PLEASE DO NOT SHARE OR DISTRIBUTE

WITHOUT PERMISSION

Burned Out by Technology: How Perceived Autonomy Shapes Strategies to Reduce Digital Exhaustion

ABSTRACT

Knowledge workers report increasing burnout at work. Mounting evidence suggests that increased use of digital technologies in the workplace is one factor contributing to burnout. We integrate various streams of research on digital technology use to develop the concept of *digital exhaustion*, which we define as the overwhelming state of psychological and physiological fatigue that results from the cumulative use of multiple digital technologies in both work and non-work contexts. Through a qualitative study of digital technology use amongst knowledge workers across a variety of industries, we show that informants are acutely aware of the degree to which they are exhausted by their use of digital technologies in and outside of work and that they enact a number of strategies in an attempt to cope with their exhaustion. The data show that some of these strategies are targeted at the symptoms of digital exhaustion, while others are targeted at the sources of digital exhaustion. We identify a cycle in which a knowledge worker's level of perceived autonomy shapes the strategic approaches they choose to enact. Notably, perceived autonomy is also shaped by whether the chosen strategy is successful, reducing digital exhaustion. We build from these data to develop a grounded theoretical model that explains the relationship between perceived autonomy, strategies targeted at sources and symptoms, and ongoing levels of digital exhaustion. We explore the implications of this model for theories of digital technology use in organizations.

Keywords: Digital Technology, Autonomy, Burnout, Knowledge Workers

INTRODUCTION

Burnout in the workplace has received increasing attention over the last few decades, with heightened concern emerging during the COVID-19 pandemic (Maslach, 2006). Burnout is a multifaceted problem that organizational scholars have grappled with through many approaches. One increasingly fruitful approach to exploring burnout is to focus on how individuals can effectively manage the constant presence of digital technologies in their lives (Rosen and Samuel, 2015; Tarafdar et al., 2014). For example, several scholars have begun to research Zoom fatigue (Bailenson, 2021), constant connectivity (Wajcman and Rose, 2011), and technostress (Ayyagari et al., 2011). However, this research typically focuses on specific technologies, neglects the cumulative effects of multiple tool use, and does not always consider both the psychological and physiological ramifications that arise from the prolonged use of digital tools. Furthermore, while studies have emphasized the antecedents and consequences of extended use of technologies, much less is known about the strategies individuals can enact to address their ailment nor why some strategies are effective, and others are not (Trittin-Ulbrich et al., 2021). Understanding how digital technologies contribute to burnout and how employees respond to combat these adverse effects is imperative to ensure worker well-being in an ever-changing and increasingly digital work environment.

In this paper, we empirically investigate the impact of prolonged exposure to digital technologies, exploring the various coping strategies individuals employ, as well as the efficacy of these strategies. We suggest that digital exhaustion – *defined as the overwhelming state of psychological and physiological fatigue that results from the cumulative use of multiple digital technologies in both work and non-work contexts* – can arise from interactions with the tools themselves or secondarily through how others use the tools to apply pressure on the recipient.

Through a detailed study of knowledge workers, we find that individuals can either choose to address the source or the symptoms of their digital exhaustion and that the success or failure of these strategies feeds back into their experience of digital exhaustion. Moreover, we draw on self-determination theory and the concept of perceived autonomy (Ryan and Deci, 2000a) to explain how these pathways lead to differential outcomes and the consequences for individuals' levels of digital exhaustion. These findings lead to the development of a model of digital exhaustion that has important implications for future research on burnout, digital technology use, and organizational communication.

Exhaustion and Digital Technologies

Over the past few decades, scholars from different disciplines have begun investigating the challenges facing individuals whose lives have become inundated with the consistent use of digital technologies. Although each new technological advance, ranging from video-conferencing, to mobile devices, to social media, and beyond, purports to improve efficiency or solve other problems, scholars have demonstrated how these digital technologies can also have negative ramifications on end-users. For example, during the COVID-19 pandemic, several scholars began investigating the effects of extended video-conferencing on remote workers. Colloquially dubbed "Zoom Fatigue" based on the popular software application, researchers found that individuals using video-conferencing technologies often had negative experiences (Bailenson, 2021; Belkin et al., 2022; Fauville et al., 2021; Nadler, 2020; Tan et al., 2022). Investigating the phenomenon, Fauville et al. (2021) found that using video-conferencing software for extended periods can cause social, visual, motivational, emotional, and general fatigue. Furthermore, they found that the duration and frequency of meetings had an effect, such

that individuals who had more frequent and longer meetings were more fatigued and cynical towards technology.

Beyond video-conferencing, other scholars have conducted research on negative individual outcomes related to other digital technologies in the workplace (Barley et al., 2011; Bellotti et al., 2005; Edmunds and Morris, 2000; Karimikia et al., 2020; Leonardi, 2013; Mazmanian et al., 2013; Wajcman and Rose, 2011). For instance, researchers found that the ubiquitous use of mobile devices creates a sense of constant connectivity that allows the stress of the workplace to expand into individuals' personal lives (Leonardi et al., 2010; Mazmanian et al., 2013). Other studies demonstrate that digital technologies in the workplace can also exacerbate cognitive processing because of information overload or intrusive interruptions (Edmunds and Morris, 2000; Karimikia et al., 2020; Wajcman and Rose, 2011).

However, the stress, strain, and fatigue of digital technologies are not isolated to the workplace. Significant literature has also developed on the consequences of digital technologies like social media, computers, and mobile phone use in individuals' personal lives (Blatter and Bongers, 2002; Dhir et al., 2018, 2018; Jensen et al., 2002; Kushlev et al., 2019; Vogel et al., 2015). For example, in their study of the consequences of using social media platforms, Dhir et al. (2018) found that compulsive users suffered emotionally from depression and anxiety. Additionally, consequences of digital technologies can occur outside the mind, as demonstrated by Blatter and Bongers (2002), who found that extended time on computers causes strain on the musculoskeletal system.

Much prior research has focused on the consequences of specific digital technologies. One theoretical perspective that has sought to integrate these disparate research streams is the scholarship on technostress (Atanasoff and Venable, 2017; Ayyagari et al., 2011; Hung et al.,

2015; Nisafani et al., 2020; Ragu-Nathan et al., 2008; Salazar-Concha et al., 2021; Srivastava et al., 2015; Tarafdar et al., 2007). According to a recent article tracing the history of the term from the 1980s through contemporary times, technostress is defined as "the stress that people experience due to the use of information and communication systems and technologies (Salazar-Concha et al., 2021, p. 1). Researchers have extensively elaborated on the antecedents and consequences of technostress. For example, studies have shown that technostress can arise from features of technology, personality traits, and factors relating to work (Ayyagari et al., 2011; Srivastava et al., 2015). Other studies focus more on the outcomes of technostress. For example, Tarafdar et al. (2007), in their seminal study on salespeople, demonstrated that technostress negatively impacted job performance and caused feelings of overload. Another more recent study by Turel and Gaudioso (2018) similarly found that technostress led employees at multiple firms to feelings of job distress and work-exhaustion. Yet, as a recent literature review pointed out, most technostress studies focus on emotional and psychological consequences rather than physical effects (Nisafani et al., 2020). Especially in management and organizational studies, fewer technostress studies elaborate on how individuals may also experience technostress in their physical bodies (Riedl, 2012).

Thus, we propose the term *digital exhaustion* to describe the overwhelming state of psychological and physiological fatigue that results from the cumulative use of multiple digital technologies in both work and non-work contexts. Digital exhaustion addresses three limitations evident in previous literature. First, digital exhaustion captures the state of being overwhelmed from the combined use of multiple different digital tools in all aspects of life, addressing the limitation of studies focusing on piecemeal technologies at work or at home. Second, digital exhaustion gives equal consideration to mental and physical symptoms since both contribute to

overall feelings of distress and fatigue, which has been overlooked in studies of technostress. Last, digital exhaustion captures a constant state beyond fleeting stress and strain. Rather, it arises from the extended and sustained use of digital technologies to the point of feeling overwhelmed.

The literature described above represents a body of research focused primarily on the antecedents and consequences of strain from technology use. However, researchers have paid little attention to the coping strategies or antidotes to technology-related exhaustion and, in turn, have not investigated the effectiveness of these strategies. This study aims to address this gap in the literature to develop a more nuanced understanding of how digital exhaustion is experienced and the actions individuals take to remedy digital exhaustion. By identifying the different strategies employed by users, the relative efficacy of these strategies, and the consequences of digital exhaustion, this study points to different approaches to addressing this problem and illuminates best practices for mitigating the negative effects of digital exhaustion. One factor that emerged from our data that has been overlooked in studies of technology and workers is the concept of perceived autonomy. In a survey study of 270 IT professionals, Moore (2000) showed that lack of autonomy was significantly correlated with work exhaustion and turnover intention. However, the exact role of autonomy in its relationship to digital exhaustion is undefined.

