Excessive Use of Digital Devices: A Qualitative study on perceived causes and impact.

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Abstract

Digital devices are now used by over 50% of the world's population (Geyser, 2023). This widespread use has raised concerns about the impact of spending excessive time on these devices (Almourad et al., 2020). People use digital devices for various purposes, such as work, communication, and socialising, making them an integral part of daily life (Aleem et al., 2023). The current study aims to explore the experiences of individuals who use digital devices excessively and to understand the perceived causes of this behaviour. Participants were first required to complete a pre-screening survey, and those identified as excessive users were invited to participate in semi-structured interviews. These interviews were conducted with 26 participants, including 3 males and 23 females, aged between 18 and 52. Each interview lasted about 45 minutes, during which participants discussed their digital device usage, the factors leading to excessive use, and the reasons that sustained this behaviour. A Reflexive thematic analysis was employed to identify four key themes related to the perceived causes of excessive digital device usage: using digital devices for essential purposes, enduring reliance since the COVID-19 pandemic, dependence on digital devices for self-regulation, and the fear of missing out (FoMO). The results indicated that either a combination of these factors or a single factor could lead to and sustain excessive use, depending on the individual. The study also found that these causes were not limited to specific types of digital content users, such as gamers or social media users, but were applicable to any excessive digital device user. Additionally, the study examined psychological theories to understand the reasoning behind excessive usage. The findings validate and update existing research on the causes of excessive digital device use. These insights could help future studies better understand the reasons behind excessive usage and develop targeted interventions or treatments to address this issue.

Keywords: Digital addiction, excessive use of digital devices, factors which cause and maintain digital addiction.

Excessive Use of Digital Devices: A Qualitative study on perceived causes and impact.

The use of digital devices such as tablets, smartphones and gaming consoles has become common in many households, and their use can begin as early as 2 years old (Hawi et al., 2019; Duch et al., 2013). Digital devices are commonly known as electronic gadgets usually to conduct internet-related activities such as leisure activities (e.g., YouTube and gaming), communication and interaction (e.g., Instagram, Snapchat and Whatsapp) (Hawi et al., 2019). These modern technological devices include application services such as personalised websites, blogs, and social networking websites. Besides, many home appliances such as vacuum cleaners, fridges, televisions and so on traditional digital devices have smart technology i.e., AI (Artificial Intelligence) (Vardakis et al., 2024). These smart devices provide convenience, speed and security mainly in the context of smart houses (Vardakis et al., 2024).

Based on a survey on the exponential growth of personal Internet-enabled devices to about 50 billion connected devices in 2020, they estimated that the number of Internet-connected devices will reach 1 trillion by 2035 (Vardakis et al., 2024). It is worth acknowledging that people do have a need to maintain their lifestyle and upgrade home appliances with the functionality of technology (Likar & Likar, 2019; Teoh et al., 2022). However, no study was found that could demonstrate excessive usage of smart home appliances. Conversely, smartphones were considered the most likely used digital devices for excessive usage (Statists, 2021). According to Influencer MarketHub (Geyser, 2023), the Internet is used by over 50% of the world's population, and more than 5.34 billion people (or nearly 66.9% of the world's population) own a smartphone. The average daily time spent on mobile phones increased from 152 minutes in 2014 to 215 minutes in 2018 and rose to 234 minutes by 2021 (Statista, 2021). The number of mobile devices in use worldwide was 14.02

billion in 2020, and it is expected to rise to 17.72 billion by 2024, representing a 3.7 billion device increase over 2020 levels (Statista, 2021).

In recent years, there has been a rapid development in digital technologies, along with increased societal concerns around the compulsive and excessive use of digital and internet-enabled devices (Almourad et al., 2020). Digital technology has become increasingly popular and pervasive among college students (Almourad et al., 2020) and this group of individuals heavily relies on electronic devices to conduct various activities such as academic research, communication, entertainment, and social interactions (Hawi et al., 2019; Almourad et al., 2020). However, despite the widespread use and advantages of digital technologies among college students, their purpose for using these devices varies greatly (Almourad et al, 2020).

To understand the causes of excessive usage, it is important to understand the definition of digital addiction. There is no standard definition of digital addiction as the topic remains controversial (Anderson et al., 2016), and the existence of digital addiction has been questioned due to insufficient evidence. Research by Zhai (2010) has shown that digital technology is often misused and needs to be carefully examined. This raised the debate about the appropriate terminology for spending excessive time on digital devices (Anderson et al., 2016). The increase in internet usage has also drawn widespread criticism for its addiction and problematic use in certain areas and there was a debate going on about the misuse of the internet and whether it should be referred to as “Problematic Internet Use (PIU)” or “Internet addiction” as the definitions of both terms are overlapping currently (Anderson et al., 2016; Fernandes et al., 2020). The following chapter will discuss different topics that cover the definition and types of causes that lead to excessive use of digital devices.

Chapter 1

Understanding Internet Addiction and Problematic Internet Use Terminology

The detrimental effects of excessive usage of digital devices and its impact on mental health have garnered significant attention among experts from various fields (Moretta et al., 2022). This controversial phenomenon has been studied extensively by researchers in scientific, medical, and technological disciplines. One of the main causes of the controversy is due to the definition each term holds (Staff, 2008; Moretta et al., 2022).

According to Young (1998), Internet Addiction (IA) is a broad term that encompasses various behaviour and impulse control issues in online activities. The definition of IA has changed over time due to the evolution in the use of technology (Young, 2010). The internet is considered a medium to fulfil different psychological addictions towards sex, shopping or gaming (Young, 2010). It is essential to consider the specific type of dependency a person may have. For example, they may experience loss of control, withdrawal symptoms, strong psychological dependency, interference in daily life, or loss of interest in other activities (Kuss & Griffiths, 2017). These patterns of maladaptive use can potentially cause clinical harm to the individual (Elhai et al., 2021). In comparison to other addictions, Internet addiction is difficult to define because there is no substance intake to quantify it (Staff, 2008; Moretta et al., 2022).

However, the findings of some research indicate that it does have similar effects and changes within the brain caused by substance and technology dependence, there is a consensus that the two categories are remarkably similar (Miller, 2022; Haynes, 2018). According to Bergmark et al. (2011), substance addiction and internet addiction share similar experiences like withdrawal symptoms when not engaging in the activity, being preoccupied

or consumed with the substance or activity, experiencing cravings, having impaired control over usage, and continuing to use despite negative consequences.

Behavioural addiction involves compulsive behaviours like gambling, while substance addiction involves the compulsive use of drugs or alcohol (American Psychiatric Association, 2013). Both share common mechanisms like dysregulation of the brain's reward pathway, similar behavioural patterns (Grant et al., 2006) and they can co-occur and exacerbate each other (Petry et al., 2015). Treatment approaches overlap but also differ; substance addiction may require medication, while behavioural addiction may rely more on psychotherapy (American Psychiatric Association, 2013; Volkow & Morales, 2015). Despite differences, both have significant impacts and require comprehensive interventions.

There has been research to examine similarities and differences between digital addiction and substance addiction. Research indicates that excessive internet use can lead to neurobiological changes akin to those seen in substance dependence, particularly in brain regions involved in reward processing (Kuss & Griffiths, 2017; Lin et al., 2012). These changes, observed through functional magnetic resonance imaging (fMRI), include alterations in the ventral striatum and prefrontal cortex. Moreover, internet addiction was associated with changes in neurotransmitter systems, especially dopamine, which plays a crucial role in the brain's reward pathway (weet al., 2009; Hou et al., 2012). These brain regions were associated with critical functions such as decision-making, impulse control, and emotional regulation, suggesting that internet addiction may impair cognitive and behavioural processes essential for self-control and healthy emotional responses. Electroencephalography (EEG) studies have identified abnormalities in brain regions where the brain electrical activity in individuals with internet addiction, reflects deficits in attentional control and cognitive processing (Yuan et al., 2011).

Overall, the shreds of evidence from neuroimaging, neurochemical, and electrophysiological studies suggest that excessive internet use can dysregulate brain function and structure similarly to substance use disorders. This highlights the potential addictive properties of digital technology and has significant implications for treatment approaches for internet addiction. However, further research is needed to fully understand the causality and long-term effects of internet addiction.

The concept of 'problematic internet use' or ‘PIU’ was first proposed by Beard and Wolf (2001) and later adopted by researchers like Davis (2001) and LaRose et al. (2003). ‘PIU’ refers to internet use that causes a variety of struggles in people's lives, mental states, social, academic and/or professional aspects (Davis, 2001; LaRose et al., 2003). According to Tokunaga (2015), PIU falls in the middle of a spectrum of severity, ranging from harmless digital usage to addictive behaviour. At the upper end of this spectrum lies internet addiction, which can lead to serious negative consequences in an individual's life. Such as withdrawal symptoms while unable to use a digital device, constant need to use a digital device (tolerance), and neglecting responsibilities due to persistent use of digital devices (Young, 1998). In simpler terms, PIU is a complex issue, which involves both mental and behavioural symptoms resulting in problems within social, professional, academic or personal problems (Caplan, 2002). Researchers who prefer to use the term PIU also believe it is a behavioural disorder (de Vries et al., 2018). PIU shares similar traits with behavioural disorder symptoms, such as impulsive and obsessive-compulsive behaviour with digital devices (Caponnetto et al., 2021).

Since the identification criteria for both overlap yet are different, internet addiction implies clinical characteristics resulting in demonstrating a need for treatment as it's considered more severe due to both physical and psychological dependency indicators (Young, 1998; Yuan et al., 2011). However, PIU does not necessarily imply addiction so the

method of treatment doesn't require clinical interventions. The main focus of treating PIU is on behavioural factors, replacing or adjusting the behaviour of using digital devices with productive behavioural outcomes (Caplan, 2002; de Vries et al., 2018; Caponnetto et al., 2021).

Overall, there are several overlaps and differences in identifying and proposing diagnostics criteria for IA and PIU; mainly the absence of substance limits some researchers from using the term IA and promotes the term PIU (Beard & Wolf, 2001; Staff, 2008; Moreno et al., 2013). Based on the overlaps and similarities between the two terms, it can be contested that problematic use can potentially lead to internet addiction (Tokunaga, 2015; Cemiloglu et al., 2022). However, it remains unclear and raises a debate whether the terms "PIU" or "IA" which term is most appropriate to describe the excessive use of digital devices (Anderson et al., 2016).

A literature review by Fernandes et al. (2020) evaluated the definitions of both terms and concluded that PIU should be considered an appropriate term for two reasons. Firstly, they were able to provide evidence that the term addiction was inaccurate and that the theory that excessive usage was an addiction was flawed. Secondly, the term 'problematic' describes the behaviour in a wider range compared to 'pathological' or 'inappropriate' (Ang et al., 2012). Regardless, it can further be argued that the use of both PIU and internet addiction is reasonable and interchangeable, depending on the context of the article (Fernandes et al., 2020).

The present study defines digital addiction as an impulsive and obsessive use of digital devices and digital platforms which can interfere with an individual's daily routine activities such as continuous checking local feeds on social media platforms while they are at work or studying (Cash et al., 2012; Alrobai et al., 2019). According to Alrobai et al. (2019), excessive online games, shopping and social networking platforms are often associated with

negative consequences. However, not all activities or behaviours concerned with digital technology can be labelled as digital addiction noted by Unicef (Niblett, 2020; van Endert, 2021). Since the usage of the internet is rationally proportional to the usage of digital devices, which has been ingrained in our society over time, studying and providing appropriate characteristics of digital addiction is necessary. Most of the devices currently developed are equipped with the internet, the definition of internet addiction incorporates digital addiction or excessive use of digital devices (Kuss & Lopez-Fernandez, 2016). The utilisation of several digital devices with access to the internet can potentially cause excessive usage of digital devices (Kuss & Lopez-Fernandez, 2016)

Causes of excessive usage of digital devices

The prominence of the internet in everyday life has created a global network for different people to learn, collaborate and consume content and services from others (Hawi et al., 2019; Almourad et al., 2020). However, it can potentially have an adverse effect on certain individuals who spend an excessive amount of time using digital devices, which may contribute to psychological disorders such as anxiety or depression (Nakshine et al., 2022). It is essential for everyone to understand the causes that affect the well-being of the people so that effective interventions can be developed in the future.

The addictive impact can vary depending on the type of digital device and the activities performed on it. For instance, smartphones, with their constant connectivity and multiplicity of apps, might have a higher addictive potential compared to e-readers or music players (Billieux et al., 2015). Activities also matter such as social media use, online gaming, or streaming services, which offer immediate gratification and endless content, might be

more addictive than activities like reading e-books or using productivity apps (Kuss et al., 2014).

Moreover, some activities might lead to specific forms of addiction. For example, online gaming might lead to Internet Gaming Disorder, while excessive use of social media can result in Social Media Addiction (American Psychiatric Association, 2013). However, it's important to note that the device or activity itself isn't inherently addictive. It's excessive, compulsive use, despite negative consequences, that leads to addiction (Ding & Li, 2023; Cemiloglu et al., 2022). Therefore, while understanding the differential impact of digital devices and activities it is important to have a comprehensive approach considering individual and contextual causes to be crucial in addressing digital addiction.

The effects of excessive use of the internet and digital devices have been observed globally (Horwood & Anglim, 2019). According to Horwood and Anglim (2019), excessive internet use was caused by an underlying tendency to experience anxiety, negative emotions and lack of self-control, combined with maladaptive coping mechanisms and compulsive behaviour. This highlights the importance of understanding and managing digital devices to maintain psychological well-being. Presently, several commonly identified causes are associated with excessive usage of the internet and digital devices. Some of these causes include Fear of Missing Out (FoMO) (Rozgonjuk et al., 2020), boredom (Li et al., 2022), mental health issues (Woods & Scott, 2016), lack of self-control and impulsivity (Horwood & Anglim, 2019). The causes that sustain excessive use of digital devices will be discussed in the following sections.

Psychological theories association with digital addiction

There are several psychological theories that can explain the bond that has been developed between humans and digital devices. A few theories are discussed further since they provide certain insights and explanations for the excessive use of digital devices. Self-determination theory was considered one of the key theories that can help understand the adverse outcomes of digital addictions.

Self-determination Theory (SDT) focuses on the psychological needs of individuals and their motivation towards certain behaviours (Ryan & Deci, 2000). According to SDT, individuals have three basic psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). Autonomy refers to the need for control over their actions or choices, Competence refers to the need to feel effective and capable and Relatedness refers to the need to feel connected with others and be a part of society (Ryan & Deci, 2000). However, when these needs are thwarted in offline contexts, individuals may turn to digital environments as compensatory spaces where they can satisfy these needs, potentially leading to maladaptive patterns such as digital addiction (Ryan & Deci, 2000; Zhao at al., 2011; Kardefelt-Winther, 2014). Digital addiction, including social media addiction or gaming addiction, could fulfil some of these basic psychological needs (Zhao et al., 2011; Mills & Allen, 2020).

Digital spaces, especially social media and gaming platforms, often provide a sense of autonomy by allowing users to control and customise their interactions, fostering a sense of freedom and self-expression that may be limited in offline contexts (Kardefelt-Winther, 2014). Similarly, platforms that offer feedback and rewards, such as video games or social media “likes,” can fulfil the need for competence, as users feel recognised and validated for their skills or social influence online (Zhao et al., 2011). These digital environments also facilitate a sense of relatedness by connecting individuals through forums, social networks,

and multiplayer gaming, thus providing an accessible source of social connection (Mills & Allen, 2020). Research by Liu et al. (2018) further corroborates this perspective, indicating that higher levels of autonomy support and competence satisfaction in online contexts were associated with lower levels of problematic internet use, suggesting that fostering these needs in real-life settings could mitigate the risk of digital addiction.

The Cognitive-Behavioral Model (CBM) emphasises the interplay between thoughts, behaviours, and emotions in the development and maintenance of addictive behaviours (Davis, 2001). In the context of digital addiction, maladaptive cognitions, such as the belief that constant connection is necessary or that problems can only be solved online, can trigger cravings for digital engagement (Brand et al., 2019). Studies by Brand et al. (2019) and Kim et al. (2018) have shown that cognitive distortions related to internet use and poor self-regulation skills were associated with digital addiction. Additionally, the intermittent reinforcement experienced through social notifications and "likes" can strengthen addictive patterns as individuals engage in repetitive behaviours seeking similar rewards (Davis, 2001; Kuss & Griffiths, 2011).

The CBM offers an insightful framework for understanding digital addiction by focusing on the interplay between thoughts, behaviours, and emotions in fostering and maintaining excessive digital use (Davis, 2001; Brand et al., 2019). This model posits that individuals' cognitive patterns—such as beliefs about self-worth, social validation, and escapism—drive habitual engagement with digital platforms, which over time becomes reinforcing and potentially addictive (Davis, 2001). For instance, individuals may turn to digital devices to avoid negative emotions or social anxiety, gradually associating digital engagement with temporary relief or pleasure (Brand et al., 2019). Over time, this repeated behavioural cycle can solidify maladaptive beliefs (e.g., "I need social media to feel valued"), reinforcing the behaviour and heightening dependency on digital platforms (Kuss & Griffiths,

2011). The model highlights the role of immediate rewards provided by digital platforms, such as notifications or in-game achievements, which create strong positive feedback loops that further entrench usage patterns (Wegmann & Brand, 2016).

The Need-to-Belong Theory emphasises the inherent human desire for social connection and belonging (Baumeister & Leary, 1995). In today's digital landscape, social media platforms and online communities offer readily accessible avenues to connect with others and seek validation (Andreassen et al., 2017). However, excessive reliance on these digital interactions for acceptance and belonging can lead to addictive behaviours. Andreassen et al. (2017) and Wegmann et al. (2017) found that social factors like the fear of social exclusion and seeking support from online peers were associated with digital addiction. While online communities offer a sense of belonging, fostering strong real-world relationships can potentially reduce dependence on digital platforms for social fulfilment.

