—when operating as a job demand—can cause technostress and have negative impacts on employee wellbeing. While acknowledging the JD-R model's motivational pathway and digital workplace job resources, we focus solely on job demands and health impairment to deepen understanding of dark side impacts.

2.2 Digital workplace job demands

The pervasiveness of digital technologies inside modern organizations has ushered in unprecedented levels of connectivity, transforming the nature of work. While the benefits of digital working are undeniable, a growing body of literature highlights the emergence of a darker side, marked by stress, overload, anxiety and Fear of Missing Out, as well as excessive and compulsive use of digital tools (Marsh et al., 2022). Indeed, the constant connection they enable for employees can lead to poorer wellbeing due to the inability to disengage from work (Büchler et al., 2020). These dark side aspects are characterized in the JD-R model as DWJDs that, where perceived as excessive by workers, have been shown to levy costs in terms of worker mental and physical health (e.g., Johnson et al., 2020).

At the core of this darker side is technology-related stress, sometimes referred to as technostress, wherein workers struggle to cope with technology in the workplace, leading to stress and burnout (Tarafdar et al., 2007). A plethora of dark side studies evidence its pernicious influence on wellbeing outcomes for workers including strain and exhaustion (Nisafani et al., 2020); this is evidenced in objective measures as well as self-reports, for example, Mishra and Rašticová (2024) show that stress relating to workplace technologies is associated with biomarkers such

as increased levels of cortisol and elevated blood pressure. In their systematic review of the technostress literature, Ballangan et al. (2024) highlight the links between technostress and anxiety, depression and physical health issues.

Overload is considered a key dimension of technostress (Rasool et al., 2022) and has been extensively implicated in adverse health outcomes for workers (Nisafani et al., 2020). While often associated with the incessant flow of information and messages facilitated by digital technologies (Graf and Antoni, 2023), it can also relate to a burdensome level of applications and features (Karr-Wisniewski and Lu, 2010). The proliferation of applications in the digital workplace has been associated with elevated technostress more broadly (Camarena and Fusi, 2022). Overall, overload experiences in the digital workplace have been found to be detrimental to wellbeing (Thurik et al., 2024) and implicated in a range of health complaints (Junghanns and Kersten, 2020) for workers.

Fear of Missing Out (FoMO) has been highlighted as a job demand in the digital workplace in which worries about missing out on informational and relational opportunities are associated with burnout (Budnick et al., 2020). FoMO in the digital workplace has been found to increase burnout and negatively impact health (Marsh et al., 2024). While workplace FoMO studies are fairly sparse (Rahmadania and Sanyata, 2023), computer anxiety is better understood as a dark side aspect (Powell, 2013). Uncertainties associated with rapid technological changes, coupled with the pressure to be constantly available and digitally proficient, contribute to heightened anxiety among employees (Graveling, 2020). Compulsive and excessive digital workplace use represents another dark side aspect, in which the compulsion to stay constantly connected and engaged with digital platforms can negatively impact health (Salanova et al., 2013). Blake et al., 2024 identified increased work-life conflict for workers with higher smartphone use for work purposes during off-job hours.

By exploring these dimensions of the dark side of digital working using a theoretically driven qualitative framework, this study aims to provide a nuanced understanding of the challenges posed by modern technological work environments. We seek to unravel the intricate ways in which DWJDs in the JD-R model, such as overload and hyperconnectivity, intersect and contribute to both technostress and health impacts, which have previously been underexplored. We note the disparate use of terms relating to DWJDs in previous literature; for example, various terms have been used to describe hyperconnectivity including availability, ubiquitous or constant connectivity, and telepressure (e.g., Scholze and Hecker, 2023; Büchler et al., 2020; Sun and Xu, 2023). Therefore, we also aim to further inform the way in which DWJDs are labeled and described, ensuring that they are clearly distinguished from more generalized job demands. We aim to offer insights for organizations striving to create optimal digital workplace experience.

2.3 Research questions

Considering the theoretical and empirical background, as well as research needs and gaps, our research questions were as follows:

Research question 1 (RQ1).
What are workers' perceptions and experiences of digital workplace job demands?
Research question 2 (RQ2).
What tendencies can be inferred in terms of the digital workplace job demands?
Research question 3 (RQ3).
What psychological, technological and organizational factors may influence workers' experiences of digital workplace job demands?

3 Materials and methods

3.1 Qualitative approach

Adopting a Reflexive Thematic Analysis (RTA) grounded in Critical Realism, we directly engaged with participants' experiences as well as situating them within JD-R. This approach facilitated inductive exploration, deductive identification of tendencies, and abductive reasoning to understand underlying potential mechanisms (Danermark et al., 2002).

3.2 Reflexivity

All three authors are focused on and fascinated by various aspects of the psychology of technology: EM focuses on digital workplace skills and wellbeing; EPV's research includes ethical and mental health aspects of digital technologies; AS's research includes perceptions and behaviors relating to environmental technologies. Concerning the present study, we are "insider researchers" in that we are digital workers ourselves, as well as being "outsider researchers" as scholars invested in understanding the psychological experience of digital work (Braun and Clarke, 2022 p. 18). Additionally, EM has worked in the digital workplace industry as a practitioner and consultant for over 20 years. Investigating workers' experiences of the dark side of digital work prompted all of us to reflect further on our own digital work practices. In addition, collecting and engaging with the data for this study formed part of an ongoing discussion among the researchers about the nature of digital work life inside modern organizations.

3.3 Paradigm

Critical realism (CR) is considered a popular paradigm within which to conduct RTA (Braun and Clarke, 2022). In line with CR's layered ontology, we identified experiential, inferential and dispositional themes (Wiltshire and Ronkainen, 2021) relating to, firstly, participants' experiences and feelings; secondly, what can be inferred from these experiences; and thirdly, how they might relate to relevant theory (see Figure 1). While the experiential themes are data driven, the inferential and dispositional themes engage the researchers' creativity to explore underlying structures and mechanisms that are not directly observable (ibid.).