Other studies have investigated the relationship between job characteristics and exhaustion. For example, Ito and Brotheridge (2003) found a positive association between job resource levels and the use of active coping strategies to combat emotional exhaustion. However, this study does not interrogate *whether* or *why* specific coping strategies are more effective than others. A study of 356 school board employees by Fernet and colleagues (2013) demonstrated a mediating effect of perceived autonomy on job resources/demands and emotional exhaustion,

whereby perceived autonomy plays an active role in the relationships between job characteristics and burnout components. These findings implicate perceived autonomy in influencing how work-related negative affect is experienced. However, the pathways through which perceived autonomy is developed, lost, or enacted in response to work-related stressors are not explained.

Based on the findings from this study, one reason for the incomplete findings in the technology and burnout literature is the lack of in-depth inquiry into the role of perceived autonomy in combating the adverse psychological and physiological effects of prolonged digital tool use. According to Ryan and Deci's (1985, 2000) self-determination theory, autonomy – the perception of choice and volition in one's actions – is one of three basic human psychological needs (along with competence and relatedness). When an individual satisfies all three needs, they experience increased motivation and well-being. Contrastingly, when they feel their needs are thwarted, individuals experience exhaustion and degradation of well-being. Although self-determination theory has been the focus of numerous other disciplines, scholars focused on interventions to ameliorate the adverse effects of technology use have paid far less attention to the concept (Van den Broeck et al., 2016). By drawing on self-determination theory, we propose that perceived autonomy plays a critical role in determining not only the types of strategies employed to cope with digital exhaustion but also the success and effectiveness of those strategies. Using an inductive approach, we address the following research questions: ***(RQ1)*** *What strategic pathways do workers take to address digital exhaustion?* ***(RQ2)*** *When and why are these strategies successful or unsuccessful?* ***(RQ3)*** *What is the role of perceived autonomy in determining the effectiveness of these strategies?*

METHODS

Data Collection

We collected data through semi-structured interviews with 54 informants (female = 50%). We sought to include informants from various industries, job roles, company sizes, and ages to create a representative and diverse sample. We recruited at first through personal connections keeping in mind our purpose of collecting data from a diversity of knowledge workers. Knowledge work differs from other forms of labor because knowledge work entails tasks that require the handling, interpreting, and transmitting information and data. As described by Reinhardt et al. (2011), "the [knowledge] work process is dominated by communication, data production, and consumption actions" (p. 153). Because data and information fundamentally characterize knowledge work, knowledge workers must use various digital technologies and tools that operate on computers, mobile phones, tablets, and other devices. Since we define digital exhaustion as the *cumulative* use of digital technologies, we focused this study solely on individuals employed in knowledge-based work because their work is inextricably linked to using digital tools. We used a snowball technique to find other informants and recruited additional participants through professional social media networks. For contacts not in our direct personal networks, we sought to complement those we had selected prior such that we found informants in occupations, industries, and ages that were underrepresented in our prior sample. Each interview lasted from 30 minutes to 75 minutes. Interviews were conducted using a combination of video conferencing and in-person meetings. All interviews were audio-recorded and transcribed, resulting in a total of 495 pages of codable documentation.

We followed the approach of Spradley (2016) and Kvale and Brinkmann (2009) in developing a semi-structured interview protocol. Our goal for the protocol was to create questions that would elicit systemically comparable data that illuminated our informants' views of their social world. Our protocol contained three main sections. First, we sought definitions

from our informants related to the term *digital exhaustion*, as well as the opposite of digital exhaustion. During this section, we asked informants to reflect on their feelings of digital exhaustion and how they understood it compared to other negative feelings like *stress*, *burnout*, and *fatigue*. Second, we guided informants to describe their work, the nature of the digital tools they used, and how they felt about the tools they used in both work and non-work contexts. In the third section, we returned to reflections from our informants but this time focused on their strategies for using their digital tools. For example, we asked informants for specific examples of how they used their digital tools, how they would ideally want to use them, how in control they felt over the technologies, and how their organizations supported them in using these tools. In our last section, we asked informants about the outcomes of their digital tool use. Employing the same language each informant used when they described their level of exhaustion, we asked them to elaborate on the consequences of being digitally exhausted as they had experienced it and as they had seen others experience it. During the interview phase, we also iterated on our interview protocol after completing half of the interviews to update questions for better understanding by informants.

Data Analysis

To answer this study's research questions, we used a grounded theory technique of comparing and contrasting data from each informant to illuminate emergent patterns and develop connections between these patterns (Strauss and Corbin, 1998). We followed an inductive approach employing multiple iterations of coding to determine and reveal relations between the emergent patterns (Glaser and Strauss, 1967). Following grounded theory, during the first stages of our data analysis, we conducted open coding using the language of our informants but guided by the categorical sections of our interview protocol. Within each of these categories, we created

descriptive codes based on the language provided by the informants. For example, within the category of digital exhaustion, informants used language describing that their digital exhaustion increased because of distractions which we coded as "exhaustion_ increase_distraction."

From open coding, we found all our informants were well aware of when they were experiencing digital exhaustion and the leading causes of this exhaustion. Thus, we organized open codes into categories that distinguished the symptoms and sources of digital exhaustion. During this process, we returned to the literature on other concepts related to digital exhaustion and found alignment between the symptoms and sources our informants elaborated on. For symptoms of digital exhaustion, we organized codes into those that manifested as strains psychologically or physiologically. For example, there were several codes describing the fatigue that informants felt in their bodies from using digital technologies for extended periods of time. We organized these open codes into the category of physical strain, a physiological symptom that other scholars, such as those studying Zoom fatigue, have similarly described (Bailenson, 2021; Fauville et al., 2021; Nadler, 2020). We conducted a similar process for the sources of exhaustion which we organized into four categories from which digital exhaustion originated: the design of technology, job and work demands, social and relational dynamics, and individual traits. These four sources also reflected findings from previous studies, such as those describing the antecedents of technostress. Table 1 reviews the symptoms and sources of digital exhaustion with example quotes from informants and references to previous studies with supporting findings.

<<INSERT TABLE 1 ABOUT HERE>>

After dividing each activity into broad categories (increasing or decreasing levels of digital exhaustion and addressing source or symptom), we then coded for different strategic approaches enacted by informants and whether the strategy was characterized as technological or

non-technological. We identified a strategy as an expression of action the informant takes in response to a particular stimulus that increases experiences of digital exhaustion. These categorizations also helped us determine the nature of the different sources and symptoms of digital exhaustion when performing co-occurrence analyses (e.g., addressing a source of stress in a non-technological manner).

In addition to characterizing different strategies, we coded for whether an enacted strategy was successful or unsuccessful at addressing the source or symptom of digital exhaustion using a technological or non-technological approach. To distinguish a successful strategy from an unsuccessful strategy, we followed the informants' expression of whether or not they felt like their actions produced the intended effect by improving or exacerbating overall feelings of frustration, stress, or exhaustion. Next, we sought to determine each informant's level of digital exhaustion. We combined informants' self-rating on a scale of 1 to 10 of their digital exhaustion with the total occurrences of quotes describing that they felt digitally exhausted. We determined that quotes exemplified digital exhaustion when informants' mentioned a specific example of digital technologies causing them stress or strain. Often, these instances of digital exhaustion overlapped with the categories of sources and symptoms. Thus, using informants' self-ratings and the occurrences of digital exhaustion, we organized informants into groups of low, medium, or high digital exhaustion.

During the process of categorizing informants by the level of digital exhaustion, a complementary pattern emerged suggesting that informants not only differed in their levels of exhaustion, but also in how much autonomy they perceived to have over their situations. Since self-determination theory posits that a person's sense of autonomy is a crucial component to motivating action, we then coded for instances of informants describing whether they perceived

they had autonomy or not. After coding for all instances of perceived autonomy or lack thereof, we categorized informants as either having high or low autonomy. The high autonomy group included informants who had above average quotes signifying they felt a sense of autonomy than not and vice versa for the low autonomy group.

Informants described digital exhaustion like a chronic disease that must be actively managed. They recognized the sources and symptoms of their ailment and, in response, enacted strategies to keep the condition at bay. Yet, as we discuss in the following sections, differences in the target of the coping strategies, the success of strategies, and levels of perceived autonomy related to differences in our informants' experience of digital exhaustion. We present our findings in three parts. First, we discuss the various strategies individuals use to cope with digital exhaustion. Next, we examine the different pathways by which informants implemented coping strategies. In this section, we elaborate on how the successful or unsuccessful implementation of coping strategies interacted with perceived autonomy and digital exhaustion. Finally, we explore the connections between all constructs showing how each influences the other and ultimately relates to why individuals' have differing experiences with digital exhaustion.