Digital platforms—such as social media, online gaming, and forums—offer accessible environments where users can satisfy their need for belonging by engaging in social interactions and receiving real-time feedback (Nadkarni & Hofmann, 2012). Research indicates that individuals who struggle with offline relationships or feel socially isolated are more likely to engage in excessive digital use as a compensatory strategy, with platforms providing a readily available source of social validation and connection (Choi et al., 2015). The constant connectivity offered by these platforms can create a dependency as individuals repeatedly turn to online interactions to satisfy their unmet need to belong, reinforcing patterns of overuse and potentially leading to addiction (Andreassen et al., 2017).

Attachment theory pioneered by John Bowlby in the 1960s, provides a foundational framework for understanding how early emotional bonds influence social relationships, self-regulation, and coping mechanisms across the lifespan. At its core, the theory suggests that individuals develop either secure or insecure attachment patterns based on their early

interactions with caregivers, which in turn shape how they handle stress, form relationships, and seek emotional support (Bowlby, 1969). Mary Ainsworth's subsequent empirical work on attachment styles identified secure, anxious/ambivalent, and avoidant attachment, with the disorganised style later introduced by Main and Solomon (Ainsworth et al., 1978; Main & Solomon, 1986). These attachment patterns influence behaviour across many domains, including modern digital environments.

In recent years, attachment theory has become instrumental in explaining digital addiction, a behavioural pattern in which individuals engage excessively in internet use, social media, or online gaming to cope with unmet emotional needs (Estevez et al., 2022). Research suggests that insecure attachment styles, particularly anxious/ambivalent attachment, were significantly linked to higher risks of digital addiction (DeWall et al.,2012; Estevez et al., 2022; Tas, 2019). For individuals with anxious attachment, digital platforms offer immediate, albeit temporary, relief from feelings of loneliness, rejection, or anxiety related to real-life relationships (DeWall et al., 2012; Nicolas, 2020; D'Arienzo et al., 2019; Schimmenti & Caretti, 2010). This attachment style was noted as an intense desire for closeness and reassurance, and digital spaces offer a uniquely accessible environment for seeking emotional support without the complexities of face-to-face interaction (D'Arienzo et al., 2019; Schimmenti & Caretti, 2010). Furthermore, DeWall et al. (2012) found heightened activities was observed in parts of the brain that were linked to feeling hurt when rejected confirming the significant impact on the brain in people who experience anxious attachment to digital devices. The study also suggested that the need to belong was measured as a component of the anxious attachment style.

Digital addiction often manifests as compulsive use of social media, online chat rooms, or gaming, where individuals, particularly those with insecure attachments, can curate their self-presentation, seek validation, and manage anxieties around social interactions

(Wegmann et al., 2015). For instance, anxious/ambivalent individuals may become dependent on social media “likes” and messages, using them to reassure themselves of their worth and relevance (Wegmann et al., 2015). This need for constant digital affirmation leads to excessive use, withdrawal symptoms, and preoccupation with online relationship patterns that closely resemble addiction mechanisms observed in substance dependence (Wegmann & Brand, 2016).

Additionally, the anonymity of digital platforms also attracts individuals with avoidant attachment styles, who may turn to digital environments to escape the discomfort of intimacy and reliance associated with in-person connections (Monacis et al., 2017). However, it is those with ambivalent or anxious attachments who appear most vulnerable to digital addiction due to their dependency on external validation to soothe attachment-related anxieties (Monacis et al., 2017; DeWall et al., 2012).

To summarise, the theories emphasise the importance of fulfilling basic psychological reliance associated with excessive internet use and the psychological reasoning causing problematic use of digital devices (Ryan & Deci, 2000; Brand et al., 2019; Zhao et al., 2011; Kim et al., 2018; Andreassen et al., 2017; Wegmann & Brand, 2016). Understanding the motivations behind digital addiction is crucial for designing effective interventions to address this growing problem among adolescents. Further research should continue exploring other potential motivational factors underlying excessive online behaviour to improve our understanding of this complex issue and develop successful interventions supporting healthy adolescent development in today's digital age.

Impact of essential work on digital devices

Working is an essential and unavoidable part of life, it is necessary to work to gain monetary benefits for a sustainable lifestyle (Greding et al., 2023). Since the COVID-19 lockdown, many companies acquainted with work-from-home culture as it was not practical to travel to work (Gerding et al., 2023; Aleem et al., 2023), where the employees were provided with essential devices for their work to be done from home, which caused individuals to spend extended time on digital devices.

Working from home can also enhance employee productivity, studies suggested a reduction in distractions and interruptions compared to traditional office environments, leading to a more focused work style (Gunnarsson et al., 2010). Additionally, employees may experience increased job satisfaction due to the aforementioned benefits, potentially leading to greater motivation and higher-quality work (Gunnarsson et al., 2010). While working from home offers numerous advantages, it is important to acknowledge potential drawbacks, such as social isolation or difficulty maintaining boundaries between work and personal life. However, the potential benefits for both employees and organisations highlight the value of exploring remote work arrangements.

Working from home offers flexibility and convenience, however, resulting in excessive time spent on laptops or computers (Aleem et al., 2023; Alshammari et al., 2023). A prolonged lack of physical separation between work and personal life can lead to increased feelings of isolation, burnout, and struggle to disconnect from work responsibilities (Aleem et al., 2023). A study by Wu & Chen (2020) found that many people experienced an increase in workload by three hours per day and a 38% decrease in productivity due to connection issues. Additionally, pointing out that prior to working from home the level of stress and the efficiency was better as the work was done on-site with better connectivity and less

miscommunication. Moreover, there has been an increase in the level of stress by 50% and an increase in workload even after the uplift of the COVID-19 lockdown (Gerding et al., 2023). This excessive work has caused problems with mental health, physical health and social relationships (Kim et al., 2022). SDT provides insight into how this setup may lead to digital overuse. Remote work fulfils certain needs for autonomy, but it may simultaneously thwart others—such as the need for relatedness—when personal boundaries are compromised by prolonged work hours (Ryan & Deci, 2000; Thomas et al., 2021).

When working from home, the boundaries between professional and personal life can become blurred, leading to a loss of equilibrium (Thomas et al., 2021; Aleem et al., 2023; Allam et al., 2022; Loscalzo & Giannini, 2018; Molinaro et al., 2023). Purwanto et al. (2020) mentioned that working from home has caused a lack of boundaries in the workplace. In light of diminished travel times and the emergence of digital devices, individuals possess more elevated expectations and are engaged in protracted working hours (Purwanto et al., 2020; Hallman et al., 2021; Alshammari et al., 2023). According to CBM, such work environments can exacerbate maladaptive beliefs, such as feeling the need to be perpetually connected to achieve productivity or remain in control, which further encourages excessive digital device use (Davis., 2001). This constant connectivity, reinforced by frequent notifications and emails, traps employees in a cycle of overwork, contributing to elevated stress levels and declining mental health (Rozgonjuk et al., 2020; Twenge & Campbell, 2018).

Most employees experience negative effects on their mental health, causing negative impacts on the work-life balance particularly for workaholics, which causes high levels of stress, depression and anxiety (Krishnan et al., 2023; Loscalzo & Giannini, 2018; Molinaro et al., 2023; Alshammari et al., 2023). Especially since spending excessive time on digital devices for work burnout was the most common side effect (Krishnan et al., 2023). Additionally, they found poor psychological health and quality of life. This was supported by

Aleem et al. (2023), who added that working from home impacted their relationships with family and friends, especially since the COVID-19 pandemic. Furthermore, using a qualitative method Thomas et al, (2021) found that mothers who were studying from home were grateful for the convenience that digital devices offer. However, mothers felt guilt for not being available for kids while being at home and paying attention to their work. This demonstrates that there is a need for healthy work/study from home practice to avoid impacting psychological well-being of individuals.

The pervasive use of digital devices has been associated with a range of psychological effects. These include heightened stress, anxiety, and depression (Twenge & Campbell, 2018). The incessant connectivity offered by smartphones and social media platforms can induce feelings of being swamped and perpetually available, thereby escalating psychological distress (Rozgonjuk et al., 2020). Furthermore, overindulgence in screen time has been linked to attention deficits and diminished cognitive functioning, especially in children and adolescents who spend excessive time studying on digital devices (McDaniel & Radesky, 2020).

Interestingly, to cope with the stress caused due to work, many people rely on other types of digital content (Prakash et al., 2020). It has been established that many people relied on e.g. social media to comfort themselves from stressful situations or use it to procrastinate (Suryanto et al., 2022; Modecki et al., 2021; Lebni et al., 2020; Moge & Romano, 2020; Veisani et al., 2020). Similarly, it found that working from home has made it easier for people to spend time on multiple devices compared to the office, leading to work as a perceived cause of excessive use of digital devices (Suryanto et al., 2022). Importantly, using digital devices as coping mechanism for extended periods of time was found to negatively impact psychological and physical health (Veisani et al., 2020). CBM emphasise how such coping

strategies can lead to over-dependence on digital devices, reinforcing maladaptive behaviours and contributing to further psychological distress (Kuss & Griffiths, 2011).

In addition to ongoing psychological experiences of working on devices, many people also began experiencing physiological issues. Due to the increased hours, excessive time was spent on digital devices, which led to exhaustion, headache, disturbed or reduced sleep, physical fatigue and reduced leisure time (Hallman et al., 2021; Krishnan et al., 2023; Loscalzo & Giannini, 2018; Molinaro et al., 2023). Additionally, staring at screens before bed can impact sleep quality (Lemola et al., 2015). The blue light emitted by the device screen suppresses the production of melatonin, a hormone essential for regulating sleep-wake cycles, leading to difficulties falling asleep and obtaining restorative rest (Chang et al., 2016). Furthermore, excessive screen time has been associated with potentially leading to health issues such as obesity and musculoskeletal issues (Tremblay et al., 2017).

Overall, the workload caused people to remain in the same place, inactive, to complete tasks, which was found to negatively impact physical health. However, there were a few limitations to these studies, such as the socioeconomic status was not assessed, which might have made it necessary for people to work excessively on digital devices regardless of its impact on their well-being (Hallman et al., 2021; Krishnan et al., 2023; Loscalzo & Giannini, 2018; Molinaro et al., 2023). Additionally, most of the studies use a self-report measurement that can be biased based on the stress experienced at the workplace and the subjectivity of tolerance.

Since COVID-19, most of the work and study was conducted via digital devices due to its convenience (Krishnan et al., 2023; Molinaro et al., 2023). Although individuals working from home appreciated the convenience and effectiveness of digital devices, they suffered the consequent impact of excessive usage of digital devices (Krishnan et al., 2023; Molinaro et al., 2023). However, many companies continue the work-from-home culture

following the COVID-19 lockdown as a permanent fixture. As companies recognised the benefits of remote work, such as increased flexibility and cost savings, many adopted hybrid or fully remote models even after restrictions were lifted (Yusriani et al., 2023).

Research shows that employees have embraced this shift, citing improved work-life balance and reduced commuting stress as significant advantages (Aleem et al., 2023). However, this trend also raises concerns about the long-term impact of prolonged digital device use on employee well-being and productivity (Gerding et al., 2023). Subsequently, there was a notable increase in psychological and physiological distress as people relied on digital devices to cope with psychological distress, which further impacted negatively on their mental and physical health.

Being dependent on digital devices for various coping mechanisms

Coping mechanisms are when people face challenging situations and tend to adopt certain patterns and habits to cope with them effectively (Lebni et al., 2020). These strategies help people stay calm until the problem resolves or until they get accustomed to the new situation (Lebni et al., 2020; Karakose et al., 2023; Gupta et al., 2020). Many people use digital devices to cope with difficult times. This aligns with CBM, which explains how maladaptive cognitions—such as viewing digital engagement as essential for coping—can reinforce behaviours that lead to excessive device use (Davis, 2001). For instance, during COVID-19, many people have coped with stress by relying on digital devices, but it can be an unhealthy method of coping after an extended period of time (Karakose et al., 2023; Gupta et al., 2020).

Additionally, the constant reliance on digital devices during the pandemic resulted in an overall increase in time spent on digital devices (Moge & Romano, 2020; Karakose et al.,

2023; Gupta et al., 2020). Regardless, the use of digital devices for social connection and meaningful activity was found to be helpful during the lockdown period (Ellis et al., 2020). Since digital devices are accessible most of the time, digital devices have become the most commonly used coping mechanism for individuals facing stress, anxiety, and depression (Moge & Romano, 2020). Consequently, it results in adverse effects on an individual's mental health and makes the individual an excessive user of devices (Younes et al., 2016). According to SDT, this dependence on digital devices may stem from unmet psychological needs, such as relatedness and autonomy, which people try to satisfy through online interactions (Ryan & Deci, 2000).

Mental health issues were found to be a potential cause of relying on digital devices for comfort, escapism and other potential emotional dysfunctions for coping, leading to excessive usage of digital devices (Woods & Scott, 2016). Some studies discuss that excessive use of digital devices was associated with various mental health illnesses, such as anxiety and depression symptoms (Woods & Scott, 2016; Veisani et al., 2020). However, it has been acknowledged that mental health conditions and excessive usage of digital devices share a complex relationship, however, it's still unclear which one impacts the other. Additionally, CBM emphasises how maladaptive thoughts and behaviours interplay, with digital device use serving as a temporary relief but ultimately worsening psychological outcomes (Davis, 2001).

A study by Woods and Scott (2016) investigated Scottish adolescent social media use and its relationship with mental health. They found that 97% of adolescents were social media users, with 35% of participants classed themselves as poor sleepers, 47% of participants reported experiencing anxiety, and 21% of participants reported experiencing depression, indicating a strong association between self-esteem and emotional investment in social media. A similar study conducted by Veisani et al. (2020) in Iran found that excessive

use of digital devices positively correlated with somatic symptoms of severe depression, anxiety, insomnia and social dysfunction. According to Veisani et al. (2020), the results were consistent with previous research (Wood & Scott, 2016) indicating that excessive use of digital devices can be associated with mental health disturbances or vice versa, emphasising the need for early intervention and prevention programs aimed at reducing excessive use of digital devices in adolescents. These findings underscore the severe impact that excessive use of digital devices can potentially have on adolescents' mental health.

These studies examining the impact of excessive digital device usage on mental health present several potential limitations. Primarily, the representativeness of the sample could be questioned if it lacks diversity in age, culture, or socio-economic status. For instance, there was no comparison made with adolescents who were not on social media, indicating a lack of information about the mental health conditions of adolescents who were not a part of social media. Further research is required to assess if there would be a difference or similarity in the mental health conditions based on social media use. The studies' cross-sectional nature restricts the understanding of long-term effects. The measurement of 'excessive' usage and mental health constructs may vary, influencing results. Data accuracy might be compromised if self-reported originally. Lastly, the complex relationship between digital device usage and mental health makes determining causality challenging. These limitations suggest the need for further comprehensive, longitudinal research in this field.

To evaluate the consistency of excessive use of digital devices across different cultures, a study conducted by Lebni et al. (2020) aimed to investigate the excessive use of digital devices and its impact on mental health among medical students in Iran. The results revealed that 45.5% of participants were excessive users of digital devices, and 45.6% of participants were at-risk users. Additionally, there was a significant positive correlation between internet addiction and mental health problems such as depression, anxiety, and social

dysfunction (Woods & Scott, 2016; Veisani et al., 2020). It was concluded that excessive use of devices was predominantly used for social purposes (Woods & Scott, 2016; Veisani et al., 2020; Lebni et al., 2020) and was found to be consistent with SDT, which suggests that the excessive use of digital devices for social purposes stems from unmet needs for competence and relatedness, leading to diminished social life quality (Davis, 2001; Woods & Scott, 2016; Veisani et al., 2020; Lebni et al., 2020).

In addition to using digital devices due to mental health conditions as a coping mechanism, there is an ongoing debate on whether excessive use of digital devices is a standalone mental health issue or a symptom of other underlying conditions (Woods & Scott, 2016; Veisani et al., 2020; Lebni et al., 2020). Moge and Romano (2020) showed a significant correlation between gaming addiction and gaming due to Depression, Anxiety and Stress (DAS). Additionally, gaming addiction was significantly correlated with higher withdrawal symptoms and coping mechanisms (Moge & Romano, 2020; Wang et al., 2018) demonstrating one of the symptoms of behavioural addiction. Furthermore, participants who were excessive users of gaming used online video gaming as a coping mechanism and as a way of escaping reality from their existing DAS (Moge & Romano, 2020; Younes et al., 2016).

The constant use of gaming as a coping mechanism and means of escaping reality has the potential to lead to psychological dependency on gaming, resulting in withdrawal symptoms when unable to play (Beranuy et al., 2013; Moge & Romano, 2020). Moreover, research suggests that individuals who use gaming as a coping mechanism for psychological distress were more prone to engage in violent gaming as compared to those who do not experience psychological distress (Wang et al., 2018; Garakani et al., 2021). However, gaming addiction and video game engagement had a significant association with time spent

gaming per week (Moge & Romano, 2020; Wang et al., 2018), indicating an association between screen time and psychological dependency.

However, Modecki et al. (2021) argued that using digital devices, had a moderate improvement in emotions, self-distraction and information seeking, resulting in a decrease in worry, sadness, anger, and stress. Yet it also resulted in spending more time, an average of 7 hours online, making them meet the potential criteria for digital addiction. Besides impacting mental health, excessive use of digital devices can potentially lead to multiple physiological problems, such as headaches, eye dryness, muscle stiffness and physical fatigue, depending on the hours spent (Mylona et al., 2020; Lee et al., 2019; Moon et al., 2016). It has been argued that using gaming as a coping mechanism was ineffective in improving long-term mental health (Fernandes et al., 2020; Modecki et al., 2021). Individuals who become addicted to gaming often experience further decline in their mental well-being (Modecki et al., 2021). This indicates that even though digital devices are a reliable source for coping with momentary stressful situations, individuals must be mindful of the potential negative consequences of persistent use (Younes et al., 2016; Fernandes et al., 2020; Modecki et al., 2021; Lebni et al., 2020; Moge & Romano, 2020; Veisani et al., 2020).