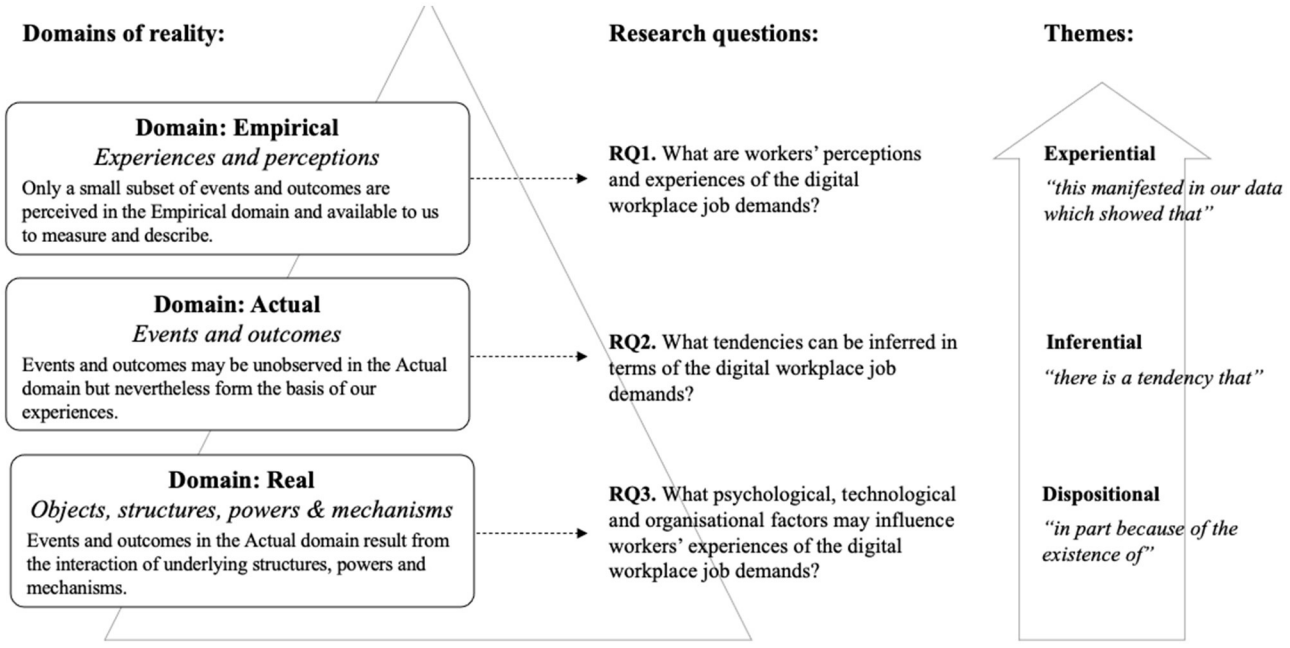

FIGURE 1
Critical realist depth ontology (based on Mingers, 2004) with research questions and theme categories responding to the three domains of reality.

3.4 Data collection

Workers utilizing technology daily were recruited using convenience sampling on a participant recruitment website, Prolific (prolific.co), and compensated the recommended £10.00 per hour. Interview questions, shaped by the literature, probed dark side of digital work experiences such as stress, overload and addiction (see Supplementary material 1). Questions relating to mindfulness and digital workplace confidence were also asked and the data analyzed separately in a mixed methods study. The semi-structured interview format allowed flexibility in exploring participants' encounters with adverse aspects of digital work.

Interviews lasting between 23 and 45 min (mean 34 min) were conducted on either Microsoft Teams or phone during July 2022. The interview procedure was approved by the University Research Ethics Committee at XXX and included an information sheet, consent statement and debrief information. Interviews were conducted by the lead author who also prepared anonymized transcripts.

Interviewees ($n = 14$) were 43% ($n = 6$) male and 57% female ($n = 8$), were aged between 27 and 60 years (median 41 years) and fulfilled a range of roles in different organizations (see Table 1).

While data saturation commonly justifies sample size in qualitative research, Braun and Clarke (2021) argue that predicting the required number of participants is challenging and that although RTA sample size recommendations range from $n = 6$ to $n = 16$, size is often determined pragmatically. They advocate for information power, as per Malterud et al. (2016), suggesting fewer participants are needed when the study is focused, sample specificity is dense, established theory is applied, dialogue quality is robust, and analysis strategy is case-oriented rather than cross-case. As such, we sought an initial sample of $n = 12$. As differences in dark side effects have been observed based on gender (e.g., Rafnsdottir and Gudmundsdottir, 2011) a further two interviews were conducted to improve the gender balance of the sample, bringing the final sample to $n = 14$. Examining the facets of information power in this context, overall, our sampling strategy furnishes us with relatively high information power (see Table 2).

3.5 Data analysis

Data were analyzed using RTA with guide rails drawn from Braun and Clarke (2022) and Wiltshire and Ronkainen (2021), moving from the surface level (i.e., semantic) with the experiential themes, to underlying meanings (i.e., latent) with the inferential and dispositional themes. All researchers engaged in familiarization with the data set (involving multiple engagements with both transcripts and recordings): EM as the principal researcher with all transcripts; EPV and AS with $n = 2$ transcripts each. After familiarization, EM derived experiential themes ($n = 12$) inductively from the initial transcript and deductively validated them across all transcripts. An additional set of inductive themes ($n = 10$) was generated from the remaining transcripts and cross-checked, yielding a total of 22 experiential themes. We use Wiltshire and Ronkainen's (2021) term "experiential themes" although we acknowledge that in RTA these are generally referred to as "codes" (Braun and Clarke, 2022).