STRATEGIES TO COPE WITH DIGITAL EXHAUSTION

Informants could readily identify digital exhaustion as the debilitating state reached after the sustained use of digital technologies and were also aware of the sources of their condition. To manage feelings of digital exhaustion, individuals engaged in coping strategies that either directly targeted the sources or the symptoms of their condition. In comparison to the downstream symptoms of psychological and physiological stress, informants also cited that the sources of their exhaustion originated with digital technologies' design, workplace demands, social relations, and individual dispositions. Thus, informants coped with digital exhaustion by

targeting either the origins of exhaustion or downstream symptoms. Additionally, we found that informants implemented both technological and non-technological solutions.

Strategies Targeting Sources of Digital Exhaustion

Within strategies targeting sources of digital exhaustion, individuals often enacted actions directed at digital technologies. These strategies occurred when digital tools directly impacted informants' ability to work as they wanted. Specifically, we found that individuals enacted the two technology-based strategies targeted at the source of digital exhaustion: (1) optimizing tool selections and settings and (2) seeking training and support.

Optimizing tool selection and settings. Individuals addressed digital exhaustion by selecting optimal tools that fit their objectives or customizing their tools to fit their individual needs. By optimizing which tool to use, individuals directly addressed the source of their digital exhaustion related to the inefficient tool-task match, ineffective technology design, or malfunctioning features. For example, Clarissa, a chief operating officer at a small technology company, described her strategy of optimizing her workflow by aggregating tasks and functions into as few digital tools as possible: "Try to limit the amount of ones you use. And if you're using one just like, utilize it as much as possible."

By optimizing her workflow to as few tools as possible and having her team follow suit, Clarissa decreased her need to switch between multiple programs and applications, which many informants cited as the reason they felt cognitively depleted. Similarly, Ross, a head of software development, explained how he set up notification filters on his company's messaging platform to filter only messages that he deemed relevant to his work: "Let's say I want to see every piece of work that's currently in review, across my entire organization. Well, there's a filter for that [...] I try to find a shortcut that I can store and then keep that open at all times."

By adding filters and shortcuts, Ross altered his messaging platform in a way that became a better tool for him. Dictating what digital tools to use and how these tools functioned provided a sense of control that defended against feelings of digital exhaustion. For Clarissa and Ross, their strategies did not specifically eliminate the necessity of using digital technology, but by choosing what tools to use and creating personalized settings, they stymied the sources of exhaustion. Their actions addressed the inefficiencies inherent to the design and function of digital technologies.

Seeking training and support. As another technological-based strategy to target the source of digital exhaustion, informants sought training or support to use their digital tools better. Learning about how to use digital technologies helped to improve informants' effectiveness at using digital technologies eliminating the difficulties in lack of understanding. For example, Phil explained that when a tool is not working well, he looks up videos online to educate himself on the various functions and features of the tool: “YouTube is resource rich with tutorials, instructions [...] the more time you invest in getting better at something, the less [exhausting], the easier it will get for you.” As Phil described, though the technology may not always work in the way he wanted, he sought to learn more about the intricacies and functioning of those digital tools. Thus, by using online resources, he augmented his knowledge and increased his efficacy.

Other individuals sought out resources to learn more about the digital technologies they used. In particular, many informants described attending training or support services provided by their organizations. For example, Cora, the recruiter, mentioned how her company provided training for a range of digital tools she uses at work: “I will say we do a lot of training [...] so I'll see a lot of trainings on, like how to better utilize Zoom or Microsoft Teams, or you know how to better utilize Microsoft OneNote so different things like that.” Both Phil and Cora felt they had

the choice to seek out learning to get better at using digital tools based on the resources available to them. By pursuing the strategies related to training, individuals could often address the source of digital exhaustion and increase their perceived autonomy by learning to use their digital tools more effectively.

A second approach for managing digital exhaustion by addressing the source of exhaustion involved using non-technological strategies. While many informants described feeling exhausted by their digital tools, another source of exhaustion originated from the behaviors of others, both in personal and work relationships. In this sense, the source of exhaustion was not the digital tools themselves but the actions of other people that digital technologies transmuted. As an example of how digital tools transmuted others' behaviors, Leon, a marketing manager, described the work culture at a previous employer: "People are on [Microsoft] Teams 24/7 and you're being bombarded with Slack messages after work until 10pm by your coworkers. I don't know if you can tell from my tone of voice, but I didn't like that." Thus, to address sources originating from social factors, work demands, or limitations in the design of digital technologies, informants enacted two non-technological strategies, (1) setting boundaries with others and (2) bypassing the digital tool.

Setting boundaries with others. Setting boundaries and expectations with communication partners was a strategy that directly targeted the behaviors of others that informants found to be the source of their exhaustion. Many informants who felt stress from the onslaught of digital communications verbalized desired work boundaries to coworkers, managers, clients, and friends. For example, Penny, a publicity assistant, described setting boundaries with her supervisors to set the expectation of when she would respond to emails: "We have that spoken agreement that if they send me an email after 5pm, it's considered at that point, not urgent. So I'm

more than free to look at it the next day when I'm on at 9am." For Penny, setting expectations with others provided them with boundaries that made the digital aspect of their work less exhausting. She was able to draw boundaries between her work time and non-work time.

Bypassing digital tools. We also found that individuals eliminated or minimized the source of digital exhaustion by bypassing digital tools altogether. Informants enacted this strategy by reaching out directly to others and meeting in person rather than over Zoom, phone, or online chat (although this strategy was greatly limited by the COVID-19 pandemic and those working remotely). Bypassing digital tools decreased digital exhaustion in two ways. First, informants described the quality and fluency of communication to be superior to digitally-mediated communication. For example, Colin, a financial advisor, described his preference for in-person meetings with clients:

> "Getting everything tapped in, dialed in, and then having the internet slow down, glitches, you know, screen freezing is just disruptive to the whole process about someone's deep vulnerabilities about finance. So I found that very, very distracting. So we'd much rather sit across from each other 10 feet outside [...] than to be on a video camera that's glitching."

Colin chose to hold meetings with clients outdoors, in-person and socially distanced during the COVID-19 pandemic because he found the in-person conversation to be a superior communication option to communications conducted through digital technologies and platforms. The limited social cues provided by digital communication tools made it challenging to build trust, convey non-verbal information, and transfer knowledge effectively for Colin. Thus, he opted not to use the digital tool when it was not necessary.

Similarly, we found that many individuals occupying positions of power within organizations, like business owners, could choose when to not use digital technologies. For example, Joey, a CTO for a school district, prescribed running meetings in-person instead of

relying on digital technologies: “Somebody will say, ‘Well, we could do this in Jam Board (a Google Product).’ I'm like, ‘Yeah, of course we can. But I want to do it on the whiteboard this time.’ You know, you don't always have to use a computer for everything.” As a decision-maker, Joey was able to limit his team's digital tool use to reduce his digital exhaustion. He focused on using the tools for personal connection and avoided the stress of trying to collaborate digitally.

Strategies Targeting Symptoms of Digital Exhaustion

In contrast to strategies directed at sources, informants also attempted to reduce the psychological and physiological symptoms they experienced by enacting two strategies: (1) applying structure around tool use, and (2) disconnecting from digital tools.

Applying structure. One of the most common strategies that informants enacted was to structure their personal workflow or daily interactions with digital tools in a way that minimized strain and effort. Many informants did so by optimizing their screen space by allocating similar programs or tools associated with related tasks onto one desktop or monitor. For example, Clarissa described how she organized her monitors:

> “So what I do is I put all this fun stuff on this monitor. So this one has my Slack, it has my iMessages, it has my personal email inbox open, and it has music. So Spotify, you know, whatever I'm listening to, would be here [...] And then I usually keep my calendar open here all the time, just because, like, I want to know what's next..”

As Clarissa elaborates, having her digital workspace organized in a way that suited her working style allowed her to work more efficiently and with minimal cognitive effort. Similarly, other informants structured their workflows by prioritizing tasks. As mentioned by Naomi, a consultant, creating a system to organize and prioritize information helped decrease feelings of being overwhelmed for both herself and her colleagues: “I tried to have everything organized into folders and have everything hyperlinked as much as possible, make it very intuitive for myself, but also like my team members to find whatever they need.”

The strategy of creating hyperlinked and intuitive folders helped Naomi to stay organized and reduce unneeded efforts. By structuring their work like Naomi, informants felt they focused their attention on the most critical tasks rather than spending time doing less productive work.