Social media apps are designed with features like user algorithms that keep users hooked for extended periods, potentially leading to adverse effects on their overall well-being (Haynes, 2018; Vu, 2017). These algorithms analyse user's interaction patterns—such as likes, shares, comments, and time spent on specific content—and then deliver a personalised feed designed to maximise engagement (Haynes, 2018). This tailored feed keeps users scrolling by constantly presenting content they were likely to find engaging or enjoyable, which can lead to prolonged usage and contribute to compulsive behaviour (Vu, 2017). Anxious attachment theory emphasises that the constant reliance on digital devices to regulate emotions can potentially lead to negative consequences or excessive use of digital

devices (Ainsworth et al., 1978; Estevez et al., 2022). The UK Department of Health (GOV.UK, 2018) reported that severe consequences may be associated with overuse or excessive use, such as depression, anxiety, and low self-esteem.

Furthermore, some people listen to music or have some sound in the background to cope with loneliness (Reybrouck et al., 2020). Although having sound in the background comforts people to cope with loneliness, extended periods of use can negatively impact mental well-being (Schafer & Eerola, 2018; Alali-Morlevy & Goldfarb, 2022). However, the inconsistency in the results obtained from such studies requires further examinations to considerably understand the effect of background noise on mental health (Alali-Morlevy& Goldfarb, 2022).

Overall, using digital devices for extended periods of time was found to impact mental health and well-being. Using digital devices as a coping source was found to be an effective form initially. However, continued usage of digital devices shares a complex relationship with mental health conditions such as loneliness, depression, lack of self-esteem, and anxiety (Younes et al., 2016; Fernandes et al., 2020; Modecki et al., 2021; Lebni et al., 2020; Moge & Romano, 2020; Veisani et al., 2020). CBM and anxious attachment theory were able to provide an explanation for the psychological reasoning for relying on digital devices and the impact it can have when enduring reliance on digital devices (Davis, 2001; Ainsworth et al., 1978).

Hence, the pervasive use of digital devices as a source of comfort can create a harmful cycle that disrupts daily routine, negatively affects physical health and alters self-perception. This can ultimately lead to significant impacts on an individual's mental well-being. It was worth noting that there were certain methods of coping, like background noise (music or online shows), that still require further interpretation to appropriately understand its impact on mental well-being. Future research should continue to explore the complex relationship

between digital device use and mental health, particularly in vulnerable populations who can easily be influenced by the services provided by digital devices such as adolescents (Woods & Scott, 2016; Veisani et al., 2020; Modecki et al., 2021).

Boredom is another state of displeasure that arises from insufficient stimulation, arousal or psychological engagement (Eastwood et al., 2012). When people experience boredom, they seek ways to alleviate it (Eastwood et al., 2012), most often people indulge in activities which provide excitement and stimulation (Li et al., 2021; Sandhu et al., 2022; Gupta et al., 2020; Yang et al., 2021). However, frequent reliance on digital media as a source of entertainment to alleviate boredom can potentially result in problematic and excessive internet usage patterns, akin to how coping mechanisms may lead to excessive usage. (Lebni et al., 2020; Yang et al., 2021). According to SDT, boredom can arise when individuals feel a they have little control over their activities, lack the skills or knowledge to engage in meaningful tasks, or feel disconnected from others (Ryan & Deci, 2000).

The continuous reliance on digital devices to prevent boredom can subsequently lead to the development of excessive use of digital devices, which is a significant association between free-time management and excessive usage of digital devices (Wang et al., 2018). Similar findings were reported by other researchers, such as Biolcati et al. (2017), who found that elevated levels of boredom during leisure time were associated with increased excessive use of digital devices among college students. Additionally, individuals with high levels of boredom proneness, regardless of the gender, tend to utilise technology excessively and participate less in hobbies or activities such as sports (Wang, 2018; Biolcati et al., 2017). They also exhibit a greater propensity for binge drinking and consuming strong beverages while being more vulnerable to developing excessive usage of digital devices (Biolcati et al., 2017; Stanton et al., 2020). However, Caluzzi et al. (2021) argued that the excessive use of digital devices has been normalised and the consumption of alcohol has been de-normalised.

Although avoiding alcohol is beneficial, further research studies are required to examine and understand the shift in perception of normalising excessive digital devices.

Furthermore, a study by Li et al. (2022) found that loneliness positively related to mobile phone addiction via the mediating role of boredom. An escalation in loneliness was found to be positively associated with increased boredom proneness, resulting in reduced self-restraint and more profound dependence on mobile phone usage (Li et al., 2022; Li et al., 2021). Interestingly, adolescents experience high levels of loneliness when bored, reducing their self-control and making them more likely to excessively use their mobile phones (Li et al., 2022; Li et al., 2021). However, no association was found between boredom and self-control (Li et al., 2022; Li et al., 2021). This tends to seek out new experiences and engagement in sensation-seeking activities to maintain psychological arousal levels. These findings are consistent with CBM, which emphasises how maladaptive thoughts—such as the belief that only digital engagement can alleviate boredom—reinforce addictive behaviours (Davis, 2001).

The notion that boredom and loneliness were significantly associated with smartphone addiction among university students in Italy was supported by Orsolini et al. (2023), indicating similarities in other cultures. Highlighting that boredom and loneliness can be sequential mediators between mental health issues (depression) and excessive use of digital devices (Wolniewicz et al., 2018; Orsolini et al., 2023). The above studies demonstrate the interrelatedness of boredom, free-time management, mental health issues and addiction to technological devices such as mobile phones and the internet (Wolniewicz et al., 2018; Orsolini et al., 2023; Li et al., 2022; Li et al., 2021). This identifies boredom as one of the common causes of addictive internet usage.

Overall, the above studies provide evidence for the relationship between boredom proneness and excessive use of digital devices. Individuals who are more prone to boredom

tend to use their smartphones excessively as a way of coping (Orsolini et al., 2023). Although SDT and CBM were able to provide insight into the psychological reasoning, it is unclear if it is due to the absence of stimulation, the inability to self-regulate and manage boredom, mental health issues or a combination of these. Another cause of using digital devices excessively could potentially be due to excessive dopamine release. Dopamine is a neurotransmitter for feeling happy or rewarded (Haynes, 2018). The reward/motivation system is responsible for preserving and encouraging a stable human mentality, which entails maintaining a sound mood and motivation and is often responsible for addiction-like behaviours (Haynes, 2018). The release of dopamine while spending excessive time on digital devices could be a potential indicator of underlying mental health conditions such as depression (Fujiwara et al., 2022; Haynes, 2018; Vu, 2017). This chemical is associated with addictions, such as drugs, food, or problematic internet use (Fujiwara et al., 2022).

Using digital devices as a coping mechanism has been linked to mental health conditions (Karakose et al., 2023; Cemiloglu et al., 2022), and mental health conditions can potentially occur due to a chemical imbalance in the brain, such as dopamine (Haynes, 2018; Vu, 2017). Therefore, the research indicates that mental health conditions might create dopamine imbalance, potentially making an individual a convenient target for reward conditioning (Karakose et al., 2023; Fujiwara et al., 2022). CBM explain how such maladaptive behaviours are reinforced by the brain's reward system, where each interaction with social media or gaming apps triggers a dopamine release, leading to repetitive engagement (Davis, 2001). This mechanism was similar to that observed in other addictions, such as drug use, where individuals continuously seek out dopamine stimulation (Nestler, 2013). For instance, depression has been linked to decreased dopamine signalling and receptor availability in reward pathways (Miller et al., 2015). This complex interplay between dopamine and mental health suggests that mental health conditions can disrupt the delicate

balance of dopamine function, potentially contributing to a range of symptoms and impacting an individual's motivation, reward processing, and overall well-being.

Researchers have identified the process of reward conditioning, in which users are rewarded by the release of dopamine every time they interact with social media and gaming apps through likes, comments or achievements (Fujiwara et al., 2022; Haynes, 2018; Vu, 2017). Hence, social media platforms use addictive features to keep users engaged and online (Haynes, 2018; Vu, 2017). Leading to excessive release of dopamine can result in users experiencing an increased sense of pleasure and are incentivised to continue using these apps, potentially leading to excessive usage patterns (Haynes, 2018; Fujiwara et al., 2022). This creates a vicious cycle where users crave more online interactions to experience positive emotions and feelings, leading to decreased performance in daily activities such as studying or work (Haynes, 2018; Vu, 2017).

To understand and evaluate the impact of excessive use of digital devices on the reward system. A study by Kumar et al. (2017) suggested that repeated overuse of digital devices results in a decline in the receptors on reward cells, leading to decreased pleasure reception. In addition, decreased sensitivity in the reward pathways increases the likelihood that individuals will engage in addictive internet usage patterns. This reward deficiency theory was also associated with conditioned learning and the brain's reward system, which ultimately contributes to the development of excessive use of digital devices. However, the study was theoretical and lacked practical evidence.

To confirm and validate the theoretical findings of Kumar et al. (2017), a neuropsychological study examined the relationship between behavioural addiction while using digital devices, the health benefits of daily habits and the reward system on life habits and mental health (Fujiwara et al., 2022). They found a significant relationship between the reward system and psychological dependency, which was closely related to the motivation

region of the brain. This decreased sensitivity in reward pathways can make individuals more prone to addictive internet usage. Subsequent neuropsychological research confirmed that excessive internet use is associated with heightened dopamine release during online interactions, but with reduced dopamine levels when not engaging, creating a dependency on digital activities for pleasure (Fujiwara et al., 2022; Choudhury & McKinney, 2013). Moreover, multitasking on social media further increases dopamine release, reinforcing addictive behaviours (Dresp-Langley, 2020). Regular internet usage gradually increases the need for reward/dopamine release (Dresp-Langley, 2020; Greenfield, 2021). People would need to spend more time on digital devices to experience the same sense of pleasure as before due to decreased sensitivity in their reward pathways, which can lead to addictive usage patterns (Greenfield, 2021).

This desensitisation process, resulting from dopamine postsynaptic receptor upregulation, weakens neural circuits responsible for natural rewards such as food, social interactions, or work/academic achievements (Greenfield, 2021). This pattern resembles any substance addiction process (Sharma et al., 2020). Therefore, it can be inferred that the overuse of digital devices is related to a reduction of the release of dopamine in the brain's reward system. Greenfield (2021) and Sharma et al. (2020) noted that digital technologies are designed to trigger the brain's reward centre by providing immediate gratification and stimulation like digital drugs. For instance, the unpredictability factor experienced via gambling slot mechanism.

This analogy of digital drugs may oversimplify the diverse ways individuals engage with technology. Unlike substances that chemically alter brain function, digital technologies offer a wide range of uses, from education and productivity to social connection and entertainment. Therefore, it is important to acknowledge that while some users may exhibit problematic behaviours akin to addiction, many individuals use digital devices in a balanced

and productive manner without experiencing harmful effects (King et al., 2019) Likewise, smartphones are designed for convenient use, and the unpredictable nature of online content makes it difficult to anticipate the quality or enjoyment level of what you might find during an internet session (Sharma et al., 2020).

Fear of Missing Out (FoMO) and Nomophobia

The Fear of Missing Out (FoMO) and Nomophobia or No Mobile Phone Phobia, were two closely related psychological phenomena or concerns that has become more common as technology use has increased, resulting in adverse mental and psychological health effects (Tanhan et al., 2022).

FoMO is defined as a fear of being unconnected or out-of-the-loop from significant social events and updates, leading to persistent and compulsive checking of digital devices and technology (Tanhan et al., 2022; Rozgonjuk et al., 2022; Alutaybi et al., 2020; Elhai et al., 2020). Around 16% of all internet users were believed to have experienced a significant level of FoMO among both men and women, but predominantly targeting teenagers and young adults (Jupowicz-Ginalska et al., 2018). One in every five people aged 15 to 30 suffers from severe FoMO (Jupowicz-Ginalska et al., 2018). According to Jupowicz-Ginalska et al., (2018), FoMO is primarily caused by a failure to meet the psychological desire for belonging and a fear of social rejection. FoMO has been found to be associated with a person's psychological well-being (Uram & Skalski, 2020). The indicative criteria for FoMO include fear of missing out on social events, conversations, and the tendency to use social media to stay hyper-connected with friends and family (Bowman & Clark-Gordan, 2019; Beyens et al., 2016). The hyper need to stay connected keeps people on their devices which can lead to spending excessive time on digital devices (Beyens et al., 2016; Fabris et al., 2020).

While nomophobia was derived from the DSM-IV criteria for a specific phobia, where individuals experience excessive fear or anxiety related to a specific object or situation (Bhattacharya et al., 2019). The prevalence of nomophobia is a growing concern, particularly among adolescents and young adults who have grown up in a digitally connected world and have become heavily reliant on their smartphones for various aspects of their daily lives (Humood et al., 2021; Yildirim et al., 2016; Sui & Sui, 2021). Research also shows that the prevalence of nomophobia varies widely among different populations, ranging from 6% to 73% (Yildirim et al., 2016; Kaviani et al., 2020; Tuco et al., 2023).

Both FoMO and nomophobia are deeply rooted in basic psychological needs that drive excessive digital device use, which can be understood through the lens of SDT (Ryan & Deci, 2000; Zhao et al., 2011). According to SDT, FoMO can be seen as a maladaptive strategy to fulfil unmet psychological needs for relatedness and belonging. When individuals feel that social exclusion is imminent, they often turn to digital devices to restore their sense of connection, reflecting a failure to meet these needs (Ryan & Deci, 2000; Zhao et al., 2011; Mills & Allen, 2020). This sense of belonging was crucial for adolescents and young adults, where fear of rejection and a lack of social connection drive excessive use of social media (Jupowicz-Ginalska et al., 2018; Andreassen et al., 2017).

In addition, CBM explains how maladaptive thoughts, such as believing that constant digital connection was necessary to maintain social standing, exacerbate both FoMO and nomophobia (Davis, 2001). These cognitive distortions lead to compulsive device use, where intermittent rewards (e.g., notifications and "likes") act as reinforcement, further deepening the dependency (Kuss & Griffiths, 2011). This was supported by studies showing that nomophobia was driven by cognitive factors such as anxiety about being disconnected, further illustrating the interaction between cognition, behaviour, and emotion in digital addiction (Kim et al., 2017; Brand et al., 2016).

Furthermore, the Need-to-Belong Theory highlights the innate human desire for social connection and how digital platforms create an accessible means of fulfilling this need (Baumeister & Leary, 1995; Wegmann et al., 2017). This theory directly aligns with the FoMO phenomenon, as social media allows individuals to seek validation and social approval (Baumeister & Leary, 1995; Wegmann et al., 2017). However, over-reliance on these platforms can lead to negative mental health outcomes, including anxiety and depression (Wegmann et al., 2017). The evidence suggests that while online interactions can temporarily fulfil the need to belong, they often contribute to feelings of loneliness and dissatisfaction over time, increasing the risk of FoMO and digital addiction (Andreassen et al., 2017; Fabris et al., 2020).

Nomophobia, closely linked with these psychological theories, also arises when individuals perceive their autonomy to be compromised, especially when unable to access their smartphones (Kardefelt-Winther, 2014). Research supports that a lack of control over device usage may exacerbate anxiety and compulsive behaviours, as individuals attempt to regain their sense of autonomy by increasing smartphone usage (Kaviani et al., 2020; Liu et al., 2018). Therefore, understanding these psychological frameworks helps in addressing both FoMO and nomophobia, highlighting the importance of fulfilling basic psychological needs and challenging maladaptive thought patterns to reduce the overuse of digital devices.

The excessive use of digital devices is closely associated with the development of FoMO among adolescents, Fabris et al.(2020). Adolescents who experienced FoMO while using social media found that they had increased sensitivity to stress, particularly regarding experiences of neglect and negative reactions from online peers (Fabris et al., 2020; D'Lima & Higgins, 2021). The use of digital devices due to peer pressure gradually causes FoMO and the tendency to spend excessive time on digital devices (D'Lima & Higgins, 2021). Anxious attachment theory highlights an intense desire for closeness and reassurance due to which

people experience increased sensitivity to stress and fear of negative reactions from peers (Ainsworth et al., 1978; Tas, 2019).

A study by Uram and Skalski (2022) found that FoMO was positively associated with Facebook addiction and negatively associated with self-esteem, life satisfaction, and social connectedness. Additionally, the study revealed significant evidence of the role of self-esteem, life satisfaction and loneliness versus FoMO, Indicating the psychological impact caused by FoMO and the fear of social exclusion (Jupowicz-Ginalska et al., 2018). Furthermore, Gori et al. (2023) found an association between two attachment patterns and self-esteem, FoMO, and duration spent on social media, which sequentially demonstrated associations that subsequently had significant ties to excessive social media use. The studies discussed provide evidence of the negative consequences of FoMO, including problematic attachment to social media, reduced life competency, emotional tension, adverse effects on physical well-being, anxiety, lack of emotional control, and online risk-taking (Jupowicz-Ginalska et al., 2018; Uram & Skalski, 2020; Gori et al., 2023).

However, in the case of nomophobia, young individuals found it difficult to stay away from their smartphones and experienced feelings of panic, anxiety and fear when the devices were out of range or out of battery (Akilli & Gezgin, 2016; Gonçalves et al., 2020). Despite the psychological consequences of nomophobia, adolescents continue excessive usage of digital devices and find devices as an extension (Schwaiger & Tahir, 2022). The concept of a smartphone serving as an extension of one's self was first introduced owing to its capacity to operate as both a physical and social extension of the person (Schwaiger & Tahir, 2022; Sui & Sui, 2021; Harkin & Kuss, 2021). According to the study provided by (Sui & Sui, 2021), it has been proven that individuals can develop nomophobia or fear of being without their devices, when they have a strong emotional attachment with their devices.