Experiential themes are described as relating to most ($n = 10$ or more), many ($n = 8$-10), some ($n = 5$-7), or just a few ($n < 5$) participants (adapted from Terry, 2010 as cited in Braun and Clarke, 2022, p.142). All high-frequency themes were identified in the first two interviews, with no novel themes in the last three. This pattern implies that saturation, defined by Braun and Clarke

TABLE 1 Overview of interviewee characteristics.

Participant	Age (years)	Gender	Tenure (years)	Role	Work mode*
URIF	27	F	7	Store manager	WS
SELR	31	F	<1	Administrator	H
KOBR	32	F	<1	Marketing and recruitment officer	H
RYKS	32	M	2	Logistics support administrator	H
CUPI	34	M	1	Product manager	H
WALX	36	F	4	Solicitor	H
SAMN	40	M	15	Senior software engineer	R
JAME	42	F	9	Ecologist	H
STEA	42	F	4	Teacher	WS
SUMH	43	F	12	Project manager	H
PABN	43	M	3	IT tester	R
FILB	50	M	9	Operations manager	H
GAML	55	F	7	Learning disabilities support worker	H
INFU	60	M	20	Nuclear health physicist	WS

*Work mode: WS, work site; H, hybrid; R, remote.

(2021) as the point where no new themes emerge, was achieved in this study. In addition to frequency, the strength of themes is also noted based on emotional evocativeness of participants' expression (Wiltshire and Ronkainen, 2021).

Experiential themes generated by EM were then discussed and refined as a group using a virtual meeting and whiteboard; this process was repeated for inferential and dispositional themes until all three types of themes had undergone collective review, refinement and agreement. During collaborative discussions, facilitated by the principal researcher, divergent views were encouraged and explored to seek consensus on thematic interpretations.

TABLE 2 Information power analysis for our study, based on Malterud et al. (2016).

Information power items (Malterud et al., 2016)	Position in our study
Study aim—narrow or broad?	Our research questions sit somewhere in the middle of this spectrum: they concern specific phenomena in the digital workplace but across a wide range of workers and industries.
Sample specificity—dense or sparse?	Participants recruited were working individuals who use technology for work, making the sample highly specific to the needs of the study.
Established theory—applied or not?	The study draws theoretical support from the health impairment pathway of the Job Demands Resources model (Bakker and Demerouti, 2017) in which digital workplace dark side effects are viewed as job demands.
Quality of dialogue—strong or weak?	EM is an experienced qualitative interviewer and strong dialogue was established with participants.
Analysis strategy—case or cross-case?	The analysis is cross-case thus lowering the information power somewhat.

4 Results and discussion

The final list of experiential, inferential and dispositional themes - corresponding respectively to RQ1, RQ2, and RQ3 - are in Table 3 (shorthand) and Table 4 (longhand). These align to the research questions as per Figure 1. For example, workers' perceptions and experiences of DWJDs include feeling like they need to respond quickly and have difficulty leaving work behind (see Experiential themes). These experiences indicate certain tendencies in relation to the DWJDs, such as the invasion of non-work space and time (see Inferential themes).The tendencies indicate broader factors such as organizational pressure to respond, hassles with the technology, and individual affective reactions to DWJDs (see Dispositional themes). The full data coding table is available in Supplementary Material 2.

We identify five dispositional themes—along with the tendencies and experiences they encapsulate which are reflected in the experiential and inferential themes. The first four dispositional themes relate to job demands in the digital workplace (see Table 5 for descriptions): Hyperconnectivity (4.1), Techno-overwhelm (4.2), Digital workplace hassles (4.3), and Fear of Missing Out (4.4).

The fifth theme, "Techno-strain" (4.5) relates to the outcomes of the DWJDs. Following discussion of the five dispositional themes, we consider a connecting thread between them, "Digital workplace technology intensity" in the General Discussion (5.1).

4.1 Hyperconnectivity

Participants' dark side experiences were particularly shaped by a pervasive and constant state of connectivity in the digital workplace, termed "hyperconnectivity" (e.g., Kanwal and Isha, 2022). These experiences contributed to a sense of pressure

TABLE 3 Final list of themes (shorthand).

Dispositional themes (RQ3)	Inferential themes (RQ2)	Experiential themes (RQ1)
Hyperconnectivity	Constant availability	Pressure to respond
Techno-overwhelm	Invasion of non-work space	Demonstrating digital presence
Digital workplace hassles	Invasion of non-work time	Self-imposed pressure
Fear of Missing Out (FoMO)	Strain/burden of working online	Digital workplace invasion
Techno-strain	Pace/duration of work	Stress of personal device use
	Usability and accessibility issues	Hard to leave work behind
	Individual barriers to use	Checking messages out of hours
	Videoconferencing fatigue	Boundary erosion (post-pandemic)
	Missing out on information/notifications	Techno-overwhelm
	Missing out on relational cues	Keeping up with e-mails
	Mental and physical health impacts	E-mail (self) distraction
		Working longer/faster
		Dealing with technical issues
		Frustration finding documents
		Barriers for disabled workers
		Not knowing how to use technology
		Barriers for older workers
		Online meeting stress
		Missing out on information
		Fear of missing notifications
		Relationships harder/diminished
		Poorer health

to be available and the erosion of work-life boundaries. Our analysis reinforces prior research on the erosion of spatio-temporal boundaries and the pressure to respond and demonstrate presence (e.g., Chan et al., 2023). Our unique contribution lies in revealing the normalization of constant connectivity, despite intense affective reactions to it. In this respect, our analysis reveals ways in which hyperconnected behaviors among workers (e.g., responding to e-mails in non-work hours) are collectively reinforced and perpetuated such that they become embedded as a social norm.