Disconnecting. As another technological strategy, informants also addressed symptoms of digital exhaustion by disconnecting from their digital tools or devices. This action occurred especially when other strategies were ineffective or unavailable. Most frequently, informants disconnected by either turning off notifications on their devices to reduce distraction or separated themselves completely from their devices. For example, Taylor, the director of operations for a bank, shared how he disconnects from devices to spend time with family: "I try to not use any technology between 5:30 and 8:00 so I can have family time. So I don't go on my phone generally and I try to be unavailable to others so I can be available to my family." Taylor's choice to disconnect from his devices and to momentarily ignore non-family-related demands addressed the constant-connectivity symptom of digital tool use.

Similarly, Penny, the publicity assistant, remarked on how she alleviated feelings of exhaustion by changing the notification settings on her phone: "I'm turning off the Outlook notifications on my phone. Sometimes it's convenient to have the app…[but] I don't like having the notifications popping up if I'm trying to enjoy my evening or cooking or spending time with my boyfriend." Both Taylor and Penny made choices as to how they engaged with their digital tools. Although the source of the exhaustion is still there, the communications sent by others after work hours, and their impact on informants are temporarily minimized when individuals distance themselves psychologically from their tools. Thus, in some cases, by disconnecting successfully, perceived autonomy increased and the feeling of digital exhaustion decreased. As succinctly stated by Rachel, though she could not stop the demands of her work, she has control

to use her downtime to separate from technology: "I think just finding opportunities to get away from screens, especially when you have the free time from work [...] [That] removes you from the, at least, the stressful screens in my opinion." Rachel described how despite her limited control over her work, she feels autonomy over when to disconnect from looking at screens. By doing this, she addressed the symptoms and prioritized herself which reduced her sense of exhaustion from "stressful screens".

The fourth and final coping approach addressed digital exhaustion by applying non-technological solutions to a symptom. Informants commonly enacted these strategies by applying actions to their own selves and their own behaviors, making them feel less burdened by the will and actions of others. Individuals who attempted to decrease their digital exhaustion through this pathway did so by employing the following strategies: (1) self-care and (2) changing their mindset.

Self-care. Engaging in self-care activities helped informants decrease or manage psychological and physical symptoms of digital exhaustion. These activities included a variety of methods for taking care of one's own well-being. First, and common to informants who worked from home, they described simple self-care activities such as getting up from their desks and moving around, going outside for a walk, or grabbing refreshments. Others engaged in extensive lunch breaks, spent time with friends, or went to the gym. As Clarissa, the start-up COO, described:

> "I make my weekends very fun […] It can mean being active with friends or physically exhausting myself, or just doing nothing, just staying home and cleaning my apartment. I did that a few weeks ago and it felt very, very, very good […] I just make sure my weekends are fun and that way my batteries are recharged for Monday."

Choosing to do activities away from technology, Clarissa found herself able to enjoy time in self-care activities and contribute to her sense of well-being that had been depleted during the

work week when she had to use digital technologies frequently. Taking time for herself outside of work and the digital tools associated with working, helped Clarissa to feel better both mentally and physically. Almost all informants enacted self-care by engaging in fun or rejuvenating activities such as exercising, cooking, going into nature, or playing video games.

Additionally, many informants described actively taking charge of their mental health to combat negative feelings from extended digital tool use. For example, Violet, a product manager, mentioned taking advantage of therapy sessions offered by her employer: "They also have a Lyra benefit, which is one of those, therapy session type of things [...] So I've actually taken advantage of that one." As exemplified, Violet knew that prioritizing her mental health was necessary to cope with the downstream stress from her workplace. Many informants similarly mentioned how taking care of mental health and recognizing their needs as important strategies for them. As succinctly described by Lyle, a sales director, being mindful helped him to notice and employ actions to mitigate his negative feelings:

> "I have a pretty strong mindfulness and meditation practice. I'm also in the middle of doing the inner MBA program, which is all about mindfulness and sort of self-reflection, and how to apply that to business. That's probably where I've gotten the most information and more of the sense of like, what are some of the strategies that I want to employ."

For informants like Violet and Lyle, engaging in self-care focused on their mental health allowed them to address the symptoms of psychological stress and strain. Seeking external support from a therapist or learning mindfulness techniques helped informants to reflect upon and understand their feelings. These self-care strategies allowed them to process their emotions and better cope with the strain of using digital technologies.

Changing mindset. The last strategy that individuals enacted to decrease digital exhaustion were to change their mindset towards themselves, their tools, or their work. Informants demonstrated the effect of changing mindset by enacting several psychological

reorientation strategies that allowed them to see digital tools not as a burden but in a more positive light. For example, Gretchen, a vice president of sales, described how she found ways to be creative in responding to emails:

> "I like writing emails. That can feel kind of restorative because you're just kind of writing communications [...] And it doesn't feel like as much of a burden as logging notes or being in a meeting, it can be more rejuvenating like, 'Oh, let me dream up this email that I want to send.' It's more creative, if you will."

Rather than allowing the task of writing emails to be tedious, Gretchen adopted a mindset in which she could tap into her creative and intellectual skills and reframe what could easily be an exhausting task. Like Gretchen, although many informants described digital tools as tiresome, they also enacted strategies that allowed them to express appreciation for the affordances granted by the tools that made their jobs easier and more efficient. Specifically, informants adopted a purpose mindset by reminding themselves of the overarching goals of using digital technologies. As Patrick, a director of sales, described, he mitigated his exhaustion because he saw the purpose of his work and how digital tools fit into this purpose:

> "I love being good at it, there's no purpose in doing something if you don't want to do well [...] I know, like, there's a pretty damn strong correlation between focusing on your craft, and then you being better at it [...] I just give it my attention, the better I'm gonna get at it. And if Salesforce has an issue, I gotta find my way around it."

For Patrick, although he acknowledged that digital tools like Salesforce might not work, he chose to shift his mindset to his situation. Patrick mitigated the stressful feelings of using digital technologies at work by viewing technology as a means to doing his job and therefore something that he had to learn to work with rather than against.

Although many informants expressed feeling exhausted by their use of digital tools, they also employed strategies to change their attitudes toward their work. Thus, they shifted and reframed how they experienced digital tools as a means for achieving their goals rather than as

hindrances. Whether by expressing gratitude or focusing on a greater purpose the strategy of shifting one's mindset mitigated the psychological symptoms of stress and frustration that one felt when using digital technologies. leading to diminished feelings of digital exhaustion.

COPING STRATEGIES AND FEEDBACK PATHWAYS

Our data showed that not all strategies were universally implemented, nor did they have the same results in reducing digital exhaustion. Rather, patterns emerged demonstrating that informants entered into three different pathways of experimentation, feedback, and adjustment of their strategies. These feedback pathways, although distinct in their characterization and outcomes, occurred concurrently and informed subsequent behaviors and perceptions.

We found that individuals' perceived autonomy influenced their actions in response to digital exhaustion. When strategies were successful, this enhanced perceived autonomy and empowered informants. In some cases, simply believing they had a choice or control was enough to alleviate digital exhaustion without making actual changes. Conversely, when strategies were hindered, it diminished perceived autonomy and further disempowered informants' to act in future situations. When attempts to address the sources of exhaustion failed, individuals often turned to less effective strategies targeting symptoms. However, these measures could also be inadequate at addressing the ongoing impact of digital exhaustion. The inability to exercise choice and the resulting decline in perceived autonomy intensified experiences of digital exhaustion and, in some cases, led to disengagement and resignation.

Feedback Pathway 1: Targeting the Source

The first feedback pathway involves enacting strategies to directly target the source of digital exhaustion. Many of our informants described taking the approach of treating the source when they believed they had the ability to influence the origin of digital exhaustion. These

individuals not only exuded a high perception of autonomy but also reported lower levels of digital exhaustion. For example, Bianca, the engineering director, described being frustrated with digital tools she used both for work and in her non-work life: "[I get frustrated] with apps that are not user-friendly." When asked if she felt digitally exhausted by this, she replied, "No, I'm not. Like I said, I feel like I have the choice to get into it or not." Because she believed that she had the choice to not use the tools she found to be frustrating, she was able to mitigate feelings of digital exhaustion and she also felt empowered to change other aspects of her digital tool such as deleting social media accounts and setting boundaries with coworkers.

Another informant, Joey, the CTO for a school district, expressed similar levels of low digital exhaustion as a result of his ability to dictate his tool use: "I have a lot of control over [the tools we use]. I'm the head of the department, so I can decide what tools we use." He also described strategies he employed for himself and his employees to minimize the reliance of using digital technologies: "I'm a big fan of whiteboards and doing things physically, too […] So we're trying to meet more in person and feel more connected with people." Joey was able to assert his preference for in-person meetings, bypassing the tool altogether to avoid digital exhaustion, a non-technological solution.