Research has shown that individuals who suffer from nomophobia may experience a negative impact on their cognitive abilities (Sui & Sui, 2021; Schwaiger & Tahir, 2022). This can have significant implications for their daily functioning and overall well-being (Sui & Sui, 2021; Schwaiger & Tahir, 2022). Additionally, individuals with higher levels of nomophobia demonstrate fear of losing convenience, being unable to get information and losing connectivity with people, which leads to excessive time spent on smartphones (Schwaiger & Tahir, 2022). However, other researchers argue that higher levels of nomophobia are caused by experiences of loneliness, depression and anxiety, which motivate excessive time on digital devices (Kara et al., 2019; Schwaiger & Tahir, 2022). The cause of such a drive to spend excessive time on digital devices comes from emotional gain and increased pleasurable experiences leading to loss of self-control (Schwaiger & Tahir, 2022).

Nomophobia can introduce significant levels of anxiety and distract from one's ability to maintain adequate working memory function (Sui & Sui, 2021; Schwaiger & Tahir, 2022). This causes an impact on attention span, processing speed and ability to remember, resulting in an impact on cognitive abilities (Schwaiger & Tahir, 2022). Additionally, it was found that nomophobia causes interpersonal sensitivity, obsession and compulsion with smartphones and excessive hours spent on smartphones (Goncalves et al., 2020).

The absence of smartphones causes feelings of insecurity, panic, fear and anxiety, demonstrating high levels of dependency on smartphones (Hasmawati et al., 2020). Besides anti-social behaviour, this level of dependency has been associated with problematic dependency, prohibited usage (e.g., using a smartphone in forbidden places) and dangerous usage (e.g., using a smartphone while walking or driving) (Kaviani et al., 2020). Additionally, this level of dependency can indicate anti-social behaviour in real-life and impact real-life relationships due to excessive time spent on smartphones (Hasmawati et al., 2020).

However, some researchers argued that spending time on digital devices to connect with people and maintain relationships is a convenient source (Kaviani et al., 2020; Sui & Sui, 2021). Regardless, it has mostly resulted in negative consequences on mental well-being, cognitive and daily life (Sui & Sui, 2021; Schwaiger & Tahir, 2022; Goncalves et al., 2020). Due to the growing facilities available via smartphones, it is found to be an effective source of distractions (Cobanohlu et al., 2021).

Generally, notifications from smartphones were identified as a major cause of distraction, people with nomophobia tend to check their smartphone constantly regardless of the notification (Hasmawati et al., 2020). Erdurmazli et al. (2022) revealed that nomophobia disrupted cognitive, organisational and perceptual processing, leading to work conflicts. Demonstrating a negative impact on the ability to learn (Lopez-Belmonte, 2020; Cobanoglu et al., 2021) and further impacting working groups of people (Erdurmazli et al., 2022). Based on the studies discussed, sufficient evidence was found for the existing issue of nomophobia. However, most of the studies' main limitation was that they were based on self-report questionnaires and used a quantitative approach. A qualitative approach would be insightful to understand the underlying mechanisms of the causes of nomophobia.

Likewise, FoMO was found to have a negative impact on emotional intelligence in online gamers (Che et al., 2017). Che et al. (2017) found evidence of negative effects on emotional intelligence in online gaming excessive users. The concept of FoMO is associated with the negative impact of excessive digital device use and can lead to emotional symptoms such as increased sensitivity to stress (Che et al., 2017; Beyens et al., 2016; Fabris et al., 2020). To address the negative impact of excessive use of digital devices, it is crucial to recognise and tackle issues that can cause FoMO, which can lead to adverse outcomes such as disturbance in daily routine or negative emotional state (Elhai, 2021; Che et al., 2017; Beyens et al., 2016; Fabris et al., 2020).

Elhai (2021) identified that FoMO impacts daily routine, sleep deficit, lack of friendship, anxiety, depression, low self-esteem, and excessive smartphone use. Additionally, the frequency of the number of times smartphone was used, positively correlated with excessive use of digital devices (Elhai, 2021). Since FoMO was construed as anxiety-related psychopathology, it was found to be a significant indicator of anxiety-related symptoms (Elhai, 2021; Beyens et al., 2016; Fabris et al., 2020). It can be argued that spending excessive time on digital devices due to FoMO could be because of an underlying mental health condition (Leung et al., 2021; Roberts & David, 2019) or the need to be accepted within society (Zhao et al., 2011; Mills & Allen, 2020).

To further understand the impact of FoMO on daily life, Rozgonjuk et al. (2020) found a positive association between FoMO, social media impact on daily life and work productivity. However, after controlling for age and gender, there was no relationship between FoMO and excessive use of Snapchat. Additionally, gender differences were found, with females reporting more time spent on WhatsApp and Instagram than males. A study by Li et al. (2022) supported the findings from Rozgonjuk et al. (2020).

Li et al. (2022) found a significant positive correlation between FoMO, social media addiction, and smartphone addiction use. They found no difference in the type of excessive use with extraversion and neuroticism personality traits, indicating that excessive usage is not associated with personality traits. However, they found that participants who were excessive users experienced FoMO due to an anxious attachment style. Although Rozgonjuk et al. (2020) gender differences have been reported in previous studies, using a network approach, Li et al. (2022) found no gender differences for FoMO, social media addiction, and smartphone addiction. Therefore, FoMO appears to have an equal effect on all genders.

There were several limitations that should be acknowledged in studies on FoMO (Li et al., 2022; Rozgonjuk et al., 2020). The research was conducted with college students,

limiting the study's outcome to adolescents and young adults. It was a self-report method of data collection, which could be flawed by participants' biases or being unaware of their behaviour (Li et al., 2022; Rozgonjuk et al., 2020). It was a cross-sectional study, which cannot indicate causality between the variables (Li et al., 2022; Rozgonjuk et al., 2020). The study had a convenient sampling method which limited the research outcome. The research conducted on FoMO and its impact on social media addiction has indicated a positive correlation between these two variables (Li et al., 2022; Rozgonjuk et al., 2020). While excessive internet and social media use can lead to negative outcomes such as smartphone addiction, gaming disorder, and emotional distress, evidence suggests that FoMO plays a significant role in this process. The studies examined have also identified gender differences in how women tend to report higher scores than men for some applications.

Moving towards the psychological implications of FoMO, Leung et al. (2021) investigated the relationship between using social networking sites, self-esteem, and FoMO with depression symptoms among young adults. The results demonstrated that the time spent on social media has an increased association with self-esteem and depression symptoms. This finding of time spent on social media reduced self-esteem and increased FoMO has been consistently found in several studies (Rozgonjuk et al., 2020; Uram & Skalski, 2020; Gori et al., 2023). The studies collectively discovered that self-esteem and FoMO influence the use of social media. This, in turn, directly affects symptoms of depression (Rozgonjuk et al., 2020; Uram & Skalski, 2020; Gori et al., 2023).

The Need to Belong was another essential influence that causes FoMO, especially in many young adults (Wang et al., 2018; Duman & Ozkara, 2021). The need to belong within a peer group creates the urge to stay active on digital devices for social engagement purposes out of the fear of being excluded from the social circle (Wang et al., 2018; Duman & Ozkara, 2021; Alabri, 2022).

A study by Roberts and David (2019), employed the need to belong theory to examine the relationship between FoMO, social media intensity, connections and mental health well-being in college students. They found a direct positive correlation between FoMO and social media intensity and a negative correlation between FoMO and offline social connection. This indicates that the need to belong played a significant role in experiencing FoMO, negatively impacting mental health (Roberts & David, 2019; Duman & Ozkara, 2021; Wang et al., 2018). Furthermore, people with interdependent self-construal (the degree to which individuals perceive themselves as intrinsically linked to others) were found to be vulnerable to experiencing the need to belong (Duman & Ozkara, 2021). This leads to FoMO being a significant predictor of negative mental well-being (Duman & Ozkara, 2021). However, FoMO can have a positive and negative impact on mental well-being based on subjective usage of social media (Roberts & David, 2019).

To understand the different impacts of FoMO on mental health, it is necessary to gain insights into the intentions and types of social media usage. There were several purposes for using social media, such as texting, photo sharing, content creating or scrolling through digital content (Gainous et al., 2020). Gainous et al. (2020) categorised social media usage into two groups: Passive Social Media Use (PSMU) and Active Social Media Use (ASMU). PSMU refers to monitoring the online activities of others (e.g., scrolling or reading other users' posts or content) without engaging in personal interaction. Contrarily, ASMU is when people engage on social media for communication (e.g., texting) or broadcasting (e.g., status updates) purposes (Gainous et al., 2020). These were identified as online behaviour, and most people engage in both online behaviour (Gainous et al., 2020; Roberts & David, 2019).

Based on the different online activities and engagement can have different impacts on FoMO. People who used digital devices for multiple online activities and engagement demonstrated an association between FoMO and impacted mental well-being could vary due

to PSMU (Gainous et al., 2020; Roberts & David, 2019). Individuals may feel insecure about their lifestyle or have their self-esteem impacted by constantly scrolling through others' content (McCrory et al., 2022; Saiphoo et al., 2020; Lockhart, 2019).

Roberts and David (2019) suggest that FoMO and social media usage are important predictors of mental health outcomes. However, the ASMU type of usage was found to impact individuals' well-being positively. ASMU was found to have purposeful, interactive engagement on social media platforms, such as creating content, posting updates, or directly interacting with others (e.g., through comments and messages). This type of usage fosters social connection, increases feelings of belonging, and allows users to engage in meaningful social interactions, which can potentially lead to improved psychological well-being (Roberts & David, 2019). Despite the findings, these studies have certain limitations, including a self-reported survey design, which was subject to response bias and social desirability bias. A constant ongoing research is required on this topic due to the evolution of the types of usage associated with FoMO.

Moreover, FoMO was not just limited to social media but was also found in other types of online activities. Li et al. (2020) indicated a 6.4% prevalence of gaming disorder in university students. FoMO-trait was found to be a factor that affected gaming disorder via impulsivity and gaming time indirectly (Li et al., 2020; Duman & Ozkara, 2019; Li et al., 2022). This finding was consistent with previous studies from other countries (Duman & Ozkara, 2019). Additionally, FoMO has a significant positive association with direct and indirect impacts on impulsivity and gaming time (Li et al., 2020; Duman & Ozkara, 2019; Li et al., 2022).

Another related cause related to FoMO that contributed to the excessive use of digital devices is notifications. Notifications are the alerts generated by applications which appear on digital devices such as smartphones, tablets and computers that provide information or

updates about an event, message, email or social media notification (Rozgonjuk et al., 2019). When these notifications constantly interrupt users, they can lead to distraction and decrease productivity (Rozgonjuk et al., 2019; Ohly & Bastin, 2023). Notifications are designed to attract attention and provide instant gratification, which can lead to the compulsive behaviour of constantly checking one's devices (Ohly & Bastin, 2023). Although notifications were designed to provide brief information on the actual content, they have led to adverse outcomes (Ohly & Bastin, 2023). It can further lead to anxiety and stress if individuals feel like missing out or cannot catch up on the notifications (Alabri, 2022). Therefore, they experience FoMO-like symptoms (Alabri, 2022).

A study conducted by Rozgonjuk et al. (2019) found that smartphone notifications can divert a user's focus by providing immediate updates on content or actions. This may potentially interrupt their concentration while completing an activity, such as studying and initiating a cycle of using a smartphone (Rozgonjuk et al., 2019; Wang, 2022; Greenfield, 2021). Constantly receiving these notifications negatively impacted individuals' daily lives (Rozgonjuk et al., 2019; Wang, 2022; Greenfield, 2021). Another study further supported this, revealing how notifications can cause addiction-like symptoms and affect an individual's time spent on digital devices.

Kim et al. (2021) found that notifications caused distractions for students. The notifications that smartphones provide through visual, auditory, and haptic feedback are the main factors responsible for undesired shifts in attention (Kim et al., 2021; Greenfield, 2021). Furthermore, there was a significant increase in the habit of checking smartphone notifications, which resulted in increased time spent on digital devices, leading to at-risk or excessive smartphone use (Kim et al., 2021). Given the negative impact that smartphone notifications can have on individuals' daily lives and academic performance, researchers must continue exploring this topic. Moreover, making notifications a prevalent feature on

smartphones poses a risk to individuals' time spent on digital devices and ultimately leads to becoming excessive users of digital devices.

Overall, multiple factors were found to cause nomophobia and Fear of missing out (FoMO), highlighting their inter-relations and significant impact on mental health. Nomophobia arises from anxiety and fear of missing details, inability to get information, dysfunctional usage of smartphones and psychological dependency (Goncalves et al., 2020; Hasmawati et al., 2020; Sui & Sui, 2021; Schwaiger & Tahir, 2022). The excessive use of smartphones has been found to have a significant impact on both work and studies, leading to distractions of cognitive abilities and an increase in psychological and physical dependency on smartphones. This physical dependency was an interesting factor as it was closely associated with anxiety, fear and panic.

Despite these insights, there is always a gap in understanding what causes psychological distress due to the physical absence of the smartphone. Similarly, FoMO has been found to be positively associated with addiction in various activities, such as social media and gaming. Studies have highlighted its association with negative mental health, such as loneliness, depression and anxiety symptoms. Further research on FoMO has also suggested that impulsivity, reward responsiveness, and self-compensation motivation were other critical factors contributing towards addiction in gaming specifically.

Chapter 2

Present study

This chapter will identify the aims and objectives of the current study. The discussions and discoveries of previous studies demonstrate the impact of excessive use of digital devices (Stanculescu & Griffiths, 2021; Anderson et al., 2016; Li et al., 2021). The studies identified multiple underlying mechanisms that kept users online for longer durations, even when it was detrimental to their health. Therefore, researchers must continue examining the causes of digital addiction to understand these mechanisms better. Yet there are still certain gaps which still need to be addressed, such as the perceived causes of excessive use of digital devices, the arguments mentioned above were mostly addressing the researcher's theory and not the participant's experience. Additionally, the constant advancement in technology and the need to adapt to those developments creates space to add and update knowledge within the literature. Hence the present study aims to investigate how excessive digital devices users perceive the use of digital devices and if they feel it has had an impact on their mental health or vice versa. Moreover, it is necessary to examine further in-depth the specific mechanisms that contribute to the development of excessive usage of digital devices, and digital technology to explore interventions that can minimise its adverse effects while maximising the benefits.

Additionally, it is yet to be examined if people are aware of the psychological reward leading them to spend excessive time on digital devices and evaluate how they feel about the excessive use caused by the psychological reward and compulsive behaviour resulting from the need to check for new stimuli constantly. Given the rapid pace at which digital technology is advancing, gaining a more comprehensive understanding of its effects on day-to-day lives is imperative. Such understanding will enable people to navigate this constantly evolving

landscape with greater proficiency and ultimately ensure that people can fully leverage the benefits of these technological advancements while minimising any potential drawbacks. Furthermore, it is essential to understand why people rely on digital devices when bored rather than engage in other activities. To understand the causes and impact of digital devices on people's well-being, there have mostly been quantitative studies with a moderate number of qualitative studies. Therefore, there is a need for more qualitative studies to better understand the root causes of excessive digital device usage from people's perspectives and experiences.

The proposed study aims to explore the causes of excessive use of digital devices, focusing on the perceptions of individuals who have experienced excessive usage of digital devices. The study seeks to uncover perceived causes that maintain this excessive usage from first-hand experiences. The central research question guiding this study was: “What are the experiences and perceptions of individuals regarding the factors that initiate, cause, and maintain their excessive use of the internet and digital devices?” This question intends to explore the personal, social, and psychological dimensions that contribute to the overuse of digital technology. By focusing on the experiences of those who have lived through excessive digital device usage, the study intends to provide a nuanced understanding of this global issue. The findings could potentially inform professionals to develop interventions and strategies to address and mitigate the impact of excessive digital device usage on individuals’ well-being.

A Reflexive thematic approach is used in prevailing and examining the excessive use of digital devices. Based on the literature gathered from previous studies the present study attempts to further contribute to the existing knowledge of excessive use of digital devices and attempt to address the gaps mentioned above.

Understanding the causes of excessive usage of digital devices can also provide insights into how the apps or digital devices have the potential to influence individuals to stay online and what potential implements can be incorporated to help individuals manage their device usage to minimise the risks associated with excessive use. The findings of this study can be used to educate the technological and user experience designs of digital devices to promote healthy usage habits.

Methodology

This section will discuss how the research was designed, conducted, and analysed. The method addresses the experiences of excessive digital device users. A semi-structured interview approach was conducted to analyse these experiences.

The Epistemological perspective of the research study

Epistemology is an area of philosophy that is concerned with the creation of knowledge and focuses on how knowledge can be obtained and investigating the data in a valid method to find the truth (Valsiner, 1984; Goertz & Mahoney, 2012). The epistemology determines the relationship between the researcher and the reality rooted in the ontological assumptions (Valsiner, 1984; Goertz & Mahoney, 2012). Primarily, ontological assumptions are necessary to understand as they dictate epistemological assumptions. Ontology in research concerns whether the researcher believes in one truth (realism) or multiple truths (relativism) based on participant experiences (Goertz & Mahoney, 2012). The definitions of epistemology and ontology inform the root of how the study will be interpreted as an ontological relativist position, which then directs the epistemological assumption of how to investigate the research. Therefore, an epistemological framework was identified as an appropriate method of analysis for the present research aim.

This research study focuses on participants' personal experiences and subjective meanings rather than societal and cultural constructions. Hence, to analyse the data of this study, an interpretative lens was best suited since it allows the researcher to observe reality subjectively and composite multiple perspectives for analysis (Goertz & Mahoney, 2012; Braun & Clarke, 2006). Additionally, interpretivism was chosen for this research because of

its deep engagement with subjective analysis and meanings. This type of approach prioritises participants' opinions or perspectives and the ability to collect qualitative data from participants' experiences.