Participants' experiences of not being able to get away from work align with work-life border theories and the potential for negative spillover of work into life (e.g., Ashforth et al., 2000) which may be worsened by the digital workplace (e.g., Kanwal and Isha, 2022):

> *[It's] just more difficult to leave it behind when it's all online and you can kind of jump on and do work at any time of the day or night.* (JAME)

Constant connectivity in the digital workplace has been linked to poorer wellbeing (Büchler et al., 2020) and our data substantiate this, revealing a strong sense of pressure to be online and available outside of work.

Erosion of boundaries could be temporal (work and rest time) and spatial (at home and on personal devices), echoing Chan et al.'s (2023) remote work review. Our study delves into participants' experiences, offering a unique view of the intense affective reactions accompanying these phenomena.

Receiving messages outside of working hours was a common trigger for the breach of temporal boundaries, with participants' accounts suggesting a sense of compulsion to connect and respond that is redolent of techno-addiction (Salanova et al., 2013). However, such behavior could come with strong, conflicting feelings:

> *Once you receive that pop up notification you actually feel angry at that person because you're like 'Hey don't take my privacy, don't take my time!'. But at the same time, you feel bad because you're not replying.* (KOBR)

Hyperconnectivity exacts a toll on individuals, exacerbating the imbalance of job demands vs. control in a way that is detrimental to health (Kanwal and Isha, 2022). This is further exemplified by KOBR, who, despite disapproving, admitted to presenteeism by "sneaking into [Microsoft] Teams" during sick leave. This misalignment between values and actions regarding boundary management—demonstrating cognitive dissonance (Festinger, 1962)—was not uncommon among participants and suggests that workers may be caught up in hyperconnected behaviors despite recognizing their problematic nature.

TABLE 4 Final list of themes (longhand).

Dispositional themes (RQ3) *"In part because of the existence of…"*	**Inferential themes (RQ2)** *"…there is a tendency that…"*	**Experiential themes (RQ1)** *"this manifested in our data which showed that…"*
The pervasive and constant state of connectivity enabled by the digital workplace.	Workers may feel pressure to be always available and prove they are working hard by responding quickly or showing digital presence.	Many ($n = 8$) participants feel there's pressure to respond to messages.
		Occasionally ($n = 4$) participants in this study find it stressful to have to show that they are digitally present.
		Some ($n = 6$) participants said that the pressure to connect/respond comes from the individual rather than the organization.
Work-life boundary management issues for digital workers and negative spillover of work via the digital workplace.	The digital workplace is perceived by some as invasive of their personal spaces.	Some ($n = 6$) participants strongly believe that digital work invades the home.
		Occasionally ($n = 3$) participants strongly feel that using personal devices for work can be stressful.
	The border between work and life is becoming more permeable in the digital workplace, especially since the pandemic.	Most ($n = 11$) participants strongly think that it's harder to leave work behind when you can connect to it digitally at any time.
		Most ($n = 10$) participants are more likely to check messages outside of work hours.
		Some ($n = 6$) participants think that work-life boundaries have changed since the pandemic.
Digital workplace overload due to too much information and application complexity/proliferation.	There is a sense of strain or burden associated with the experience of working online, especially pertaining to excessive e-mails and messages.	Most ($n = 13$) participants strongly feel that working online can feel overwhelming.
		Most ($n = 11$) participants strongly think it can be hard to keep up with e-mails/messages.
		Occasionally ($n = 2$) participants distract themselves from their work by checking e-mails.
	Keeping up in the digital workplace may mean working longer and faster.	Some ($n = 6$) participants strongly feel that they have to work longer and/or faster in the digital workplace.
Digital workplace hassles relating to usability and accessibility issues.	Workers' may experience frustration and stress when encountering difficulties using the digital workplace.	Many ($n = 10$) participants say that technical issues can lead to frustration and stress.
		Occasionally ($n = 3$) participants say that not being able to find documents is frustrating.
	Older, disabled, or less technologically savvy workers may experience greater anxiety and stress when using the digital workplace.	One ($n = 1$) participant strongly felt that disability makes the digital workplace more stressful to use.
		Some ($n = 7$) participants felt stressed if they didn't know how to use the technology.
		Some ($n = 5$) participants strongly said that older workers struggle the most with technology.
	Videoconferencing fatigue is among dark side experiences associated with online meetings.	Many ($n = 8$) participants strongly found online meetings stressful in a range of ways.
The fear of missing out on information and relationships in the digital workplace.	Workers worry about missing out on information and notifications.	Many ($n = 8$) participants strongly feel it's easy to miss out on information.
		Occasionally ($n = 4$) participants have a fear of missing out on notifications.
	Workers may find it harder to build and maintain relationships online.	Some ($n = 5$) participants strongly believe that work relationships can be harder/diminished online.
Techno-strain due to digital workplace job demands.	Worker mental and physical health may be negatively impacted by digital working.	Most ($n = 13$) participants strongly report negative health impacts from digital working.

Jonker (2019) points out the need to understand affective events related to the digital workplace, and our data highlight affective reactions such as anger at privacy invasion, guilt for not responding, and the fear of being seen as slacking:

> *It's that pressure to respond [...] I've received an e-mail, I've gotta do this quickly because if not, someone might think "What is she doing from home?"* (SUMH)

Hybrid workers, perhaps responding to "productivity paranoia" of distrustful managers (Microsoft, 2022), may invest up to 67 additional daily minutes to dispel perceptions of slacking (Qatalog/Gitlab, 2022). Our findings imply a "productivity anxiety" among hybrid workers - which we define here as the fear of not being seen as productive when working digitally—potentially fostering hyperconnectivity and overwork. Goñi-Legaz et al. (2023) identified work extension and presenteeism as elevating job stress among remote workers; productivity anxiety may contribute to such behaviors.