One way that organizations helped mitigate digital exhaustion for their employees was by offering options for training. As one informant Ross, a head of software development, put it: "[Our organization] provides the training. We have IT support, obviously, who assist us with any problems that we have. If anything unexpected arises as a result of their usage, we can get support. Support is very good." However, offering support or training only proved an effective solution if employees felt empowered to select this option. An option is only a realistic option if

employees *believe* they can *choose* that option. Otherwise, it is not a real choice, but rather a symbolic gesture on the organization's part and an ineffective one if no employees partake.

In summary, this first feedback pathway demonstrates how enacting strategies to address the source of digital exhaustion fosters expanding perceptions of autonomy which subsequently leads to a continuation of exhaustion-mitigating actions. Individuals who develop a pattern of successfully addressing sources of exhaustion are more likely to report lower levels of digital exhaustion and exhibit higher levels of perceived autonomy.

Feedback Pathway 2: Targeting the Symptoms

The second feedback pathway involves applying actions to address the symptoms of digital exhaustion either using technological or non-technological solutions. Typically, informants implemented strategies that targeted symptoms if they were unsuccessful at targeting sources. We found three main reasons informants chose or were forced to address the symptoms rather than the sources of digital exhaustion. First, the role they occupied within their organization often precluded them from making decisions about their tool use such as being required to use certain software. Second, they felt insecure about their ability to enact changes to address the source of digital exhaustion due to preexisting conceptions of their own autonomy (e.g., a *belief* that they had no power to voice preferences). Finally, many informants attempted to exert choice over a source of exhaustion that was rendered unsuccessful or even sanctioned leading them to avoid future attempts. For example, some informants attempted to set boundaries with coworkers who disregarded their requests. Regardless of the reason, individuals who felt limited in their choices to assert actions targeting the source of exhaustion were still able to enact autonomy in other areas that required less effort or reliance on others to comply or approve.

Many of our informants who were unable to address the source of their digital exhaustion still achieved relief from symptoms through technological and non-technological strategies that fed back into their sense of autonomy. These individuals reported a moderate degree of autonomy, as well as mid-range levels of digital exhaustion. For example, Phil, the teacher and IT administrator who rated himself as a five (medium) on a 1-10 scale of exhaustion, described feeling frustrated at his fellow teachers who relied on him for technology-related support:

> "I do find that I yelled at the screen when I read an email or a message, especially something that I've covered extensively in a previous email. That's the biggest frustration […] I can understand and empathy goes a long way[…] My colleagues are just as overloaded as I was. So I don't hold it against them for not reading my emails as they're dealing with multitudes of other things, but there were times where I just made a two minute video about that. Watch the video, two minutes, that's all I need!"

Phil's anecdote illustrates how he was not able to control the actions of his fellow teachers to address the source of his frustration, but he was able to change his mindset to be more patient and emphatic around how he managed these symptoms, a non-technological solution. In doing so, Phil usurped some level of control in how he reacted to the symptoms he experienced when he had no control over the source of exhaustion.

Other informants also applied non-tech solutions by enacting self-care techniques, such as seeking out mental health support, taking time off, or engaging in hobbies. Gretchen, the VP of sales who rated her digital exhaustion as a three (low), shared her strategies for self-care:

> "Even just walking my dog, or getting out in the sun, or eating or drinking water, like basic things, it can be really easy to get sucked into this digital universe where you have back-to-back meetings[…] Just being able to recharge yourself and give yourself what you need to function as a human."

By engaging in non-technological activities like walking her dog and going outside, Gretchen was able to address her symptoms to keep levels of digital exhaustion in check even though she had no control over the overarching demands of her job.

Alternatively, some informants opted for trying to manage their symptoms technologically by disconnecting from their devices. Jen, an engineer for a technology firm who rated herself high in digital exhaustion, explained how she attempted to solve the source of her digital exhaustion by requesting her supervisor assign her projects that required her to use less of the tools she didn't like and more of the tools she enjoyed using. However, this request was not fully granted so Jen chose instead to structure her workflow when having to work on tasks she found unenjoyable:

> "But as far as the things that I don't enjoy[…] I have to make myself really strict timelines and like to-do lists and schedules[…] And at least checking them off the list feels good, even if actually doing it doesn't feel that good. So that's kind of like one of the ways I cope with [doing things I don't enjoy]. And make sure that I'm doing all the things I need to be doing even if I don't want to be doing them."

Although Jen was unable to control the *kind* of work assigned to her, despite her appeals to management, she was able to enact choices in the *way* she executed her work using digital tools, a technological solution. Despite these mitigating efforts, Jen generally expressed a sense of disempowerment in her work, lower perceived autonomy and higher levels of digital exhaustion associated with her work, but continued to make efforts to improve her quality of life by organizing beer socials and book clubs, non-technological solutions, demonstrating that she still felt she could choices to address the symptoms of digital exhaustion.

This second feedback pathway demonstrates that addressing the symptoms of digital exhaustion, although still an effective strategy for temporarily relieving experiences of exhaustion, is not as effective as treating the source. However, individuals still experienced benefits from enacting strategies that targeted symptoms beyond simply alleviating stress. By exerting some choice or volition in treating their symptoms, individuals still accrued the benefits of having a sense of autonomy over in a segment of their situations even if they lacked autonomy

in areas that were beyond the scope of their control. This limited sense of autonomy was enough to keep levels of digital exhaustion at manageable levels, at least in the near term.

Feedback Pathway 3: Thwarted Strategies and Exhaustion

The third and final feedback pathway describes what happens when applying actions to address both the sources and symptoms of digital exhaustion were unsuccessful. The coping strategies described above, if successful, were effective ways to mitigate feelings of digital exhaustion through increasing one's perceived autonomy. However, enacting these strategies alone did not necessarily mean that the source of digital exhaustion decreased nor that one's perceived autonomy increased.

For individuals who rated their experience of digital exhaustion as high, their attempts to address their situations were frustrated by external factors. This happens when an individual has no influence over the sources of their digital exhaustion, as explained in the previous section, or when other factors preclude them from being able to effectively address the symptoms. Examples of these constraining factors are work demands that prevent individuals from being able to take breaks to recover, toxic work cultures that promote overwork or disordered boundary practices, overbearing managers who prevent informants from implementing changes, or experiencing work-related burnout that perpetuates a negative mindset.

When efforts to address sources or symptoms of digital tool use were unsuccessful, this led to a cycle of lowered perceived autonomy, decreased remedial action, and exacerbated digital exhaustion. Several informants who described falling into this cycle reported very low levels of perceived autonomy, as well as extremely high levels of digital exhaustion. In the case of Adrianna, an endocrinologist and director of clinical strategy for a telehealth firm who reported a digital exhaustion rating of 9, this feedback loop was eloquently represented. Adrianna described

efforts at both addressing the sources and symptoms of her digital exhaustion and was met with obstacles, frustration, and failure in almost every account she described. For example, when recounting situations when her tools did not work as intended (of which there were many), she expressed intense frustration over not being able to solve the problem despite employing various technological and non-tech solutions:

> "One of the frustrations [...] I use my cell phone for audio because the headphones that go with Teams have shitty audio [...] So I'd have to use my personal cell phone, find my earbuds. I have air pod pros, one of them falls out all the time. It's incredibly irritating. They lose charge, which is another irritation. So half the time I would have to scramble for my wired headphones. So as a constant scramble for audio and video to get it all together, every 30 minutes."

Her intense annoyance at being unable to get her tools to work was further exacerbated by unsuccessful attempts at seeking help from IT:

> "When I get frustrated, which happens almost daily, I think I probably have the world record for contact with the help desk[...] Constantly, 'Guys, I cannot make this work. I cannot make that work. Yes, I've already restarted my computer and lost all my notes for today.' I think unfortunately, my most common strategy was to get incredibly angry and yell at somebody, which is not very effective"

Adrianna not only experienced digital exhaustion internally, but her frustration at not being able to control her technology at the source spilled over into her interactions with others.

Additionally, her digital exhaustion interfered with her ability to exert non-technology-related autonomy over her work. In this instance, Adrianna attempted to address the source at a previous workplace by setting boundaries with coworkers for how to conduct virtual meetings:

> "It's this thing where when you're a minion, you don't have a lot of input. And so there is this whole policy at work that was supposed to be finished with five meaning end the meeting with five minutes remaining. Never happened [...] I'm very rigid about starting on time. So if everybody's not there, tough shit, I'm starting on time[...] Other than that I feel like I have very little impact, or ability to impact, which is one of the reasons I'm actually not sorry to be gone from that job."