Furthermore, interpretivism provides a comprehensive understanding of the detailed data which was obtained from individuals and it also supports reflexivity, allowing researchers to interpret the data. Overall, this approach was best suited for the present study to conduct qualitative analysis. Braun and Clarke (2006) stated that reflexivity involves ‘drawing upon your experiences, pre-existing knowledge, and social position and critically interrogating the aspects that influence and contribute to the research process and potential insights into qualitative data’. It was the researcher’s role to maintain and follow the researcher’s reflexivity to smoothly conduct the interviews (Braun & Clarke, 2006).

The present study aimed to evaluate and expand participants' experiences by utilising the epistemology of knowledge gathering through inductive reasoning. Using the interpretative approach of analysis allows for a deeper understanding of the phenomena being studied as it prioritises the perspectives and experiences of those involved in shaping knowledge (Braun & Clarke, 2006). Additionally, it allows the researcher to uncover nausea insights that may have been overlooked with a more traditional deductive approach (Braun & Clarke, 2006).

Design

The research aimed to explore experiences and understandings of excessive digital device usage. A qualitative approach was appropriate where the researcher was able to focus on exploring and understanding the meanings, experiences and perspectives of the participants in their context, also its design was chosen because it enables researchers to understand social phenomena and how people interpret them (Denzin & Lincoln, 2000). The participants were

recruited via online advertisement (Appendix H) of the study on the Bournemouth University SONA portal and the researcher's social media applications (Linkedln, Instagram and Facebook). The researcher had to contact the participants from the pre-screening section who were eligible for the interview. The participants were requested to complete an online pre-screening questionnaire via Qualtrics (Appendix D) to ensure that the participants were eligible to participate in the interview part of the study. The pre-screening survey included questions about individuals' daily digital device usage and individuals who answered 'agree' or higher were considered eligible for the research. There were no limits on how many participants could complete the pre-screening questionnaire.

The first 30 responses from the participants who were interested in participating in the interview of the study were provided with a formal invitation. The invitation email had the purpose and duration of the interview. Since the method is qualitative in nature, i.e., interviews, a total of 30 participants seems to be an ideal sample size to obtain a comprehensive perspective (Levitt et al., 2018). A sample of 30 participants is sufficient for a qualitative study because it typically achieves data saturation, where no new themes emerge, and allows for diverse, information-rich data while maintaining manageability (Levitt et al., 2018; Guest et al., 2006).

Participants

Participants were chosen using a purposive sampling technique. Purposive sampling involves the selective sampling of participants in research on the basis of those specific attributes that are relevant to the research objectives. It involves making sure that the participants possess certain characteristics e.g. age, place of residence, and occupation that correspond to the focus of the study (Palinkas et al., 2015). This strategy best addresses the research questions

by guaranteeing the inclusion of rich information cases. Participants were selected based on their responses made in the pre-screening questionnaire to understand their history of excessive usage in order to obtain a more comprehensive understanding of this phenomenon. The study attempted to collect participants from a maximum of 30 participants for the interview based on their types of digital use, age and gender (see Table 1) to get a wider insight into a variety of perspectives and causes of excessive usage of digital devices. The minimum age set for participation was 18 years old and had no known mental health issues. A total of 104 people participated in the pre-screening survey of the study. From those participants, there were 40 participants who had responded ‘agree’ or ‘strongly agree’ in more than two questions, with question three having the highest response in agreeability of 54 participants. Based on the inclusion criteria, 40 participants were eligible to participate and were invited to take part in an interview. The rest of the 64 participants mostly responded ‘slightly agree’ or less making them ineligible to participate further in the study. However, it was worth noting that even some of the ineligible participants had responded ‘agree’ or higher in at least one question. For the interview of the study, a total of 26 participants agreed to participate. There were 23 female and 3 male participants aged 18 to 52 years with an average age of 24 years.

An Independent sample T-test indicated a significant difference between the "non-eligible" and "eligible" groups for all the variables. There was a statistically significant difference in scores, $t(102) = -11.2$, $p < .001$, with non-eligible participants ($M = 17.72$, $SD = 4.3$) scoring significantly lower than eligible participants ($M = 23.03$, $SD = 2.34$).

Materials

The pre-screening questionnaire of this study consisted of questions derived from the Smartphone Addiction Scale (SAS) (Kwon et al., 2013), which would help identify excessive usage of digital devices. The Smartphone Addiction Scale (SAS) is a widely used tool for assessing smartphone addiction, with a high internal consistency and a Cronbach's alpha of 0.967 (Kwon et al., 2013; Kwon et al., 2013). It has been instrumental in studying various aspects of smartphone addiction, including the disturbance in daily life, anticipation of use, withdrawal symptoms, cyber relationships, and overuse leading to addiction (Kwon et al., 2013). The SAS provides valuable insights into the multifaceted nature of smartphone addiction and its impact on individuals' lives and relationships (Kwon et al., 2013).

SAS has been validated and found to be an assured self-reporting questionnaire used to identify excessive usage of smartphones in multiple studies (Kwon et al, 2013). Since the self-report was for pre-screening purposes, the entire SAS questionnaire which consists of about 30 questions was considered lengthy.

Therefore, four questions from the SAS questionnaire were shortlisted based on their relevance towards the research aim such as disturbance in daily life, cyber-oriented relationships and withdrawal when unable to use the digital device. The modified version of SAS consisted of four questions covering a range of digital device usage to examine if the participants identified themselves as excessive users. The pre-screening questionnaire employed consisted of questions that demonstrated reliability and internal consistency for the items in this factor, suggesting that they reliably measured in identifying excessive smartphone usage based on a reliability study by Kwon et al. (2013).

Overall, Kwon et al. (2013) demonstrated that the content validity analysis indicated that most questions demonstrated acceptable levels of content validity, with CVIs ranging from 0.57 to 1.00. However, question 3 showed a moderate CVI (0.57) and a strong negative correlation with the total score (-0.71), suggesting that it may not be measuring the same

construct as the other questions. Similarly, question 1, despite having a perfect CVI, also showed a weak negative correlation with the total score (-0.42), raising concerns about its contribution to the overall measurement. While, question 2 demonstrated a CVI (0.86) high level of correlation and a strong positive correlation (0.73) and question 4 demonstrated a perfect CVI (1.00) and moderate positive correlation between the question (0.64).

Given the reliability and internal consistency of each question, participants who responded with ‘agree’ or higher to at least two questions were considered to be engaging in excessive daily use of digital devices (Kwon et al., 2013). This criterion was deemed sufficient due to the robustness of the questions in detecting excessive usage patterns, thereby ensuring the accurate identification of potential digital device addiction among participants (Kwon et al., 2013). The process of identifying an excessive user was derived from the original SAS criteria based on the need to have access to digital devices.

There was a semi-structured interview (Appendix E) where only eligible participants were emailed an invitation to participate. The semi-structured interview questions were directed to the research aim to access the thoughts and participants' experiences of excessive use of digital devices. A semi-structured interview was employed in this research due to its flexibility, allowing for an in-depth exploration of participants’ experiences and perceptions (Bryman, 2016). They facilitate the discovery of unexpected insights, enriching the data collected. Additionally, having a semi-structured interview question was an effective and reliable method to collect information relevant to the study (Creswell & Creswell, 2018). Additionally, it provides a sense of confidence to the researcher and helps direct the participants to provide insights into experiences relevant to the study (Creswell & Creswell, 2018).

Procedure

The participants were provided with an online link to participate and join the interview. The interview was conducted via Teams video call. The participants were informed that the interview could last from 40 to 60 minutes and be digitally recorded for transcription purposes. The average time of the interview conducted was 45 minutes. Since the interview was online, the participants were informed to use a device with a camera and a reliable internet connection. At the beginning of the interview, the participants were informed to re-join the interview using the same link provided if they had an issue with their internet connection during the interview. All the participants were reminded of the aim of the study and that the interview would be digitally recorded for transcription purposes, along with the study's information sheet (Appendix C).

The interviewed participants were asked about their perspective, experiences and attitudes towards digital addiction, which was guided by an interview schedule. The researcher began with simple questions (e.g., how are you feeling today?) to ease the participants and gradually dive into the actual interview questions (Appendix E). A rapport was built with the participants to help them feel comfortable and provide accurate information for the study. The semi-structured interview had a guide for initial interview questions focused on the causes and experiences of using digital devices excessively and their perspective on what excessive usage of digital devices. At the end of the interview, the participants were provided with a debrief sheet via email (Appendix F).

The debrief sheet contained some information about the study and the contact details of the researcher if they wished to know more about the research. All the participants were thanked for their time and the contribution they made by participating in this study. Additionally, students who had participated via the BU SONA participation site were rewarded with course

credits (1 point), which was approved by the ethics committee after the interview ended as a part of their course. The overall duration of data collection was between 23rd September 2022 to 12th December 2022.

Since the data collected was in audio format, they required manual transcription. The collected data was manually transcribed into a Word file that was completely anonymised for the analysis process.

Data analysis

Qualtric software was used to collect participants pre-screening data and to shortlist eligible participants for the interview part of the study. Participants who responded 'agreed' or higher on two or more questions from the pre-screening questionnaire were considered excessive users of digital devices and were shortlisted. NVivo software was used to analyse the transcribed data. A Reflexive thematic analysis was the chosen method of analysis for this study.

Reflexive thematic analysis:

Reflexive thematic analysis identifies and interprets patterns or themes in qualitative data (Clarke & Braun, 2016). The concept of thematic analysis was originally introduced as a method of qualitative data analysis by Braun and Clarke (2006). Thematic analysis is used to capture details expressed by the participants, employing the themes technique (Daly et al., 1997; Ryan & Bernard, 2003). The field of thematic analysis has evolved to include two different approaches. A Reflexive thematic analysis approach was used for this study, as defined by Braun and Clarke (2022). Reflexive thematic analysis effectively identifies,

analyses, and reports themes within the data collected (Braun & Clarke, 2022). Reflexive thematic analysis is selected due to its proficiency in pinpointing and examining repeated patterns in the interview data, thereby offering a profound understanding of the participants' experiences

Moreover, a Reflexive thematic analysis was an iterative process and non-linear process where the researcher will be able to move between data and generated themes all over the process. Overall, the importance of reflexive thematic analysis is valued for its deep engagement with data, transparent and iterative nature throughout the process, which was most flexible for the researcher to get quality analysis of the data collected.

According to Braun and Clarke (2006), Reflexive thematic analysis follows 6 steps, (1) familiarising oneself with the data, (2) generating codes, (3) constructing themes, (4) reviewing potential themes, (5) defining and naming themes, and (6) writing up report. During the initial stage of thematic analysis, one must thoroughly review the data and identify key concepts that will be coded as potential themes. This process known as familiarisation, involves reviewing audio recordings or transcripts to ensure accuracy and making initial notes for further examination. Once a comprehensive understanding was achieved through this step, codes were then assigned to relevant quotes within the text in order to develop categories that are useful for creating patterns among these themes. The generated codes are then sorted into initial themes, which means the codes not only serve as organisational tools but also provide a piece of valuable information about the content which was saved for later memoing purposes. In this process of generating themes, the present study used the semantic coding method. Semantic coding refers to the process of encoding information based on the meaning of its superficial features, such as audio or visual appearance, in this study, semantic coding is used to understand the sub-text behind the

information provided and uses a deductive perspective to bridge the gap or add knowledge to the existing literature for further interpretations.

Later, themes were generated based on intervening codes which were obtained from the semantic process. The review process aims to detect any issues that may arise with the themes such as renaming or dividing a theme for clarification purposes. Next step, all identified themes underwent enhanced evaluation and were assigned self-explanatory names along with clear definitions specific to each theme's contribution towards understanding the data. The final step was writing up the analysis report. The Reflexive thematic analysis report includes an introduction to the research question, goal, and approach. The methodology describes data sampling, collection methods, research materials such as semi-structured interview questions and why reflexive thematic analysis was chosen.

Overall, reflexive thematic analysis proved to be a powerful tool for analysing qualitative data and obtaining rich insights (Clarke & Braun, 2016). Moreover, reflexive thematic analysis has been proven effective in identifying underlying themes that surface during interviews, emphasising individual experiences in real-life situations.

Reflexive Statement

In addition to the aforementioned steps involved in conducting reflexive thematic analysis, it is essential to acknowledge the role of researcher reflexivity in qualitative research. Reflexivity refers to critical self-awareness and reflection by researchers about their own values, beliefs, assumptions, biases, and positionality that may influence data collection, interpretation, and presentation (Clarke & Braun, 2016). Based on the qualitative nature of this study of interviews or observing participants' responses, the reflexivity of the researcher plays a significant role. Ensuring a rigorous study's integrity through the lens of reflexivity

requires careful reflection on how subjective intuitions might influence the data obtained from respondents (Berger, 2015). To be reflexive about these potential impacts on one's perceptions during fieldwork the researcher attempted to remain unbiased during the interview sessions.

The researcher has experienced excessive usage of digital devices in certain life situations. The researcher was inspired to further understand and evaluate the causes of excessive digital device usage. The researcher's position was relatable with the participants in certain scenarios, which was beneficial in obtaining quality information for the study. For instance, the researcher mentioned how the researcher often relied on social media when felt stressed while reading or writing assignments, and the participant was able to recollect their experience to add more insights as to what caused them to use digital devices. However, the shared experiences between the researcher and the participants, had the potential to drift into the details that were irrelevant to the current research.

During such situations, the researcher felt responsible for spending a few minutes offering help and advice on dealing with the situation and gently using prompt questions to direct the interview back to the research aim. The researcher attempted to ensure that personal experiences and beliefs did not interfere with or influence the interview and data analysis. The researcher remained calm and open-minded during the interview, as the information discussed could be personal to the participants. To finish, the researcher had to examine the data collected and appropriately perform data analysis patiently.

Ethical considerations

While requesting ethics approval, several ethical factors were considered and thought upon to ensure the study was conducted within BPS ethical guidelines (2021). The study targeted

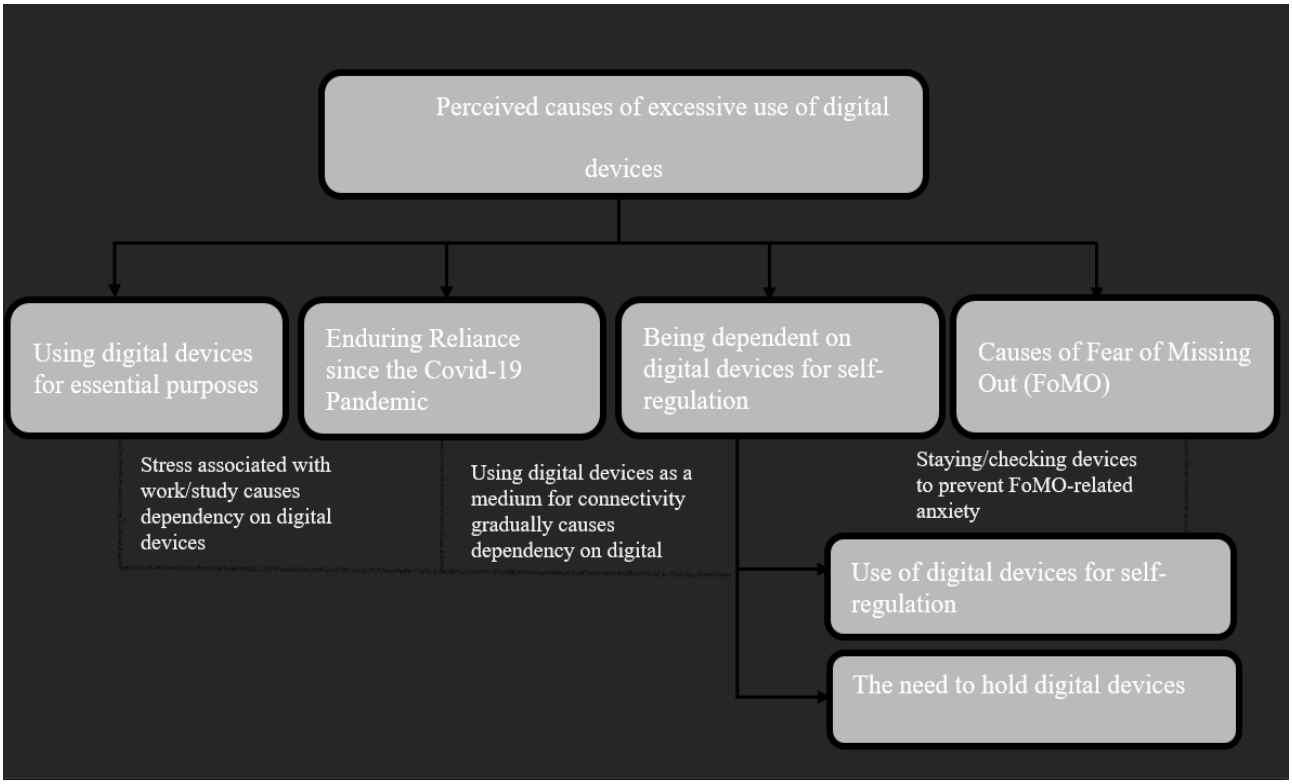
people who consider themselves excessive users of digital devices and those over the age of 18. Participant's age, gender, culture, and language background were respected, or any other status that may impact the researcher's ability to conduct participant collection and interviews. The participants were informed that the data collected and their identities would remain confidential and secured in a password-protected device. An online consent form and information sheet were provided to participants for the collection of survey data and audio recordings of interviews. Participants were given detailed information about the study's aim and objectives, how their data would be used, and asked for their permission to use it. The participants were informed that they could freely skip a question that they were uncomfortable to answer for and could withdraw from the study at any time. If the participants wish to withdraw from the study after participating, the deadline to contact the researcher was 31st December 2022.