This manifested in our data not only in the need to respond to messages outside work hours, but also to demonstrate presence in the digital workplace during work hours:

> *You kind of feel like you have to be there all the time. You have to be a little green light.* (JAME)

This aligns with techno-invasion (Tarafdar et al., 2007), but also hints at a more insidious dehumanizing impact, involving implicit surveillance and monitoring (Oviatt, 2021), reducing a remote worker to a technological signal—symbolized as "a little green light".

Spatial as well as temporal boundary erosion was evident in our data, although the latter was stronger. Participants' sense of digital work devices invading the home aligns with previous research (e.g., Hassard and Morris, 2022) and could even result in loss of rites of passage between segmented work and life roles (Ashforth et al., 2000): *"I leave work and I'm in exactly the same environment"* (SELR). FILB strove to overcome such invasion by evicting the device from the house:

> *I actually take the phone and put it in the car [in the evenings], so I'm not tempted to turn it on and look at it.*

Difficulty separating work and life in digital domains may lead to a lack of psychological detachment, aligning with Büchler et al.'s (2020) observations on hyperconnected workers. Becker and Lanzl (2023) propose segmentation versus integration personality differences as influential, yet a preference for segmentation was prevalent among our participants, especially for those utilizing personal devices for work. These participants experienced constant incursions by work as they used their mobiles for personal reasons, leading to feeling that "you never shut down" (KOBR).

Hyperconnectivity was suggested as a worsening feature of modern work, especially since the pandemic:

> *[Work-life balance] has deteriorated in my role because it's now sort of became a norm. [. . .] to message people outside work hours or even to respond to those messages outside work hours [...]it would have happened eventually, but it would have taken a longer time but the COVID pandemic actually accelerated the adoption.* (CUPI)

The evidence indicates the emergence of a hyperconnectivity norm among workers, akin to the establishment of a perceived social norm (Chung and Rimal, 2016). Despite work-life border theories portraying workers as active agents in managing borders (Ashforth et al., 2000), the hyperconnectivity norm and productivity anxiety may diminish this agency while also depleting employees' personal resources to cope with job demands. While the dark side literature generally is lacking in qualitative studies (Marsh et al., 2022), our findings on hyperconnectivity align with recent qualitative insights regarding negative aspects of constant connectivity (Farivar et al., 2023) and the pressure to be constantly available (Scholze and Hecker, 2023); although in relation to the latter study, we suggest that the term "hyperconnectivity" may be more apt than "availability" to effectively identify this job demand as one that is specific to the digital workplace. We build on previous quantitative studies (e.g., Kanwal and Isha, 2022) by providing new insights into how pressure to be available and erosion of work-life boundaries due to hyperconnectivity manifest and are managed with varying success.

TABLE 5 Description of the digital workplace job demands.

Digital workplace job demand	Description
Hyperconnectivity	Pressure to be available and erosion of work-life boundaries due to a pervasive and constant state of connectivity in the digital workplace (e.g., responding to emails after hours, maintaining digital presence).
Techno-overwhelm	Cognitive overload in response to the proliferation of messages, applications and meetings in the digital workplace and associated emotional toll and attentional conflict.
Digital workplace hassles	Difficulties with usability and accessibility encountered when performing everyday tasks online (e.g., internet instability, hardware malfunctions, new or upgraded applications).
Fear of missing out	Worry about information that may have been missed in the digital workplace as well as opportunities to build relationships with colleagues.

4.2 Techno-overwhelm

Techno-overwhelm comprises both cognitive overload in the digital workplace and associated emotional toll and attentional conflict. Our findings indicate a sense of burden associated with working digitally which surfaced for most participants in perceptions of overload and feelings of being overwhelmed by the proliferation of messages, applications and meetings in the digital workplace. A techno-overload construct (Tarafdar et al., 2007) has been extensively validated in prior literature (Marsh et al., 2022), and our data support this, for instance: *"I'm working even faster to try to get through [emails]."* (SUMH). However, our analysis suggests that "techno-overwhelm" may be more reflective of the emotional toll and attentional conflict that workers experience in response to the cognitive awareness of too much and too many (messages, applications, meetings) in the digital workplace. This aligns with previous literature showing that overload is one of the main pathways via which technology use can lead to fatigue and depletion (Korunovska and Spiekermann, 2019).

Excessive e-mail was a core contributor to overload, with participants resorting to militaristic terminology to describe its

incursions: FILB complained "I get bombarded with emails all day long", while WALX depicted the conflict between responding to e-mails and getting work done as "a battle". This visceral sense of being under attack from e-mail is, through a JD-R lens, indicative of a scenario in which job demands exceed workers' available resources (Bakker and Demerouti, 2017).

For some, e-mail was deemed manageable until certain "pinch points" (WALX) such as "3 or 4 hours worth all come through in a minute" (RYKS) or the "backlog" on a Monday morning: "Oh bloody hell look at how many e-mails I've got!" (INFU). Despite seeming less stressful, periodic overload may levy costs via psychological uncertainty (Peters et al., 2017) as workers anticipate message gluts that demand extra cognitive resources.

Participants' accounts suggest that messaging overload also takes a toll on attentional resources; awareness of this was evident in the sense of conflict between getting work done and managing messages:

> *[E-mail] can perhaps take me away from what I'm focusing on.* (SUMH)
>
> *I'm constantly on Slack on the mobile and sometimes to the detriment of other things that I should be doing.* (PABN)

This aligns with prior literature, for example Mark et al. (2015) identified cognitive, wellbeing, and productivity costs associated with e-mail distractions, as well as highlighting a distractibility personality trait. This trait may be implicated in the tendency to self-distract that PABN highlighted:

> *I could be working and I'm getting distracted and think I'll check my emails and then before you know it, you spent half an hour looking through emails for nothing in particular.*

The interruptive nature of messaging and notifications is apparent at several levels in our data: attentional conflict and mental workload; striving to get work done in face of interruptions and associated depletion of resources; and affective reactions to interruption experiences such as frustration and anger. These effects align with the three pathways—cognitive, self-regulatory and affective—via which interruptions are theorized to impact worker performance and wellbeing (Puranik et al., 2020). Previous research has also evidenced the negative health outcomes in terms of the elevated stress that can result from the fast pace of work associated with dealing with such interruptions (Mark et al., 2016).