Not only were her efforts to draw boundaries with colleagues thwarted, but she also expressed feeling like a voiceless "minion" unable to affect change. This defeated mindset fed into her belief that she had little control over her situation and eventually led to feelings of disengagement and resentment. Furthermore, Adrianna also expressed her inability to address symptoms of digital exhaustion due to her inability to disconnect from work at home:

> "There's also, I think, an element of the fact that we are using our home tools for work, where you feel like you never leave work. My work email being on my personal phone means that I'm constantly bombarded with notifications that I've got an email, I've got an email, even when I don't want to know. It makes you feel like you're accessible 24/7."

Even her efforts to practice self-care were compromised by her heavy work demands and confounding factors prohibiting her from enacting effective coping strategies: "I've tried to force myself to do things like stretch or yoga in between meetings that have not been successful. This I just can't, you know, it's like zero. I'm always late for the next meeting, you know, even if I don't do any of those things."

This third and final feedback pathway demonstrates that when efforts to address the source or symptoms of digital exhaustion were thwarted, this negative feedback, if left unabated, resulted in feelings of intense exhaustion and a sense of lack of autonomy that permeated into other aspects of one's work and non-work life. The negative outlook and feeling of burnout that resulted were difficult to overcome and could eventually lead to disengagement from work and even leaving a job altogether.

RELATING STRATEGIES, PERCEIVED AUTONOMY AND DIGITAL EXHAUSTION

Our analysis of feedback pathways showed that there were different levels of exhaustion depending on the target of coping strategies, the success of those strategies, and individuals' level of autonomy. Figure 1 illustrates the relationship between perceived autonomy and digital exhaustion. The x-axis shows levels of digital exhaustion and the y-axis shows the average count

of quotes per interview. As shown by the orange line, individuals with low levels of exhaustion had the highest average count of quotes that indicated high autonomy, and as exhaustion levels increased, the count of high autonomy quotes decreased. The opposite trend occurred for the average count of quotes indicating low autonomy, as shown by the black line. In general, having lower levels of digital exhaustion was associated with a perception of higher autonomy, while having higher levels of digital exhaustion was associated with a perception of lower autonomy.

<<INSERT FIGURE 1 ABOUT HERE>>

Figure 2 shows that both high and low perceived autonomy individuals reported different degrees of enacting strategies to address sources and symptoms of digital exhaustion with more actions taken to confront symptoms. This supports our assumption that sources are perceived to be more difficult to tackle since individuals expressed fewer instances of targeting sources relative to symptoms. On the x-axis, informants are categorized into low and high autonomy by whether strategies enacted address the source or symptoms of digital exhaustion. Average counts of strategies enacted for each category are displayed on the y-axis. Interestingly, low-autonomy individuals enacted more strategies overall across the two categories both targeting the source and symptoms of digital exhaustion more. But high autonomy individuals experienced a higher ratio of successful versus unsuccessful interventions as shown in Figure 3. This indicates that low-autonomy individuals enacted more strategies, but experienced a greater rate of failure of those strategies, which were then related to higher levels of digital exhaustion as described in Feedback Pathway 3. Correspondingly, high-autonomy individuals enact fewer strategies but have greater rates of success which are associated with lower levels of digital exhaustion as described in Feedback Pathway 1. Additionally, high-autonomy individuals have a decreased necessity to address symptoms since they were successful at abating their stress at the source.

<<INSERT FIGURES 2 AND 3 ABOUT HERE>>

Interpreting these comparisons, our findings suggest that the *perception* of autonomy over digital tool use is highly indicative of digital exhaustion outcomes. High-autonomy individuals enacted fewer strategies but enjoyed greater success in those efforts, which reinforced their high perceived autonomy and is associated with lower digital exhaustion. Therefore, a person who believes that they have control over what tools they are required to use or how they are expected to use them can alleviate digital exhaustion simply due to *feeling* they have choice and volition in their situation. Furthermore, as described, perceived autonomy operates in a cyclical relationship with coping strategies and digital exhaustion. Implementing successful strategies makes a person feel in control which further amplifies feelings of autonomy and reduces digital exhaustion. As one example, Gretchen, a VP at a remote tech company, successfully found that simply acknowledging that she had autonomy helped to mitigate her feelings of digital exhaustion. As Gretchen recounted,

> "We are still free to do whatever we want [...] I could call in sick and I could just drive down and go to the beach, and we could grab lunch. And although I don't end up usually doing those things, sometimes just fantasizing about it and telling myself I have the ability to do these things is enough."

As exemplified, Gretchen's high perceptions of autonomy, knowing that at any moment she could detach herself from her digital workplace, gave her a sense of liberation. As she aptly states, the act of fantasizing about the choice to spontaneously go on vacation was "enough" to not feel overwhelmed by digital exhaustion. Alternatively, the opposite can happen, when informants reported lower perceptions of autonomy, they also tended to experience higher levels of digital exhaustion. This occurs even for individuals who hold positions of authority in their organizations. For example, Lyle, a director of sales for a cloud computing firm, ranked high among informants in his level of digital exhaustion and low in perceptions of autonomy. Lyle

described having little control over his digital exhaustion stating: “You can’t fully protect yourself [from digital exhaustion] if you’re choosing to work in a highly digital environment […] You can’t say you want to be in the ocean all day and then complain that you get wet.” In comparison to Phil, Lyle’s quote illustrates how he views his work as a situation in which he cannot avoid the stress and strain of digital technologies. Having a low level of perceived autonomy, Lyle suffered more from digital exhaustion.

DISCUSSION

Digital exhaustion plagues many knowledge workers. The data presented herein allows us to begin theorizing about the ways in which individuals might be able to successfully reduce digital exhaustion. We summarize the relationships identified in our data between coping strategies, perceived autonomy, feedback pathways, and success at reducing digital exhaustion in the model presented in Figure 4. The model illustrates that digital exhaustion is inextricably linked to perceived autonomy. At the highest level, the model shows that when individuals feel they have control over their situations they also feel less digitally exhausted. Depending on their level of perceived autonomy, individuals enact coping strategies that can either address the sources or symptoms of their digital exhaustion. Like a patient dealing with a disease, addressing the root cause of digital exhaustion is a more effective approach, but treating the symptoms can also provide relief and alleviate negative effects. However, it is not enough to enact coping strategies; the success of these strategies also matters. Success enacting strategies contributes to an individual’s sense of autonomy. By contrast, being unsuccessful at enacting strategies has the opposite relationship; it decreases an individual’s sense of control over their situation. Thus, the experience of digital exhaustion is influenced by a cycle in which coping strategies, the success

of those strategies, and perceived autonomy are interconnected. These pathways demonstrate the iterative nature of managing digital exhaustion.

<<INSERT FIGURE 4 ABOUT HERE>>

Our study demonstrated that perceived autonomy plays a critical role in the experience of digital exhaustion and how individuals enact strategies to address their condition. Foregrounding perceived autonomy illuminates an important factor that prior research on mitigating the negative impacts of digital tool use has tended to overlook. For example, Ragu-Nathan et al. (2008) in their research on inhibitors of technostress described found that technical support, encouragement of IT literacy, and encouragement of users to be involved in IT implementations could reduce levels of technostress. However, as a recent review of technostress summarized, there are mixed results on the effects of these inhibitors (Sarabadani et al., 2018). Perceived autonomy provides one possible explanation for these conflicting findings. Despite the best efforts of training and support, interventions may not work because individuals may not feel that they have autonomy. Rather, interventions may be more efficacious when they contribute to individuals' belief that they have the choice over how, when, and why to use digital technologies.

According to self-determination theory, for intrinsic motivation to be present, individuals must perceive their behavior as self-determined and experience feelings of competence or efficacy. Therefore, it is important for interventions aimed at reducing digital exhaustion to also consider how they affect an individual's perceived autonomy. As described by Ryan and Deci (2000b) of self-determination theory, “People must not only experience competence or efficacy, they must also experience their behavior as self-determined for intrinsic motivation to be in evidence” (p. 70). Thus, interventions to mollify digital exhaustion must also consider how these

strategies impact perceived autonomy because a person's belief that they are in control is essential to motivating them into action.

The study also contributes to the research on technology-related stress by emphasizing the differences in enacting strategies directed at digital tools as a source of exhaustion versus the manifesting symptoms of digital exhaustion. This distinction has not been made in prior studies on technology and exhaustion but represents an important dimension along which enacted strategies to combat feelings of exhaustion are rendered more or less effective. By highlighting the importance of source versus symptom, this study informs future research on technology-based interventions, as well as how to successfully manage technology implementation to ensure optimal outcomes.