After the specified time, all identifiable information about participants would be removed from the data to ensure complete anonymity. This information was also mentioned in the information sheet provided to them at the beginning of the study and was reiterated during the interview. Recorded interviews would be securely deleted after the research to ensure confidentiality. The researcher took care to frame questions in a way that respected participants' mental and emotional well-being, kept them simple, goal-oriented, and open-ended, and allowed participants to skip questions or withdraw at any time without consequences. Participants were also given details of mental healthcare support regarding digital devices. Conclusively, the supervisors approved the research, and the ethical approval was obtained on 23rd March 2022 with the ethics protocol code (ethics ID: 39472) received from the Bournemouth Ethics Panel. The research was conducted under the ethical checklist protocol of Bournemouth University (Appendix A).

Results

This section will discuss the findings of the reflexive thematic analysis. Four themes were generated: (1) Using digital devices for essential purposes; (2) Enduring Reliance since the COVID-19 pandemic; (3) Being dependent on digital devices for self-regulation; and (4) Causes of Fear of Missing Out (FoMO) (Please see fig 1 and table 2).

Figure 1: Visual representation of the association between perceived causes of excessive use of digital devices and themes:



Theme 1: Using digital devices for essential purposes

Participants noted that digital devices have become essential for efficiently completing tasks related to work and studies, offering convenience and efficiency in reaching their goals. However, this convenience comes at a cost, as the prolonged use required to meet these demands often leads to mental strain, physical strain and burnout. The issue is not the use of digital devices itself but the intense and extended engagement, particularly in high-pressure environments like higher education, which can blur the boundaries between work, personal life, negatively impact health and well-being.

Now you can receive an e-mail at 12:00 o'clock at night, and you're expected to reply. Especially in the Middle East. Umm, what do you think it does to people when they expect a response at like 5 minutes that means the actual employee can never set relax they can never switch off. It's just like a light bulb with you. Never switch it off. Eventually, it burns out.(P21)

For me too much and then the stress levels are high and I will noticing that I have been more like more issues with the sleep.(P2)

Participants described the significant pressure of constant digital connectivity in the workplace, particularly the expectation to be available and responsive at all hours. P21 highlighted how receiving emails late at night, especially in regions like the Middle East, creates an expectation for immediate replies, making it impossible for employees to fully disconnect and relax. P21 mentioned that this relentless demand, ‘likened to a light bulb that was never switched off inevitably leads to burnout’. P2 echoed these concerns, noting that the stress of always being "on" has led to increased stress levels and sleep disturbances.

Yeah, it was my job. So it was a minimum of 12 hours a day. That was exhausting. (P21)
I think sometimes if I'm if I'm on it too much and like the mornings or the evenings, my eyes get a little bit sort of like uphill, a bit sick. My eyes get a bit dizzy as well, so obviously I come off my phone at that point. (P24)

Participants described the physical toll of prolonged digital device use in their work routines. A participant shared that their job required a minimum of 12 hours a day on digital devices, leading to exhaustion. Similarly, P24 mentioned experiencing physical symptoms such as eye strain, dizziness, and nausea after extended periods of screen time, potentially causing physical health issues.

That's more work-related. So yeah, I'd say maybe with that, that could make the range a bit bigger of how much time I actually do spend on devices because I literally didn't even think about that. (P6)
I would spend a lot of time when I'm supposed to be sleeping or whatever else talking to friends online and yeah. (P20)

Participants reflected on the unintentional increase in screen time due to both work-related tasks. P6 noted that they often underestimated the amount of time spent on digital devices for work, realising that their usage was higher than initially thought. P20 added that they frequently extended their device use into late hours, engaging in online conversations with friends instead of sleeping. These insights reveal how the essential use of digital devices contributes to prolonged screen time, often without conscious awareness, impacting personal routines like rest and relaxation.

Theme 2: Enduring Reliance since the COVID-19 pandemic

Participants felt their use of digital devices increased since the COVID-19 pandemic. Due to the pandemic, participants found themselves using digital devices to pass their time and continue socialising, work and education. They found themselves adapting and embracing digital devices from the time of COVID-19 and continued to use digital devices excessively even after the pandemic. Most participants reported that the duration of COVID-19 was long enough to permanently impact their dependency on digital devices and make it a habit for themselves and the people around them.

I'd say so, especially after like. Covid and everything like that. Obviously, now there's like Zoom, Teams, and everything like that. I think everything can now be relied on a device pretty much. So I think we are becoming very reliant on devices. (P5)

Participants reported that as they grew accustomed to using digital platforms as their primary means of communication, they experienced heightened social anxiety when engaging in face-to-face interactions. The lack of in-person socialisation during the lockdowns contributed to a decline in everyday social skills, leaving participants feeling less confident and more anxious in social settings once restrictions were lifted. This reliance on digital communication has, therefore, had a lasting impact on their ability to navigate social interactions in the physical world. This indicates a shift in basic social behaviour traits, which can potentially lead to difficulty in social situations and public events due to a lack of practice and experience in social interactions.

I think COVID also had like, a massive effect on it because everyone became so. Yeah comfortable with not being near one another. We're all like in our own bubbles. (P20)
Even after COVID just never went back. Because everyone found how convenient it was just to be in their own space, doing their own thing. (P14)

Due to the lockdown at the time of the pandemic, participants reported getting comfortable in their own space and relying on digital devices to connect with others. Revealing that most participants felt similarly, the convenience of digital devices along with the ability to stay in their own space, outweighed the need to leave their space to get the work done.

Especially after COVID I would have to. I couldn't really meet up with anyone, so online parties were a thing and I'm just generally quite an online person (P20)

P20 discussed how, especially after COVID-19, they became more reliant on online platforms for social interactions, as meeting up in person was not possible. They mentioned that virtual parties became a common way to stay connected, highlighting their growing preference for online socialisation. This shift reflects a broader trend where digital interactions have increasingly replaced face-to-face meetings, particularly in response to the restrictions imposed during the pandemic. As a result, P20 identified themselves as someone who has become "quite an online person," illustrating how the pandemic has ingrained a reliance on digital spaces for maintaining social connections.

Theme 3: Being Dependent on digital devices for self-regulation

As digital devices have become an integral part of people's lives, many participants have reported relying on digital devices for various purposes to self-regulate emotions. It involves seeking emotional regulation or distraction, routine use of holding devices, using the device for mental stimulation, and a desire for constant engagement with the devices. This dependency emphasises the relationship with technology and demonstrates the potential for excessive use or dependency on digital devices. This theme has been split into two sub-themes; subtheme 3a: Use of digital devices for self-regulation and subtheme 3b: The need to hold digital devices.

Subtheme 3a: Use of digital devices for self-regulation

Participants expressed their dependence on digital devices for self-regulating their emotions indicating a sense of attachment towards the services offered by digital devices. This emotional attachment driven towards digital devices offers a way to escape, entertain, distract and escape from boredom, which often results in excessive reliance on digital devices to cope with ongoing stress.

I found a form of escapism when I needed to cope I used to sit on my phone constantly (P1) It becomes a way to. Numb emotions, in my opinion. Uh, and I think that. Everyone, not just including me, but everyone starts to use their phones as a way to to numb that emotional baggage and to use this like a. The way out of facing reality. (P3)

Participants discussed using the digital devices as a coping mechanism for emotional distress. P1 described how they turned to their phone as a form of escapism, using it constantly to manage difficult emotions such as need to escape reality or procrastinate from completing a

task. Similarly, P3 observed that phones often become a tool to numb emotions, not just for themselves but for others as well. They noted that this reliance on devices serves as a way to avoid confronting emotional challenges, providing a temporary escape from reality. These accounts suggest that digital devices are increasingly being used as a means to disconnect from emotional discomfort, which may offer short-term relief but could also prevent individuals from addressing underlying issues.

Looking for new things to sort of keep me entertained. So it's more like the content is like cute, that gives like the you know constant. In a way like stimulation. (P24)
Like the telly's boring me if it doesn't fully engage my interests, I'd rather be looking at something on my phone. (P16)

Additionally, some participants mentioned the need for stimulation often arises due to lack of engagement of mental stimulation or boredom, which compelled the participants to seek constant stimulation as they found things that were entertaining or looked for some engaging content on social media. The use of digital devices was found to be the most convenient method to prevent boredom. Overall, all these insights suggest that smartphones were more adaptable over traditional media because of their ability to provide immediate and various forms of entertainment and reinforce the participants' constant digital engagement for mental stimulation.

That's like the time just flies. I don't know. I think because it's just that little snapshot. And then usually it's something like it's animals and just I just love animals and then that's it. Once I've watched one, then it will be the next one. And I just have to watch like, one more,

one more, one more. Or like travel just I think it where it's short and it's exciting and happy. You know, it didn't they. They usually give me like pleasure and joy. (P16)

I guess you sort of maybe you repeat the behaviour because you think ohh maybe I'll get that reward. I don't know. It's like we've been conditioned. (P6)

Furthermore, participants discussed engaging with digital content like snapshots, or particularly shorts and enjoyable clips can be repetitive behaviour which was driven by the pursuit of pleasure and happiness. Additionally, P16 mentioned that time seems to pass quickly when they watch shorts, and stimulating videos, such as those featuring personalised content that makes them feel happy. The content's brief and uplifting nature keeps them continuously engaged, leading to repeated viewing of the page. P6 expanded the sense of being conditioned to seek out these fleeting moments of joy. This kind of repeated viewing was driven by the instant gratification that each short, engaging video provides, and has a strong hold on their daily routines.

Subtheme 3b: The need to hold digital devices

The excessive use of digital devices was found to affect participants beyond mental and emotional dependency. A few participants mentioned that they had a physical urge to hold digital devices. This overwhelming need to keep their smartphones with them revealed a deep and persistent reliance on the device.

For me, it's not doing something with my hands. Umm. Sometimes instead, to avoid picking up my phone, I'll get a little bit of sewing out some hand sewing. And that way I'm doing something with my hands. (P12)

I kept thinking that, like, what's this thing that I. You know, need to hold like, where is it? And even the physical thing (P7)

There's not much time apart from asleep, where I'm not touching my phone or around other technology. (P23)

These statements suggest that there was a physical urge to constantly hold the smartphone even though there was not much usage of the device. This can be attributed to a similar psychological need for sensory satisfaction and comfort found in addiction to particular things. Additionally, the compulsion to hold the devices can be seen as a way for participants to occupy their hands and distract themselves from underlying anxiety or stress. This behaviour may provide a sense of distraction, allowing participants to occupy their hands and focus on some tangible things in state of discomfort or anxiety. As P7 states the urge to hold a smartphone was a physical thing along with this, P12 also experienced that they felt a little bit of sensation of sewing out some hand sewing, which indicates a psychological reliance to hold the smartphone in their hand. Alongside, a few of the participants disclosed that apart from sleep, they spent most of their time using or with their devices or other technologies. Overall, this demonstrates that some of the participants relied on digital devices for emotional regulation, mental and sensory stimulation.

Theme 4: Causes of Fear of Missing Out (FoMO)

FoMO was the most common and consistent factor due to which participants would spend excessive time on digital devices. FoMO can become detrimental which can leads to distressed anxiety, interrupted sleep, lack of concentration and dependence on social media to generate gratification. Participants reported a rush of excitement and interest in getting to

know things as they happened. When participants did not have access to their devices, they felt anxious, which triggered participants to go on devices and stay on them. Devices were used for almost every activity throughout the day, such as communication, work and socialising. Hence, the feeling of missing out on information online was considered concerning and worrisome. This resulted in spending more time online and on devices just to avoid feeling FoMO.

I get a lot of FoMO because I see what everyone else is doing. Which doesn't help because I'm like, oh, I want to be doing that or I want to be doing that and it's just not feasible to do everything so immensely. It's not great in sense of FoMO. (P9)

Many of the participants reported that FoMO was a significant factor driving their excessive use of digital devices and social media platforms. Missing out on social content on peers, friends and worldly events created a sense of anxiety and unease, compelling individuals to constantly check and engage with their digital devices. This pattern of behaviour was particularly evident in younger participants who experienced higher levels of FoMO.

I'd probably feel a bit left out because like like I said before, like when you have like all your friends that have something and then you don't have it, you're like ohh, I feel really left out like I'm gonna download it so I could make friends with these people or, you know, get along with them or like joining the conversations. (P4)
A lot of news now and everything like that is online. And it's almost like if you miss it online and then you meet someone in person and you don't know about it, it's like, oh, my God, why do I not know about this? I need to know about this for this conversation. It's almost like it

means you can't have a if you miss one thing online, you miss a whole conversation with someone in person. (P5)

One of the key reasons for experiencing FoMO was the pressure to fit in and maintain social connections. Participants feel the need to constantly stay connected and updated with what others are doing to avoid feeling worried or left out or disconnected from their social circles. It creates a need to belong within the digital world along with peers, friends and the broader society. Participants mentioned that the urge to belong drives individuals to engage in online conversations, making them active users of digital devices. Some participants reported that the constant updates on digital media content caused an obsession with checking their digital devices as it plays a vital role in real-life conversations. The excessive use of digital media helped the participant feel accepted and improve personal relationships with peers and friends. However, it promotes excessive usage of digital devices and psychological reliance on digital content to be accepted by peers.

So if I feel like I'm not on that, someone could say something and then I could like miss out. So bit of FoMO. Like it's fear of missing out. So if I'm not on my phone, I'm not gonna see it. And if I don't see it. I won't be there because people don't, really. If that making plans last minute, no one is going to be coming around like speaking to me, it'll be on the group chat and be like ohh you. Well, you didn't check the group chat so you didn't know about it. But I think a big part social aspect is fear of missing out. (P14)
Think I'll just be like an a really vicious cycle of like loads of questions. (P23)

Additionally, participants mentioned that several of the aforementioned inquiries have the potential to evoke a sense of concern and cause a FoMO response. Most of the inquiries or

questions were filled with concerns about missing out on social media messages, events or news which could potentially be a part of conversations. Missing out on this information led to a vicious cycle of overthinking and restlessness. Restlessness and overthinking affected basic abilities such as concentration, anxiety and mental health.

My phone if I have like a text or if I get distracted. (P22)
Certain noises can trigger them. So if if someone else's phone goes Bing, they will automatically pick up their phone and be like ohh how come I don't have a message? Or have I missed anything? (P21)

Notification from smartphones was identified as another common cause for FoMO, leading to excessive digital device usage. P7 stated a similar trigger that distracted them from doing their assignment in fear of missing out on a meaningful conversation. Furthermore, the sound or vibration the device creates generates a sense of curiosity (a sense of anticipated reward), excitement, anxiety or worry that compels individuals to check their phones and stay connected. Overall, FoMO has the potential to impact individuals' mental wellbeing, as individuals who struggle with emotional regulation often tend to rely on social media or other digital engagement as a coping mechanism to alleviate the feelings of anxiety, worry, stress, distraction, restlessness and overthinking.

Like I'll be a bit anxious for haven't got my phone and can't like I had to put it in the shop the other day to get fixed. So I I didn't have it for a day and yet sort of felt anxious and a bit lost without it. (P16)
It's just, it's like an extended part of my brain in the phone. (P23)

These quotes highlight the deep dependency and attachment participants developed towards smartphones, driven by FoMO. P16 mentioned anxiety and a sense of being "lost" without the phone underscore a psychological reliance on the device. This is further emphasized in P23, where the smartphone was described as "an extended part of my brain," reflecting its role as a vital tool for managing thoughts, memories, and daily tasks. The need to rely on the device and the perception of it as an extension of oneself suggests that smartphone addiction was not merely about excessive use. Instead, it's a complex and multifaceted reliance where the device becomes an integral part of one's identity and cognitive functioning, indicating the importance and dependency on digital devices. These findings suggest that the attachment to digital devices was deeply rooted in FoMO, making the smartphone an essential part of how individuals navigate and engage with the world.

Discussion

The present study aimed to explore the perceived causes that contributed to the excessive use of digital devices among participants. The study used the Reflexive thematic method of analysis to interpret, identify and examine the perceived causes of excessive usage of digital devices. Based on information collected four themes were created; 1. Impact of using digital devices for essential purposes, 2. Enduring reliance since the COVID-19 pandemic, 3. Being dependent on digital devices for self-regulation, and 4. Causes of FoMO. The key findings provide an overview of several different perceived causes that led to excessive usage of digital devices based on participants' experiences such as essential usage, psychological, physical and emotional reliance. Despite, participants being aware of the perceived causes that led to the excessive use of digital devices, most participants reported continuous engagement due to its potential monetary, intellectual and social gains.

The results indicated that digital devices have become indispensable tools for accomplishing daily tasks, such as work and studies, echoing findings from Aleem et al. (2023). Many participants reported using their devices for essential activities, such as work or completing assignments caused spending many hours on digital devices, yet it was noted that the time spent on digital devices for essential purposes was not considered or perceived as problematic usage of digital devices as it was inevitable, similar to Greding et al. (2023). Even though it was not perceived as problematic usage, due to its monetary and intellectual gains, many participants mentioned that it led to an increase in workload (Wu & Chen, 2020; Gerding et al., 2023), mental stress and anxiety associated with work (Lee et al., 2022; Krishnan et al., 2023) and strain to the body like burnouts, dizzy eyes, headaches and muscle strains (Aziz et al., 2021; Hallman et al., 2021; Krishnan et al., 2023; Loscolzo & Giannini, 2018; Tremblay et al., 2017). Most of the participants overlooked most of the physical distress as the gains

from using the digital devices were profound compared to the distress (Greding et al., 2023; Aleem et al., 2022).