Proliferation of technology also contributed to overload experiences for some participants, as per technology crowding (Karr-Wisniewski and Lu, 2010). Participants' accounts suggest that the proliferation of features, and perhaps even more so – the proliferation of applications and communication channels—could be overwhelming. For example:

> *I found [Microsoft Teams] really overwhelming because it was so many different things.* (STEA)
>
> *All this technology we're using it builds up [. . .] it does sometimes become overwhelming.* (FILB)
>
> *Because communication filters through to so many channels [. . .] you check everything on Workplace [by Facebook], everything on [Microsoft] Teams, everything on e-mail."* (URIF)

Overwhelm was also experienced in relation to videoconferencing specifically, with participants' accounts of dark side experiences relating to it, and the strength of feeling with which they described them, aligning with prior evidence (e.g., Becker and Lanzl, 2023). The number and length of meetings was raised, as was the effect of continually seeing one's own video and resulting self-awareness akin to constantly looking in the mirror (Riedl, 2022):

> *This constant need [. . .] to be self-conscious and make yourself presentable is something which I'm not very comfortable with.* (CUPI)

While messaging was the primary contributor to overload, videoconferencing appeared to add to it for some.

Our data underline cognitive aspects of *too much* and *too many* (messages, applications, meetings)—in line with prior techno-overload research on job demands. Affective aspects were also highlighted in the associated emotional reactions, encapsulated in a sense of feeling overwhelmed. Implied in the latter is a loss of control and difficulty coping and adapting that manifested for participants in experiences of psychological uncertainty, conflicting priorities, and distractibility. Techno-overwhelm therefore encapsulates both cognitive and affective reactions to the proliferation of messages, applications and meetings in the digital workplace. For employees experiencing techno-overwhelm, the digital workplace appears to levy high psychological costs.

4.3 Digital workplace hassles

Difficulties with usability and accessibility encountered when performing everyday tasks online, described here as digital workplace hassles, were sources of stress for participants. These findings align with prior literature on stress due to digital workplace demand stressors (e.g., Day et al., 2012) and techno-complexity (Tarafdar et al., 2007). These hassles included difficulties carrying out everyday tasks online, getting to grips with new or upgraded applications, internet instability or hardware malfunction and videoconferencing issues. Frustration, stress and anxiety could accompany them and ultimately, as STEA pointed out: *"All the technical issues I was having [. . .] was having a big impact on my wellbeing."*

Despite mixed evidence from previous studies on the effect of age and computer confidence in relation to dark side effects (Marsh et al., 2022); in our data, older and less technically savvy workers were indicated as more vulnerable to stress and anxiety due to digital workplace hassles, with demands more quickly outstripping resources to deal with such difficulties:

> *I do have colleagues who are not as tech savvy. And for them even just down to using [the social network] and emails is stressful.* (URIF)
>
> *I don't want it to be an age thing, but I think there is a certain element of that, of feeling a little less comfortable with newer things.* (WALX)

Disability was also flagged for consideration by GAML—the only participant who declared a disability—who found the digital workplace more challenging to use. Her experience was largely one of disempowerment, which could arise in relation to both the technology itself and, somewhat ironically, colleagues jumping in to help:

> *It's the technology that's not allowing me to do something [. . .] I'm disempowered by the technology.*
> *Well thank you very much, I'm glad that you've done it, but I could have got it done but in my own time.*

Jetha et al. (2023) urge the importance of understanding disabled workers' lived experiences of workplace technology to address a potential digital divide. GAML's diminished sense of competency and autonomy raises questions for further investigation regarding improving digital workplace accessibility for disabled workers, as well as how support can be given in an empowering manner.

Interestingly, irrespective of individual differences, video meetings were revealed in our data as a key source of digital workplace hassles for participants despite acknowledgment of their benefits. As well as overload-related issues (see Section 4.2), difficulties related to audio/video quality, accidentally talking over each other, and difficulties with attention and comprehension. Other than general stress and anxiety, dark side effects relating to feeling fatigued or drained could result:

> *It's just not very seamless, and often things take far longer than they need to and waste time and I find for me it wastes energy.* (SELR)

The digital workplace hassles identified by participants, often related to usability and accessibility issues, suggest a high level of mental effort and fatigue among workers in dealing with them. The high level of effort involved in accomplishing work while dealing with these hassles is characteristic of work intensity, and contributes to job demands (Green, 2001).

4.4 Fear of missing out

The job demand of workplace FoMO involves worry about information that may have been missed in the digital workplace as well as opportunities to build relationships with colleagues. It is a mechanism which appeared to underlie participants' anxieties about the potential for information to "fall between the cracks" (JAME)—despite greater ease of access to information reported by some (e.g., SAMN)—and a sense that work relationships are somewhat diminished online.