A third contribution that our study makes is explicating the phenomenon of digital exhaustion. Our approach to studying digital exhaustion considers both work and non-work-related technology use, as well as the psychological and physiological impacts of prolonged digital tool usage. By encompassing previous research on technology-induced stress, we examined the cumulative effects of using multiple tools over time and how individuals cope with the extended state of exhaustion. Scholars should consider the constellation of digital tools used by individuals and the role of perceived autonomy to accurately assess exhaustion and how to most effectively address causes of digital exhaustion that may lead to burnout.

As an exploratory study, our findings suggest several areas for future research. In addition to the constructs we identified, other factors such as organizational support, workload, tenure, and status may affect the effectiveness of coping strategies for digital exhaustion. For example, informants in higher-status roles may have more success setting boundaries with coworkers. Future research could examine the impact of individual, environmental, cultural, and

societal factors on digital exhaustion and coping strategies. Future research should also examine the evolution of digital exhaustion over time. A limitation of this study is that it only captured retrospective accounts of prior experiences with digital exhaustion. Future studies could use observations or other methods to investigate how individuals employ the three pathways identified in this study.

CONCLUSION

In this study, we explored the impact of prolonged exposure to digital technologies on individuals and the coping strategies for how they managed the associated digital exhaustion. We found that individuals experience differing levels of digital exhaustion based on the success of their coping strategies and how this success influences their level of perceived autonomy. These findings are important to understanding the cumulative effects of sustained technology use especially as peoples' lives become increasingly digitized. For scholars, theorizing on digital exhaustion illuminates a better understanding of the dark side of extended use of technology that crosses the boundaries of work and home. For practitioners, our findings indicate that leaders should adopt various strategies to promote feelings of autonomy to mitigate the negative effects of digital tool usage. Additionally, a more comprehensive assessment of individual technology usage is necessary for informed decision-making and effective digitization of the workforce.

REFERENCES

Abramson, A. (2022, January 1). *Burnout and stress are everywhere*. https://www.apa.org. https://www.apa.org/monitor/2022/01/special-burnout-stress

Atanasoff, L., and Venable, M. A. (2017). Technostress: Implications for Adults in the Workforce. *The Career Development Quarterly*, *65*(4), 326–338.

Ayyagari, R., Grover, V., and Purvis, R. (2011). Technostress: Technological Antecedents and Implications. *MIS Quarterly*, *35*(4), 831–858.

Bailenson, J. N. (2021). Nonverbal Overload: A Theoretical Argument for the Causes of Zoom Fatigue. *Technology, Mind, and Behavior*, *2*(1).

Barley, S. R., Meyerson, D. E., and Grodal, S. (2011). E-mail as a Source and Symbol of Stress. *Organization Science*, *22*(4), 887–906.

Barrero, J. M., Bloom, N., & Davis, S. J. (2020). 60 Million Fewer Commuting Hours Per Day: How Americans Use Time Saved by Working from Home. SSRN Electronic Journal.

Belkin, L., Tuskey, S., and Conroy, S. A. (2022, August). Surviving Remotely: How the Forced Shift to Remote Work Impacted Work Behaviors and Well-being. *Remote Work (Session 999)*. Academy of Management 2022.

Bellotti, V., Ducheneaut, N., Howard, M., Smith, I., and Grinter, R. (2005). Quality Versus Quantity: E-Mail-Centric Task Management and Its Relation With Overload. *Human-Computer Interaction*, *20*(1), 89–138.

Blatter, B. M., and Bongers, P. M. (2002). Duration of computer use and mouse use in relation to musculoskeletal disorders of neck or upper limb. *International Journal of Industrial Ergonomics*, *30*(4), 295–306.

Crum, A. J., Salovey, P., & Achor, S. (2013). Rethinking stress: The role of mindsets in determining the stress response. *Journal of Personality and Social Psychology*, 104, 716–733.

Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum.

Dhir, A., Yossatorn, Y., Kaur, P., and Chen, S. (2018). Online social media fatigue and psychological wellbeing—A study of compulsive use, fear of missing out, fatigue, anxiety and depression. *International Journal of Information Management*, *40*, 141–152.

Edmunds, A., and Morris, A. (2000). The problem of information overload in business organisations: A review of the literature. *International Journal of Information Management*, *20*(1), 17–28.

Fauville, G., Luo, M., Queiroz, A. C. M., Bailenson, J. N., and Hancock, J. (2021). Zoom Exhaustion & Fatigue Scale. *Computers in Human Behavior Reports*, *4*, 100119.

Fernet, C., Austin, S., Trépanier, S.-G., and Dussault, M. (2013). How do job characteristics contribute to burnout? Exploring the distinct mediating roles of perceived autonomy, competence, and relatedness. *European Journal of Work and Organizational Psychology*, *22*(2), 123–137.

Hung, W.-H., Chen, K., and Lin, C.-P. (2015). Does the proactive personality mitigate the adverse effect of technostress on productivity in the mobile environment? *Telematics and Informatics*, *32*(1), 143–157.

Ito, J. K., and Brotheridge, C. M. (2003). Resources, coping strategies, and emotional exhaustion: A conservation of resources perspective. *Journal of Vocational Behavior*, *63*(3), 490–509.

Jensen, C., Ryholt, C. U., Burr, H., Villadsen, E., and Christensen, H. (2002). Work-related psychosocial, physical and individual factors associated with musculoskeletal symptoms in computer users. *Work & Stress*, *16*(2), 107–120.

Karimikia, H., Singh, H., and Joseph, D. (2020). Negative outcomes of ICT use at work: Meta-analytic evidence and the role of job autonomy. *Internet Research*, *ahead-of-print*.

Kushlev, K., Dwyer, R., and Dunn, E. W. (2019). The Social Price of Constant Connectivity: Smartphones Impose Subtle Costs on Well-Being. *Current Directions in Psychological Science*, *28*(4), 347–352.

Kvale, S., and Brinkmann, S. (2009). *InterViews: Learning the Craft of Qualitative Research Interviewing*. SAGE.

Leonardi, P. M. (2013). When Does Technology Use Enable Network Change in Organizations? A Comparative Study of Feature Use and Shared Affordances. *MIS Quarterly*, *37*(3), 749–775.

Leonardi, P. M., Treem, J. W., and Jackson, M. H. (2010). The Connectivity Paradox: Using Technology to Both Decrease and Increase Perceptions of Distance in Distributed Work Arrangements. *Journal of Applied Communication Research*, *38*(1), 85–105.

Maslach, C. (2006). Understanding Job Burnout. In A. M. Rossi, P. L. Perrewé, and S. L. Sauter (Eds.), *Stress and Quality of Working Life: Current Perspectives in Occupational Health* (pp. 37–53). IAP.

Mazmanian, M., Orlikowski, W. J., and Yates, J. (2013). The Autonomy Paradox: The Implications of Mobile Email Devices for Knowledge Professionals. *Organization Science*, *24*(5), 1337–1357.

Moore, J. E. (2000). One Road to Turnover: An Examination of Work Exhaustion in Technology Professionals. *MIS Quarterly*, *24*(1), 141–168.

Nadler, R. (2020). Understanding "Zoom fatigue": Theorizing spatial dynamics as third skins in computer-mediated communication. *Computers and Composition*, *58*, 102613.

Nisafani, A. S., Kiely, G., and Mahony, C. (2020). Workers' technostress: A review of its causes, strains, inhibitors, and impacts. *Journal of Decision Systems*, *29*(sup1), 243–258.

Ragu-Nathan, T. S., Tarafdar, M., Ragu-Nathan, B. S., and Tu, Q. (2008). The Consequences of Technostress for End Users in Organizations: Conceptual Development and Empirical Validation. *Information Systems Research*, *19*(4), 417–433.

Reinhardt, W., Schmidt, B., Sloep, P., and Drachsler, H. (2011). Knowledge Worker Roles and Actions—Results of Two Empirical Studies. *Knowledge and Process Management*, *18*(3), 150–174.

Riedl, R. (2012). On the biology of technostress: Literature review and research agenda. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *44*(1), 18–55.

Rosen, L., and Samuel, A. (2015, June 1). Conquering Digital Distraction. *Harvard Business Review*. https://hbr.org/2015/06/conquering-digital-distraction

Ryan, R. M., and Deci, E. L. (2000a). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78.

Ryan, R. M., and Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78.

Salazar-Concha, C., Ficapal-Cusí, P., Boada-Grau, J., and Camacho, L. J. (2021). Analyzing the evolution of technostress: A science mapping approach. *Heliyon*, *7*(4), e06726.

Sarabadani, J., Carter, M., and Compeau, D. (2018). 10 Years of Research on Technostress Creators and Inhibitors: Synthesis and Critique. *AMCIS 2018 Proceedings*.