Additionally, participants perceived that the increase in working hours led distorted perception of time management reflected in blurring the boundaries between work and personal life, potentially leading to neglect in other areas of life, supported by previous findings by Hallman et al. (2021) and Molinaro et al. (2023). The blurred boundaries between work/ study and personal life mainly impact family dynamics resulting in improper regulations at home like lack of monitoring TV shows for kids (Thomas et al., 2021). Hence, developing an imperative issue to consider and develop health practices for working from home. Furthermore, working from home provides relief from travelling and is convenient, therefore reflecting in spending that amount of time working (Hallman et al., 2021; Molinaro et al., 2023). This convenience of connectivity led to out-of-hours working expectations and disturbed sleep patterns in some participants, similar to Purwanto et al. (2020), Hallman et al. (2021) and Alshammari et al. (2023). Consequently, resulting in participants experiencing increased mental stress that led to additional digital device usage to cope with the stress and anxiety, similar to Prakash et al. (2020). Interestingly, participants mentioned that to cope with the stress and anxiety associated with work/study, they relied on another digital device causing multiple digital device usage, overlapping with Suryanto et al. (2022). This finding was contradictory to a few studies' findings Odgers and Jensen (2020), Young and de (2010), and Woods and Scott (2016) which suggest mental health issues were caused due to excessive usage of digital devices. SDT provides a useful framework for interpreting and understanding these effects (Ryan & Deci, 2000; Molinaro et al., 2023). The reliance on digital devices to the extent of affecting mental health can potentially impact their development of competence in other life areas such as educational or career growth (Deci & Ryan, 2000)

Likewise, the use of digital devices has prominently grown since the COVID-19 pandemic, many participants experienced an increased reliance on technology for social connection and daily activities (Karakose et al., 2023; Gupta et al., 2020). Especially, for coping from isolation and depression caused due to the COVID-19 lockdown (Karakose et al., 2023; Gupta et al., 2020). To prevent feeling isolated and depressed, the participants relied on digital devices as they were the safest form of connectivity for social engagement, communication, news, work and education (Sandhu & Barn, 2022). Many participants mentioned that the COVID-19 lockdown was for a long period of time, causing them to become comfortable in staying in their space for online socialisation (Karakose et al., 2023; Gupta et al., 2020). Confirming that while the initial use of digital devices during the COVID-19 pandemic was to facilitate comfort through digital engagement, the implications of this shift extended beyond temporary adaptations (Aleem et al., 2022). This information states that participants' behaviour and experiences resonate with the attachment theory, suggesting that participants relied on digital platforms to seek comfort, reassurance and connection. Additionally, due to the adaptation of modern means that rely on digital devices to cope, SDT also captures some of the autonomy, competence, and relatedness (Deci & Ryan, 2000).

Remarkably, participants wished to experience both social connections and personal comfort via digital devices but in the comfort of their rooms, similar to Aleem et al. (2022). Hence, resulting in discomfort in transitioning back to in-person interactions after prolonged periods of online engagement (Sandhu & Barn, 2022). Whilst this could potentially be an indicator of addictive behaviour (Zhai, 2010) or a sign of a new trend of normalised behaviour for coming generations (Caluzzi et al., 2021). Some participants mentioned that online engagement was a form of lifestyle where spending 6-7 hours on digital devices for socialisation with friends or online gaming, work/study, was considered normal (Modecki et al., 2021; Aleem et al., 2022;

Alshammari et al., 2023). It is important to acknowledge that online social events have been increased and normalised. However, the research findings from Rozgonjuk et al. (2018) and Foerster et al. (2019) prior to COVID-19 state that screen time was associated with excessive use of digital devices, contradicting current findings and recent research findings since the COVID-19, indicating the number of hours spent on digital devices does not necessarily indicate digital addiction (Modecki et al., 2021). The perception towards the number of hours spent on digital devices has evolved over time (Modecki et al., 2021). However, few participants mentioned that they were simply an online person, a term that has not been mentioned before as a perception of self that requires further investigation.

Many participants articulated a reliance on their smartphones as a coping mechanism to escape from emotional discomfort, effectively numbing their feelings and avoiding reality. The current findings also resonate with existing research that the overuse of smartphones can be helpful in regulating emotions, often at the expense of addressing underlying psychological issues (Greenfield, 2021; Bhattacharya et al., 2019; Moge & Romana, 2020; Robert & David, 2023; Uram & Skalski, 2022). Furthermore, it confirms and indicates a shift in perception of using digital devices for over time gives comfort, instead of receiving comfort from family, friends or, in extreme cases, professional support (Schafer & Eerola, 2018; Morlevy & Goldfarb, 2022). However, some participants felt terrible about themselves after realising the duration of time spent on digital devices for comfort, supported by Schafer and Eerola (2018), and Morlevy and Goldfarb (2022). This indicates a need for practising healthy approaches for coping and comfort at convenience such as mental helplines or emotional- regulations resources which can now be easily assessed online or by downloading the required application on smartphones (Cemiloglu et al., 2021).

Some participants experienced relying on digital devices for mental stimulation to escape boredom as digital devices give numerous sources of entertainment at their convenience,

confirming the findings from Yang et al. (2021) and Wang (2018). However, it was indicated that participants have been using digital devices for extended periods of time, which can potentially be a sign of suppressed or hidden emotions, distress or psychological issues (Eastwood et al., 2012). These current findings were consistent with other research findings such as Yang et al. (2021), Wang (2018), Wolniewicz et al. (2019) and Orsolini et al. (2023). Moreover, it led individuals to use multiple devices simultaneously due to a lack of engagement on one device and end up turning to another device for entertainment or stimulation. Similar to the previously mentioned cause of using digital devices for relieving stress and anxiety associated with work/ study.

Moving towards another perceived cause of excessive use of digital devices, some participants reported that the usage of social media platforms such as Instagram, Facebook, and Snapchat on smartphones provides them with an immense sense of pleasure and joy. This sense and experience of pleasure were referred to as reward conditioning by a few participants, this finding was supported by a few studies that identified that users who interact with social media on digital devices were rewarded by the release of dopamine (Fujiwara et al., 2022; Haynes, 2018; Vu, 2017). It was acknowledged that the content on digital platforms was personalised based on their search history, this was quite engaging for the participants resulting in spending an extended amount of time on social media, demonstrating a lack of self-control, similar to Shapka (2019) and Bayer et al. (2016). Notably, the current study did not measure the release of dopamine but interpreted participants' experience and perception of the feeling of pleasure and joy while using digital devices which was further termed reward conditioning.

The form of self-regulation was the need to hold a smartphone, demonstrating that the dependency on digital devices was also physical and not limited to emotional, mental or psychological. Some participants reported that they experienced an uncontrollable urge to

hold the smartphone even when they were not actively using it. Additionally, experienced anxiety, discomfort and restlessness as to what to do with their hands without the smartphone, indicating an association between physical and psychological dependency. The association between the desire to hold a device and the comfort it provides offers insight into the psychological comfort of digital devices. This finding demonstrates similarities with Greenfield (2021) and Sharma et al. (2020) studies on the association between excessive usage of digital devices and substance addiction. Behavioural addiction provides a valuable framework for understanding the anxiety and restlessness experienced in the absence of a smartphone demonstrating withdrawal symptoms (Griffith,1996). Besides, this dependency on smartphone presence can be a potential predictor of nomophobia.

The concept of nomophobia, or the fear of being without one's mobile phone, further illustrates this dependency. Participants expressed heightened anxiety when separated from their devices, echoing findings from Bhattacharya et al. (2019), Kaviani et al. (2020) and Kara et al. (2021) that link nomophobia to increased stress levels and feelings of inadequacy. However, it is unclear whether nomophobia leads to excessive usage of smartphones or vice versa. Although, few participants informed that they needed digital devices for comfort could manage to feel comforted by any digital device and not necessarily rely on a smartphone. Therefore, this requires further investigation to assess the complex nature of psychological and physical reliance on digital devices, the data collected in this study should be viewed as a preliminary source of information and used accordingly. Attachment theory and Need-to-belong theory were highly associated with nomophobia since they were able to explain the interplay between the behavioural need to have a smartphone and psychological reliance on digital devices (Rozgonjuk et al., 2020; Wang et al., 2018; Duman & Ozkara, 2021). These theories suggest that individuals have an intrinsic desire for social connection and acceptance, which drives them to seek constant engagement with their devices (Rozgonjuk et al., 2020;

Wang et al., 2018; Duman & Ozkara, 2021). The anxiety experienced when individuals are away from their phones and they feel frequently fear of losing social connections or missing vital interactions while disconnected (Rozgonjuk et al., 2020).

Finally, FoMO was the most perceived cause of excessive usage of digital devices. Many participants reported experiencing FoMO on a daily basis due to their need to be up-to-date with information from social media, peer influence, anxiety which was caused by the notification pop and most importantly missing out on events or messages. These findings have been established by Beyens et al. (2016), Fabris et al. (2020), D'Lima and Higgins (2021) and Jupowicz-Ginalska et al. (2018) and were consistent in the present study. Many participants recognised social acceptance as one of the main causes that led to anxiety and the need to please their peers, similar to Fabris et al. (2020), and D'Lima and Higgins (2021). Additionally, participants mentioned the importance of constant engagement on social media was perceived as a way to maintain relationships and a platform to gather information for real-life conversations.

The goal of the participants' was to improve bonding with peers via social media engagement i.e., Active Social Media Use (ASMU), where they contact each other for communication and update their status alongside Passive Social Media Use (PSMU), monitoring other people's posts or statuses without connecting with them on direct messages (Valkenburg et al., 2021; Gainous et al., 2020). To prevent FoMO participants engaged in both types of ASMU and PSMU practice when they have stress and anxiety due to the thought of experiencing FoMO, leading them into a vicious cycle of staying online for an extended period of time even when they didn't want to be on the digital device (Haynes, 2018; Fujiwara et al., 2022; Vu, 2017). However, the current study did not find evidence to support the notion that ASMU or PSMU engagement inherently contributes to well-being similar to Valkenburg et al. (2021), and Gainous et al. (2020). The internal need to belong, a core component of SDT, and anxious

attachment, underlies the development of FoMO, with social norms and peer influence contributing to the anxiety of missing out (Beyens et al., 2016; Fabris et al., 2020; Przybylski et al., 2013; Gainous et al., 2020). This study's findings highlight a complex interplay of psychological and social factors that reinforce excessive device usage, suggesting that interventions targeting both psychological and behavioural aspects could be beneficial.

Also, participants mentioned that the notifications from their smartphones made them anxious and generated a sense of curiosity to check the notifications, even when they heard other smartphones get notifications, confirming existing studies by Rozgonjuk et al. (2019), Wang (2022) and Greenfield (2021). This could be a potential indicator of anxiety or psychological reward anticipated from the sound or vibration of notifications (Ohly & Bastin, 2023; Alabri, 2022).

Moreover, digital devices were considered as an extended part of participants' lives stated by some participants in the current findings. They mentioned that their reliance on digital devices has increased to an extent that they feel anxiety and a sense of being lost without digital devices on them. Similar results were observed in the findings from Schwaiger and Tahir (2022), and Sui and Sui (2021). Additionally, participants have mentioned that digital devices have become part of their identity as all the necessary information such as bank IDs and identity proofs were stored in their smartphones, supported by Sui and Sui (2021). This indicates the importance and relevance of smartphones as a physical object that carries a portion of participants' lives and increases dependency on a psychological level (Sui & Sui, 2021). These findings contribute insights into the importance and relevance of smartphones and how significantly it has been incorporated into participants' identities leading to FoMO. This finding required further investigation to understand the importance of smartphones and what would it mean to be without a smartphone alongside FoMO.

Limitations

Despite the significance of this research, some limitations should be acknowledged. Even though the study collected a sufficient number of participants, the pre-screening questionnaire focused on excessive smartphone usage instead of excessive digital device usage. This restricted the participants from considering their excessive usage towards other digital devices and multiple devices usage at the same time. This error could potentially be the reason for not being able to explore a selection of excessive digital device users that could have provided additional insights into existing findings. The interview section of the study was conducted online, and it involved limitations like poor network connection, which sometimes made building rapport with participants challenging due to audio distortion. At times when poor network connection was encountered it led to repetitive asking and answering of information and if the video froze it confused both the participant and the researcher causing discomfort and breaking the bond built. Additionally, the unclarity in the audio collected reflected difficulty during the transcription process.

The study advertisements were posted on multiple platforms like Facebook and Instagram, there were many participants for the self-report questionnaire part of the study. However, after learning that the study did not provide any monetary gain or reward, many participants were unwilling to participate in the interview part of the study upon contacting them if eligible. Regardless, the study was able to recruit many participants via the SONA participation portal from Bournemouth University. Most participants were psychology students, which might have been an issue. Since the participants had prior knowledge and psychological reasoning based on their research or study, it was observed that some of the participants were using analytic terms and were noticed to be self-diagnosing themselves with

excessive usage issues such as FoMO or the need for reward. Due to this, the data the participants provided could be filtered, impacting the quality of the overall information. The study did not include operational measurement of digital addiction and relied on self-reported measures, which might have resulted in inaccurate data due to biases and subjectivity of threshold among participants. Although participants classified themselves as excessive users of digital devices, the subjective nature of this classification means some individuals who engage in excessive usage of devices may have been overlooked, while some participants who do not meet the objective criteria for excessive usage of digital devices could have classified themselves as excessive users based on their perception. Furthermore, most of the participants were young adults, limiting the perception of excessive usage of digital devices amongst other age groups. However, there were a few participants who were old adults with kids of their own, at times, they referred to their experience as a parent when talking about their excessive digital device usage. Regardless, it is noteworthy that young adults are a group that uses digital devices more frequently than other age groups, a few of the old adult participants confirmed from their observation. Lastly, most of the participants were female so the data outcome could be biased towards female experiences and causes of excessive use of digital devices.

Future research

Future studies can conduct research solely with digital natives (children and adolescents born into the digital world) to understand their perception of what is considered excessive usage of digital devices. This is primarily necessary because of the ongoing advancements in technology that have constantly evolved and altered the impact on human experiences. Therefore, it is crucial to have an update on these advancements and their impacts on people.

Additionally, future studies can design and conduct research on the addictive aspect of excessive digital device usage by interviewing clinical practitioners to get their opinions on this topic. Interviewing clinical practitioners can guide professionals to understand if mental health causes digital addiction or vice versa. This approach would provide a more in-depth understanding of the physical, psychological, and behavioural indicators related to digital addiction and effective treatment strategies.

Additionally, future studies can benefit from examining individuals who experience and manage digital addiction in their daily lives. It will also benefit from advertising on platforms where individuals have an interest in the advancement of digital device usage and its impact on well-being, followed by some reward to attract more participants. Instead of using a self-report questionnaire to identify excessive users, a fMRI study would benefit in finding individuals with similar psychological responses to further examine the causes behind their excessive usage of digital devices. This would demonstrate stability and consistency within the participants' collection and reduce the chances of biases and subjectivity of classification of excessive usage. The interview questions can include questions about their definition of digital addiction, what are the positive and negative impacts of digital addiction and finally how they manage their daily routine alongside digital addiction. This way professionals can get a deeper understanding of the perspective of individuals who experience digital addiction how they interpret their lifestyle and the type of approaches that can benefit them manage digital addiction.

Furthermore, future studies could also explore the impact of cultural and socioeconomic influences on digital addiction. Alongside the long-term effects of excessive digital use on individuals' well-being and social functioning. It would be beneficial to investigate the threshold at which the use of digital devices transitions into addiction since the line between them is extremely thin and subjective to experiences.

Conclusion

To conclude, the study explored the experiences and perceptions of participants who self-identified themselves as excessive digital device users. Participants' experiences revealed numerous emotional, mental, and physical health concerns linked to excessive use of digital devices. Using a Reflexive thematic analysis, the study was able to identify four themes that identified the causes that the participants perceived as the reason of excessive use of digital devices. The themes revealed that prolonged use of digital devices from working/studying impacted individuals' mental, physical and emotional health, noting that it was unavoidable. Considering the COVID-19 lockdown, participants had to rely on digital devices for work from home, studies and entertainment purposes. After the uplift of the COVID-19 lockdown, individuals continued to rely on digital devices for the mentioned causes due to convenience and comfort. Self-regulation was another major cause where individuals depended on digital devices to regulate their emotional and mental well-being. Although initially, digital devices were beneficial for temporary comfort to suppress the individuals' mental or emotional distress, nevertheless, most individuals continued to use digital devices to manage emotional and mental health subsequently having a negative impact after an extended period. For instance, individuals’ ability to regulate their emotional or mental health without the assistance of digital devices.

Lastly, the study was able to provide several causes that led to FoMO, such as the need to keep themselves updated with social news or digital communication with their peers or react to notifications to prevent FoMO. Highlighting that smartphone was the most relied digital device, so much so that it was considered an extended part of people’s identity. Even though participants were aware of the negative effects on their health, they continued to use devices excessively because of the convenience and digital devices' role in daily activities,

demonstrating the extent to which digital devices have integrated into individuals' everyday routines. The study was also able to establish an association and overlap between psychological theories of SDT, CBM, attachment theory and the need to belong and perceived causes of excessive use of digital devices.

Overall, the study has unveiled significant and innovative discoveries regarding the adverse effects of excessive utilisation of digital devices. These discoveries have been exhaustively deliberated and scrutinised alongside the limitations and suggestions for future studies to consider. The findings from this study can be used as a preliminary source of information for future studies to understand the impact of modern technology on humankind and develop interventions for healthy usage of digital devices.

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Tables

Table 1: Participants demographics and type of digital devices usage

Participant id	Gender	Age	Type of excessive usage of digital device.
1	Female	22	Entertainment, Gaming and Social media
2	Female	23	Work, entertainment and music
3	Female	20	Social media, entertainment and music
4	Female	20	Social media and entertainment
5	Female	26	Work, social media, entertainment and shopping
6	Female	23	Gaming, Social media, work
7	Female	18	Social media and entertainment
8	Female	20	Social media and entertainment
9	Male	38	Work, social media and gaming
10	Female	26	Social media, shopping and entertainment
11	Female	23	Social media and entertainment
12	Female	18	Social media and entertainment
13	Male	26	Social media and entertainment
14	Female	19	Social media and entertainment
15	Female	21	Social media
16	Male	20	Social media and entertainment
17	Female	45	Social media and entertainment
18	Female	24	Gaming, Social media and entertainment
19	Female	18	Social media
20	Female	19	Social media and entertainment
21	Female	27	Social media, work and entertainment

Participant id	Gender	Age	Type of excessive usage of digital device.
22	Female	26	Social media
23	Female	22	Social media, gaming, entainment and music
24	Female	19	Social media and entainment
25	Female	21	Social media and entertainment
26	Female	52	Work and entertainment

Table 2: Table of themes and definitions of perceived causes of excessive use of digital devices.