There could be a sense that *"I sometimes will miss out on information or tasks or deadlines."* (URIF) and that worrying about this while carrying out tasks could contribute to FoMO. For example:

> *You are teaching and you receive an e-mail [. . .] about a boy who needed to leave the room for an important reason or whatever and you missed it.* (STEA)

> *I have experimented in the past with switching off the alerts, which is helpful. But then you worry that you're going to miss something.* (WALX)

Our study offers a novel lens by indicating that a vicious circle may be occurring between interruptions, overload and FoMO: if interruptions/distractions are ignored in favor of minimizing overload and getting work done, this can trigger worry about what may have been missed, potentially heightening distractibility and reinforcing message checking behaviors. In line with her remark above, STEA wanted to focus on teaching, but the repercussions of missing important messages meant:

> *I have to be checking [for e-mails] every 15 minutes because otherwise I'm missing important things.* (STEA)

Keeping up with information in the digital workplace thus appears challenging, potentially leading either to overload or FoMO (or both). Staying connected to colleagues could also be challenging for some (although others felt connected via digital meetings and communication channels):

> *There is that wee bit of remoteness from colleagues from being online.* (JAME)

For these participants, the obscuring of body language and associated difficulties interpreting emotions (Riedl, 2022) appeared central to their sense that relationships were diminished online, along with the possibility of misinterpreting what was being communicated:

> *Some things can get lost in the emails and the way they translate cause you to interpret an e-mail like somebody's angry when actually it's not them being angry at all.* (INFU)

There was also a sense of missing out on non-work interactions that happen in shared physical spaces—"the two-minute chats over the coffee machine" (SELR)—and that can be hard to replicate online. Social comparison theory was employed by Maier et al. (2022) in a study that showed envy of office workers toward remote workers; our data suggest that friction and disparity of experience work both ways.

Participant experiences of FoMO revealed a constant worry about missing important information or chances to engage with colleagues in the digital workplace. These anxieties appeared to heighten attentional conflict, further prompting hyperconnected behaviors in an effort to stay updated.

4.5 Techno-strain

Our study elucidates the contextual impact of dark side phenomena on health, referred to here as "techno-strain", a term sometimes used to denote the specific health impacts due to DWJDs (e.g., Salanova et al., 2013; Camacho et al., 2015). With a sole exception—INFU, an older worker with well-defined work-life boundaries—physical and mental health issues related

to the DWJDs were common among participants, an aspect less explored in prior literature (Lunde et al., 2022). Aligned with the JD-R health impairment pathway, heightened demands negatively affect wellbeing, resonating with Sun and Xu's (2023) findings on the adverse health impact of quick message responses.

Physical health impacts reported by participants resulting from working on the computer and sitting for long periods included poorer posture (JAME), neck and shoulder pain (SUMH), and weight gain (CUPI); such symptoms were also perceived as common among colleagues and family members.

Even more conspicuous than physical health impacts in our data was the pronounced effect of digital workplace demands on mental wellbeing. In a review of studies in this domain, Graveling (2020) identified that hyperconnectivity, overload and continual adaptation to technology can have negative effects on employee mental health. Indeed, mental health impacts of hyperconnectivity were highlighted by KOBR (connecting when off sick) and RYKS (messaging invasion after work), among others. Participants described experiences of anxiety, depression, and strain; their words are powerful in illustrating the mental health impacts they experience in the digital workplace:

> *The notifications make me feel sometimes on edge and it does make me feel anxious and it affects [. . .] my mental health.* (PABN)
>
> *I was exhausted [due to notifications] I was strained. I didn't have problems sleeping but I never felt rested.* (SAMN)
>
> *I do experience, I would say a lack of peace at many times.* (CUPI)

Digital working can support improved wellbeing (e.g., Johnson et al., 2020) and yet our data show that excessive job demands relating to the digital workplace can impair physical and mental health for workers who are subject to surveillance technologies:

> *The part of my work that is always problematic, is the sort of the timer type aspects of it [. . .] I think that does have a bit of a mental health impact.* (WALK)

Negative health impacts of monitoring have been indicated in the literature (e.g., Giacosa et al., 2023) and WALX's account underlines the need for further research in this area amidst rapid increases in collection and monitoring of employee data (ibid.).

The digital workplace presents both challenges and opportunities for employee health (Johnson et al., 2020); by highlighting anxious, low feelings and even a lack of peace among digital workers—in CUPI's case leading to "a lot of unplanned leaves"—our data underline the need to understand and mitigate excessive job demands that may arise relating to hyperconnectivity and techno-overwhelm, in particular.

5 General discussion

5.1 Digital workplace technology intensity

In our examination of the five overarching dispositional themes, a connecting thread is apparent: the intensity of the digital workplace technology experience. It reflects the burden placed on workers by the DWJDs of hyperconnectivity, overload, hassles and FoMO. Work intensity is an existing construct defined by the level of physical, mental and emotional effort employees must exert during the working day, while work intensification refers to the increase in this effort (Hunt and Pickard, 2022). It encompasses both quantitative aspects of job demands (e.g., pace, volume and complexity of tasks) as well as the qualitative aspects such as mental and emotional toll (Mauno et al., 2023). The digital workplace has been found to contribute to work intensity (Chesley, 2014; Green et al., 2022) as has increased pressure to meet objectives and targets associated with telework (Rebelo et al., 2024).

However, while previous studies highlight DWJDs as a contributor to work intensity (e.g., Scholze and Hecker, 2023), our findings go further. We argue that our data indicate a parallel construct of *Digital Workplace Technology Intensity* (DWTI): participants' experiences relating to the DWJDs of hyperconnectivity, overload, hassles, and FoMO in the digital workplace are suggestive of high levels of mental effort required to work digitally. For instance, the feeling of being unable to get away from the technology, the visceral sense of being under bombardment from it, the exertion required to demonstrate presence while also maintaining borders, the effort required to deal with hassles, and the fatigue related to video calls are all powerful examples from the data that speak to the lived experience of DWTI. Furthermore, evidence from participants' experiences suggests a trajectory of technology intensification evidenced particularly in post-pandemic rises in hyperconnectivity. These examples highlight how DWJDs reflect intensity, manifesting in heightened mental and emotional engagement as workers feel compelled to be constantly connecting, keeping up and responding. Resulting techno-strain can encompass adverse effects on both the physical and mental wellbeing of workers.