Spradley, J. P. (2016). *The Ethnographic Interview* (Reissue edition). Waveland Press, Inc.
Srivastava, S. C., Chandra, S., and Shirish, A. (2015). Technostress creators and job outcomes: Theorising the moderating influence of personality traits. *Information Systems Journal*, *25*(4), 355–401.
Strauss, A., and Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory, 2nd ed* (pp. xiii, 312). Sage Publications, Inc.
Tan, N., Yao, J., Lu, Y., and Narayanan, J. (2022, August). Is "Zoom Fatigue" Real? Video Conferencing Boosts Productivity but Worsens Well-Being. *Effects of Anytime-Anywhere Connectivity on Work Productivity and Control (Session 1140)*. Academy of Management 2022.
Tarafdar, M., D'Arcy, J., Turel, O., and Gupta, A. (2014). The Dark Side of Information Technology. *MIT Sloan Management Review*. https://sloanreview.mit.edu/article/the-dark-side-of-information-technology/
Tarafdar, M., Tu, Q., Ragu-Nathan, B. S., and Ragu-Nathan, T. S. (2007). The Impact of Technostress on Role Stress and Productivity. *Journal of Management Information Systems*, *24*(1), 301–328.
Trittin-Ulbrich, H., Scherer, A. G., Munro, I., and Whelan, G. (2021). Exploring the dark and unexpected sides of digitalization: Toward a critical agenda. *Organization*, *28*(1), 8–25.
Turel, O., and Gaudioso, F. (2018). Techno-stressors, distress and strain: The roles of leadership and competitive climates. *Cognition, Technology & Work*, *20*(2), 309–324.
Vogel, E. A., Rose, J. P., Okdie, B. M., Eckles, K., and Franz, B. (2015). Who compares and despairs? The effect of social comparison orientation on social media use and its outcomes. *Personality and Individual Differences*, *C*(86), 249–256.
Wajcman, J., and Rose, E. (2011). Constant Connectivity: Rethinking Interruptions at Work. *Organization Studies*, *32*(7), 941–961.

TABLES AND FIGURES

Table 1: Sources and symptoms of digital exhaustion that emerged in interviews and corresponding to findings in prior literature

Symptoms of Digital Exhaustion		
Symptom	Examples from Informants	Reference in Prior Literature
Cognitive Strain (Psychological)	"A lot of times, I can't find something, and I'm like, 'Where did we talk about this? Was it in Slack, or was it over email? Which email did this come through? Was it a phone call or text message? It's very scattered mentally" (Abby).	(Kim et al., 2015; Tarafdar et al., 2007; Turel & Gaudioso, 2018)
Emotional Strain (Psychological)	"I think there's also something around, if you're on a zoom call or video call, there's a little bit of a lag. And so when you're facial expressions in person, you'd react and have empathy and be able to react to people. [On Zoom] you have to use a little bit more energy to actually relate and read people's facial expressions." (Violet)	(Ayyagari et al., 2011; Kushlev et al., 2019; Lee et al., 2016)
Physical Strain (Physiological)	"Thinking about the physical toll, definitely in my back. When I stress out, I carry all the stress in my shoulders and in my lower back. So, sitting at a desk for, you know, 10 hours a day, 12 hours a day, because I'm juggling school and work; it was just incredibly physically taxing" (Ruthie)	(Blatter & Bongers, 2002; Jensen et al., 2002; Tan et al., 2022)
Sources of Digital Exhaustion		
Source	Examples from Informants	Example References in Prior Literature
Technology Design	"[I]t's clunky, and the buttons are moving in different places, and there are ads, and it's rescaling and jumping [...] It's like a puzzle you're constantly trying to figure out." (James)	(Ayyagari et al., 2011; Ragu-Nathan et al., 2008; Tarafdar et al., 2007)
Work and Job Demands	"[I]n order to get all the information about a member, I'd have to look at both the record as the nurse had written it down, find another tab for labs, which may or may not be there, go to a whole different platform and sign in separately to see if there were any hospital records that I could find." (Adrianna)	(Ayyagari et al., 2011; Dabbish & Kraut, 2006; Kim et al., 2015)
Social and Relational Factors	"I think that people struggle to understand sometimes that other people aren't exactly like themselves when it comes to using these tools that way. I think the communication tools are where you will most likely experience exhaustion if someone else's way of employing that tool is not in alignment with yours." (Joey)	(Barley et al., 2011; Hung et al., 2015; Wajcman & Rose, 2011)
Individual Traits	"I put an expectation on myself to respond to messages within an appropriate amount of time and consistently […] I put this requirement on myself in order to feel like I'm maintaining my friendships" (A2).	(Krishnan, 2017; Srivastava et al., 2015; Tarafdar et al., 2015)

Figure 1: Digital exhaustion levels and average quotes per group of high vs low autonomy

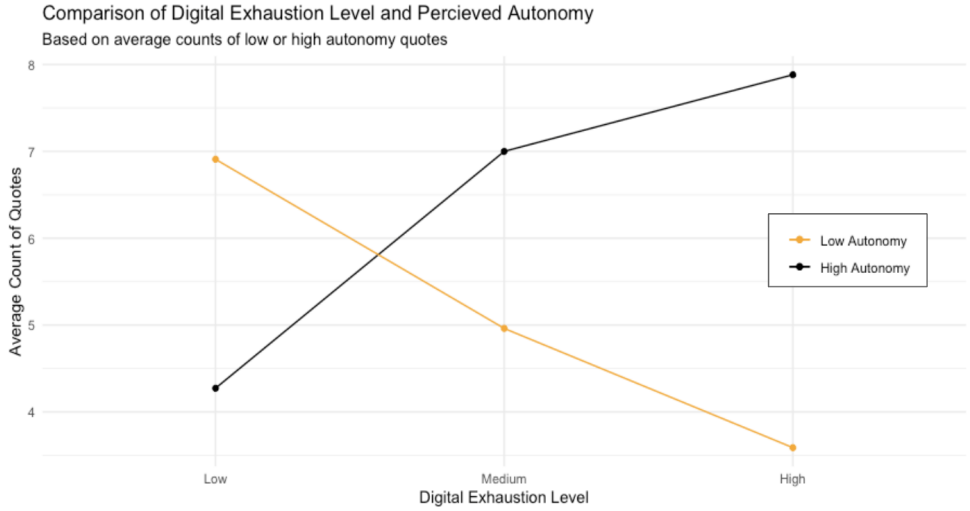


Figure 2: Level perceived autonomy and strategies enacted strategies by source or symptom

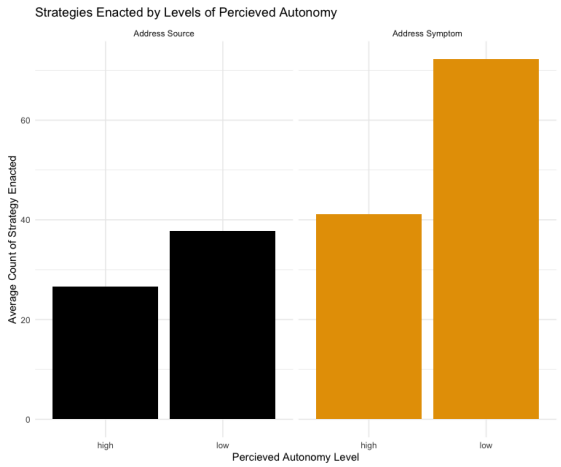


Figure 3: Level perceived autonomy and ratios of successful versus unsuccessful strategies

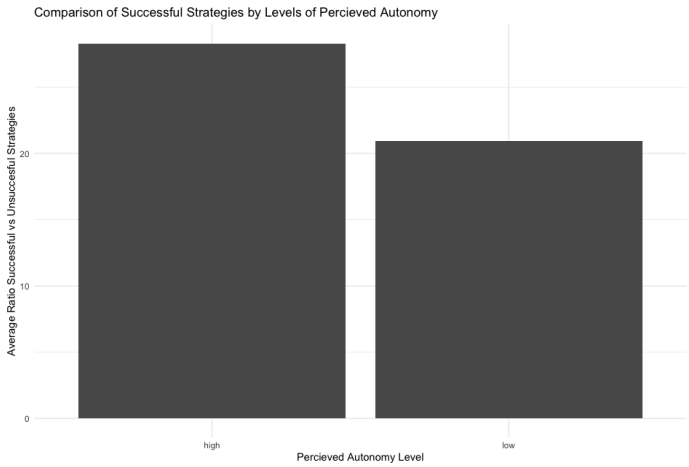


Figure 4: Model of perceived autonomy, digital exhaustion and enacted strategies