Green (2001) argued that the effortfulness associated with work intensity "is inversely linked to the "porosity" of the working day, meaning those gaps between tasks during which the body or mind rests" (p. 56). This dynamic is reflected in the proposed DWTI construct: the intensity of the digital workplace experience demonstrates an inverse relationship with psychological detachment and recovery. Just as research has shown work intensity to be associated with poorer health outcomes (Hunt and Pickard, 2022), our data suggest that DWTI, as reflected in experiences of the DWJDs, may impair workers' physical and mental health in the form of techno-strain. Mental burden is exacerbated as workers strive to get work done while dealing with messages and interruptions, keeping up with applications and information, navigating hassles, and managing video calls.

A novel layer contributed by our analysis, is the extent of the affective costs that are levied in parallel: working in the digital workplace can be emotionally intense for individuals, underlining the need for further research on specific negative affective experiences within a digital work context (Jonker, 2019). This was particularly apparent in the DWJD of techno-overwhelm, in which participants' experiences of psychological uncertainty, conflicting priorities, and distractibility reflected the emotional intensity of their reactions to overload.

In this study, DWTI was characterized by a sense of fatigue and strain due to being overburdened with the multifarious demands

of the technology, even where its benefits and affordances are acknowledged, utilized and appreciated. We therefore define DWTI as the mental and emotional effort required to navigate the constant connectivity, overload, hassles and FoMO associated with the digital workplace, leading to impairment of both physical and mental health through techno-strain.

5.2 Theoretical and practical contributions

Our study extends JD-R theory by using a theoretically driven qualitative approach elucidating specific DWJDs (as distinct from wider job demands) and ways in which they contribute to health impairment. We specifically develop and clarify the DWJD constructs of hyperconnectivity, overload, hassles and FoMO, extending the dark side and JD-R literature. In addition, we contribute a novel construct of Digital Workplace Technology Intensity (DWTI) which adds new insight on the causes of technostress in the digital workplace. In doing so we emphasize health impacts in the form of techno-strain linked to the mental and emotional burden of digital work. Relatedly, our data shed light on the digital workplace job demand of hyperconnectivity as a growing workplace norm, within which workers experience a cyclical interplay between FoMO and overload.

In addition, our study is to the best of our knowledge the first in the dark side of digital working domain to employ CR methodology to explore the tendencies and mechanisms underlying dark side of digital workplace experiences. By rigorously applying Wiltshire and Ronkainen's (2021) thematic analysis approach, we advance insights into the practical implementation of CR theory while simultaneously adding depth and nuance to understanding of the specific demands associated with the dark side of digital work. Our study adds qualitative richness to a primarily quantitative dark side literature, thereby indicating potential novel directions for investigation while enriching the discourse on the wellbeing of digital workers.

Several practical implications are also highlighted for the consideration of organizations. Firstly, in context of widespread remote and hybrid working practices, especially post-pandemic, organizations would do well to consider strategies to help workers manage DWJDs. This should include fostering the requisite skills and mindset to flourish in the digital workplace (Peiró and Martínez-Tur, 2022) as well as empowering employees to manage boundaries in a way that enable positive work and life outcomes (Kossek et al., 2012). In terms of specific technologies, guidance around optimal usage and management of both e-mail and video calls should be paramount in order to mitigate, respectively, e-mail bombardment and videoconferencing fatigue. Impacts of application proliferation within the digital workplace, as well as usability and accessibility shortcomings also warrant serious attention. Exploring differences due to demographic factors like age and disability as well as personality traits such as distractibility and segmentation preferences, should form an integral part of enquiry into digital workers' experiences and needs. Protecting worker physical and mental health, as well as optimizing performance and productivity, in the digital workplace is highlighted as a priority for organizations.

5.3 Limitations and future research

Several limitations of our work warrant consideration. The nature of a CR thematic analysis, rooted in the exploration of underlying mechanisms within a specific context, may limit traditional generalisability. While the findings provide in-depth insights into the examined context, caution should be exercised when extrapolating them to broader populations or settings. Our findings also represent a snapshot of participants' dark side experiences, meaning that temporal dynamics are not captured.

Despite these limitations, our study contributes valuable insights to the dark side literature. Our intensive exploration of worker's experiences indicate avenues for investigation into the broader implications of the dark side of digital working for worker wellbeing across diverse organizational settings and demographics, as well as over time and in a more extensive sample. Several rich veins for future research are indicated by our findings: factors implicated in hyperconnectivity; negative affective aspects of dark side experiences, especially overload/overwhelm; overload and FoMO interactions; and the nature and manifestation of the new DWTI construct proposed here in terms of how it is reflected in the DWJDs and exacerbates techno-strain. In addition, we recommend further investigation of disabled workers' lived experiences of working digitally, including aspects relating to accessibility and support. Other demographic factors such as ethnicity, company size, industry and technological experience also warrant consideration in future studies. Future quantitative explorations of these phenomena might also investigate any differences in workers' experiences of the DWJDs and any resulting health impairment based on work location/mode (e.g., work site, remote, or hybrid); a specific DWJDs scale may prove a useful instrument to develop, in this respect.

5.4 Conclusion

This study highlights how DWJDs such as hyperconnectivity, techno-overwhelm, Fear of Missing Out and digital workplace hassles contribute to experiences of digital workplace technology intensity, with deleterious health impacts as evidenced in experiences of techno-strain. The findings underline the need for both researchers and professionals to identify, understand and mitigate DWJDs to protect the wellbeing of digital workers. Such work is integral to enable the digital workplace to fulfill its promise as a key strategic enabler inside modern organizations.

Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found in the article/Supplementary material.

Ethics statement

The studies involving humans were approved by University Research Ethics Committee, University of Nottingham. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

EM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Visualization, Writing – original draft, Writing – review & editing. EP: Supervision, Validation, Writing – review & editing. AS: Conceptualization, Methodology, Supervision, Validation, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/forgp.2024.1392997/full#supplementary-material

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