Theme	Subtheme	Definition
Impact of using digital devices for essential purposes		Participants observed that while digital devices were essential for efficient work and study, their prolonged use can lead to mental and physical strain and burnout**.** This was problematic in environments like higher education, where the blurring of work and personal life can negatively impact health and well-being.
Enduring reliance since COVID-19 pandemic		Participants' reliance on digital devices increased remarkably during the COVID-19 pandemic and has persisted, even after the pandemic ended.
Being dependent on digital devices for self-regulation	A: The use of digital devices for self-regulation B: The need to hold the device	Participants often used digital devices to manage their emotions and regulate their behaviour. This included seeking emotional support, mental distraction, or a sense of holding devices. This reliance on technology was the cause of excessive digital device usage and highlights the strong connection participants had developed with digital devices.
Types of Fear of Missing Out (FoMO)		Many participants felt they spend too much time on their devices because they feared missing out. This can lead to excessive screen time and

	reliance on digital communication, work, and socialising to avoid the feeling of FoMO

Appendices

Appendix A: Ethics approval obtained from Bournemouth University.

Bournemouth University

Research Ethics Checklist

About Your Checklist	
Ethics ID	39472
Date Created	22/08/2021 14:14:13
Status	Approved
Date Approved	23/03/2022 11:15:38
Risk	Low

Researcher Details	
Name	Janhavi Ambat
Faculty	Faculty of Science & Technology
Status	Postgraduate Research (MRes, MPhil, PhD, DProf, EngD, EdD)
Course	Postgraduate Research - FST
Have you received funding to support this research project?	No

Project Details	
Title	Examining experiences of excessive digital device usage: a qualitative analysis.
Start Date of Project	28/09/2020
End Date of Project	31/07/2024
Proposed Start Date of Data Collection	14/03/2022
Original Supervisor	Catherine Talbot
Approver	Liam Wignall

Summary - no more than 600 words (including detail on background methodology, sample, outcomes, etc.)

The compulsive use of digital devices such as digital technology and digital platforms (online gaming, social networking, and shopping), digital gadgets (smartphone, tablet, and computer) (Hawi, Samaha and Griffiths, 2019) is called Digital addiction. While there are many benefits of digital devices, some researchers have also identified negative associations between excessive digital device usage and psychological variables. For example, Che et al. (2017) found online gaming addiction was associated with perceived stress, self-management, and emotional utilisation. Additionally, there are other internet related activities that may have negative effects on emotional health, including fear of missing out (FoMo), lack of empathy and increase in stress levels due to peer pressure (Longobardi and Settanni, 2020). Furthermore, there is a significant negative impact of digital addiction on student's academic engagement, interference with daily life, loss of control (Singh and Srivastava, 2021) and academic aspirations among adolescents and self esteem (Mo, Chan, Wang and Lau, 2020).

In the past three decades, there has been huge developments in digital technology and devices, raising questions about what factors influence digital addiction. The purpose of my present thesis is to examine and evaluate the risk factors involved in digital addiction. In this study I aim to examine experiences of digital addiction, including risk and protective factors associated with excessive usage of

digital devices. To address this aim, a qualitative study will be conducted with people who perceive themselves as excessive users of digital devices

Participants will be recruited using word of mouth, online advertisement on social media platforms (Instagram and Facebook) and university SONA system to recruit students. People who perceive themselves as an excessive user of digital devices can participate. Potential participants will be directed towards an online link to a pre-screening questionnaire which will be on Qualtrics to get a basic information of the participants such as demographics and usage of the internet and digital devices. Based on the pre-screening answers participants will be informed if they are eligible to participate. Then the participants will be invited to an interview/focus group depending on their preference. After providing formal consent, participants will be asked a series of questions about their experiences of using digital devices. These discussions will be guided by a semi-structured interview schedule. The interview/focus group would last for approximately 60 minutes. The interview/focus group will be audio recorded (with consent) on a secure device. The recording will be transcribed verbatim and imported into Nvivo to aid subsequent analysis. Data will be analysed using Braun & Clarke's (2006) approach to thematic analysis.

Filter Question: Does your study involve Human Participants?

Participants
Describe the number of participants and specify any inclusion/exclusion criteria to be used
No more than 30 participants will be recruited. Participants will be included in this study if they: (1) Are over the age of 18; (2) Identify as an excessive user of digital devices; (3) Score higher than six (agree or or strongly agree) on more than two of the pre-screening questions.

Do your participants include minors (under 16)?	No
Are your participants considered adults who are competent to give consent but considered vulnerable?	No
Is a Disclosure and Barring Service (DBS) check required for the research activity?	No

Recruitment
Please provide details on intended recruitment methods, include copies of any advertisements.
Bournemouth University's SONA system will be used to recruit participants. Social networking platforms will also be used to recruit participants, including Facebook groups of Psychology UK and Cyberpsychology (with permission will be obtained from the group moderators). Instagram post and Linkedin.

Do you need a Gatekeeper to access your participants?	No

Data Collection Activity	
Will the research involve questionnaire/online survey? If yes, don't forget to attach a copy of the questionnaire/survey or sample of questions.	Yes
How do you intend to distribute the questionnaire?	
online	
If online, do you intend to use a survey company to host and collect responses?	No
Will the research involve interviews? If Yes, don't forget to attach a copy of the interview questions or sample of questions	Yes
Please provide details e.g. where will the interviews take place. Will you be conducting the interviews or someone else?	

The interviews/focus groups will take place online (Teams or Zoom), depending on participant availability and preference. I will receive training on qualitative interviewing from my first supervisor who is an expert in this method. As part of training, I will pilot the interview schedule with a member of my supervisory team.

Will the research involve a focus group? If yes, don't forget to attach a copy of the focus group questions or sample of questions.	Yes

Please provide details e.g. where will the focus group take place. Will you be leading the focus group or someone else?
The interviews/focus groups will take place online (Teams or Zoom), depending on participant availability and preference. I will receive training on qualitative interviewing from my first supervisor who is an expert in this method. As part of training, I will pilot the interview schedule with a member of my supervisory team.

Will the research involve the collection of audio recordings?	Yes
Will your research involve the collection of photographic materials?	No
Will your research involve the collection of video materials/film?	No
Will any audio recordings (or non-anonymised transcript), photographs, video recordings or film be used in any outputs or otherwise made publicly available?	No
Will the study involve discussions of sensitive topics (e.g. sexual activity, drug use, criminal activity)?	No
Will any drugs, placebos or other substances (e.g. food substances, vitamins) be administered to the participants?	No
Will the study involve invasive, intrusive or potential harmful procedures of any kind?	No
Could your research induce psychological stress or anxiety, cause harm or have negative consequences for the participants or researchers (beyond the risks encountered in normal life)?	No
Will your research involve prolonged or repetitive testing?	No

What are the potential adverse consequences for research participants and how will you minimise them?

Consent

Describe the process that you will be using to obtain valid consent for participation in the research activities. If consent is not to be obtained explain why.
The consent of the participant will be collected via online questionnaire (Qualtrics). Potential participants will first be directed to a page that provides information about the study, and what will happen if they decide to take part. On the following page, they will then be asked a series of questions to determine if they meet the criteria for the study. If they do, they will be asked to leave their name and contact details. These contact details will be stored on Qualtrics and only used for the purpose of contacting participants about this study.

Do your participants include adults who lack/may lack capacity to give consent (at any point in the study)?	No
Will it be necessary for participants to take part in your study without their knowledge and consent?	No

Participant Withdrawal

At what point and how will it be possible for participants to exercise their rights to withdraw from the study?
The participants can withdraw from the study until the end of the interview/focus group. This is detailed in the information sheet provided
If a participant withdraws from the study, what will be done with their data?

The data will be collected until the point of withdrawal but will not be analysed. The participants will be informed that due to the nature of focus group it will not be possible for participant to withdraw their data.

Participant Compensation	
Will participants receive financial compensation (or course credits) for their participation?	Yes
Please provide details	
Only the 1st year and 2nd year students of Bournemouth university will be reimbursed with SONA credits after their participation. The rest of the participants will be generously thanked and appreciated for the time and contribution they will be making towards the aim of the study.	
Will financial or other inducements (other than reasonable expenses) be offered to participants?	No
If participants choose to withdraw, how will you deal with compensation?	
The SONA credits for interviews/focus groups will not be effected if the participant wishes to withdraw from the study.	

Research Data	
Will identifiable personal information be collected, i.e. at an individualised level in a form that identifies or could enable identification of the participant?	No
Will research outputs include any identifiable personal information i.e. data at an individualised level in a form which identifies or could enable identification of the individual?	No

Storage, Access and Disposal of Research Data	
Where will your research data be stored and who will have access during and after the study has finished.	
The research data will be collected and stored on researcher's password protected laptop which will solely be used for research purpose safety authorized by the university. Only the researcher and the supervisor team will have access to the data for analysis purpose. Once the research is completed the data will be safely destroyed.	
Once your project completes, will your dataset be added to an appropriate research data repository such as BORDaR, BU's Data Repository?	No
Please explain why you do not intend to deposit your research data on BORDaR? E.g. do you intend to deposit your research data in another data repository (discipline or funder specific)? If so, please provide details.	
The data collected from this study will not be used for public access and is solely for the current research. To prevent the likelihood of participants being identified.	

Dissemination Plans	
How do you intend to report and disseminate the results of the study?	
Peer reviewed journals,Internal Report,Conference presentation,Publication on website,Other Publication	
Will you inform participants of the results?	Yes
If Yes or No, please give details of how you will inform participants or justify if not doing so	
If the participant is interested to know the outcome of the research they will be asked during the interview/focus group to provide their	

best method of contact to provide the report of the study.

Final Review	
Are there any other ethical considerations relating to your project which have not been covered above?	No

Risk Assessment	
Have you undertaken an appropriate Risk Assessment?	Yes

Attached documents
Prescreening questionnaires updated JM.docx - attached on 05/11/2021 11:55:34
Poster one.docx - attached on 25/02/2022 17:15:49
Debrief.docx - attached on 28/02/2022 23:21:57
INTERVIEW.docx - attached on 28/02/2022 23:22:01
Participant Information Sheet Template edited.docx - attached on 09/03/2022 22:14:39
Participant Agreement Form edited.docx - attached on 09/03/2022 22:14:43
INTERVIEW (1).docx - attached on 27/04/2022 20:29:08
Debrief.docx - attached on 27/04/2022 20:29:08

Approved Amendments	
Message	I would request the participants to withdraw their data from the study by the 31st of July 2022. The rest of the study would remain the same.
Date Submitted	27/04/2022 20:29
Comment	
Date Approved	03/05/2022 13:16
Approved By	Liam Wignall

Appendix B: Participant Agreement Form

Ref & Version: 2
Ethics ID number: 39472
Date: 09/03/2022

Bournemouth University

Participant Agreement Form

Full title of project: Examining experiences of excessive digital devices usage: a qualitative analysis.

Name, position and contact details of researcher: Janhavi K Ambat, researcher, jkrishnadasambat@bournemouth.ac.uk

Name, position and contact details of supervisor: Catherine Talbot, supervisor, ctalbot@bournemouth.ac.uk

To be completed prior to data collection activity

Section A: Agreement to participate in the study

You should only agree to participate in the study if you agree with all of the statements in this table and accept that participating will involve the listed activities.

I have read and understood the Participant Information Sheet (PI Sheet Ref & Version: 2) and have been given access to the BU Research Participant Privacy Notice which sets out how we collect and use personal information (https://www1.bournemouth.ac.uk/about/governance/access-information/data-protection-privacy).
I have had an opportunity to ask questions.
I understand that my participation is voluntary. I can stop participating in research activities at any time without giving a reason and I am free to decline to answer any particular question(s).
I understand that taking part in the research will include the following activity/activities as part of the research:
• being audio recorded during the project
• my words will be quoted in publications, reports, web pages and other research outputs (without using my real name).
• I have been told how information relating to me (data obtained in the course of the study, and data provided by me about myself) will be handled: how it will be kept secure, who will have access to it, and how it will or may be used.
I understand that, if I withdraw from the study (by the end of the interview/focus group), I will not be able to withdraw my data from further use in the study where my data has been anonymised (as I cannot be identified) or it will be harmful to the project to have my data removed.

I understand that my data may be used in an anonymised form by the research team to support other research projects in the future, including future publications, reports, presentations, or teaching.

	Tick the box to agree
I consent to take part in the project on the basis set out above (Section A)	

Appendix C: Participant Information Sheet

Bournemouth University

Participant Information Sheet

The title of the research project

Examining experiences of excessive digital device usage: a qualitative study.

Invitation to take part

You are being invited to take part in a research project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you wish to take part.

What is the purpose of the project?

This research is being conducted by Janhavi K Ambat (researcher) under the supervision of Dr. Catherine Talbot, Professor John McAlaney and Dr. Janice Attard-Johnson.
In this study, we aim to examine people's experiences of excessive digital device usage and understand their views and opinion of digital addiction. We are interested in talking with participants who use internet-related applications like social media, games, dating or shopping daily. If you decide to take part in this study, you will be asked to take part in an interview or focus group, lasting approximately 60 minutes.

Why have I been chosen?

You have been asked to take part in this study because you are over the age of 18 and a excessive user of digital devices.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a participant agreement form. We want you to understand what participation involves, before you make a decision on whether to participate.

If you or any family member have an on-going relationship with BU or the research team, e.g. as a member of staff, as student or other service user, your decision on whether to take part (or continue to take part) will not affect this relationship in any way.

Can I change my mind about taking part?

Yes, you can stop participating in this study until the end of the interview/focus group without giving a reason. You will not be penalised in any way if you decide to stop the interview/focus group early and you can also choose to not answer some of our questions.

If I change my mind, what happens to my information?

After you withdraw from the study, we will not collect any further information from or about you. With regards to the information we have already collected before this point, your rights to access, change or move that information are limited. This is because we need to manage your information in specific ways in order for the research to be reliable and accurate. Further explanation about this is in the Personal Information section below.

What would taking part involve?

You will first be required to complete a short online questionnaire to determine your eligibility for the study. The questionnaire will consist of four questions to evaluate if you are an excessive user (e.g,. Constantly checking smartphone, and spending most of the time online). If you are eligible, you will then be asked to provide your contact details so that Janhavi Ambat can arrange a time for the interview/focus group. The interview/focus group can be conducted online or face to face depending on your personal preference. During the interview/focus group you will be asked a series of open-ended questions about your experiences and perspectives of digital devices and the internet. These will cover questions about things like:

1. First experiences with digital devices
2. Experiences of excessive digital device usage
3. Triggers of excessive digital device usage

Will I be reimbursed for taking part?

Participation in this study is voluntary. All the participants will be thanked and appreciated for the contributions they will be making towards the aim of the study. Students recruited via SONA will receive 1 course credit as reimbursement.

What are the advantages and possible disadvantages or risks of taking part?

Whilst there are no immediate benefits to you participating in the project, it is hoped that this work will provide new insights into digital addiction.

Whilst we do not anticipate any risks to you in taking part in this study, if you have any concerns during or after the interview/focus group please contact the researcher and they will signpost you to the appropriate service. If there are questions you do not feel comfortable answering, you can choose not to answer these.

What type of information will be sought from me and why is the collection of this information relevant for achieving the research project's objectives?

The current study is part of a MPhil which aims to address and evaluate the risk factors of digital addiction. The data collected during the interview/focus group will be used to provide an insight into digital addiction and inform future studies.

Will I be recorded, and how will the recorded media be used?

The interview/focus group will be audio recorded for transcription and data analysis. The data will be collected via Zoom or Teams the meeting will audio recorded on the researcher's password protected device, your contribution will be used in the analysis and research outputs. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the original recordings.

How will my information be managed?

Bournemouth University (BU) is the organisation with overall responsibility for this study and the Data Controller of your personal information, which means that we are responsible for looking after your information and using it appropriately. Research is a task that we perform in the public interest, as part of our core function as a university.

Undertaking this research study involves collecting and/or generating information about you. We manage research data strictly in accordance with:

- Ethical requirements; and
- Current data protection laws. These control use of information about identifiable individuals, but do not apply to anonymous research data: "anonymous" means that we have either removed or not collected any pieces of data or links to other data which identify a specific person as the subject or source of a research result.

BU's Research Participant Privacy Notice sets out more information about how we fulfil our responsibilities as a data controller and about your rights as an individual under the data protection legislation. We ask you to read this Notice so that you can fully understand the basis on which we will process your personal information.

Research data will be used only for the purposes of the study or related uses identified in the Privacy Notice or this Information Sheet. To safeguard your rights in relation to your personal information, we will use the minimum personally-identifiable information possible and control access to that data as described below.

Publication

You will not be able to be identified in any external reports or publications about the research without your specific consent*. Otherwise your information will only be included in these materials in an anonymous form, i.e. you will not be identifiable.

Security and access controls
BU will hold the information we collect about you in hard copy in a secure location and on a BU password protected secure network where held electronically.

Personal information which has not been anonymised will be accessed and used only by appropriate, authorised individuals and when this is necessary for the purposes of the research or another purpose identified in the Privacy Notice. This may include giving access to BU staff or others responsible for monitoring and/or audit of the study, who need to ensure that the research is complying with applicable regulations.

Keeping your information if you withdraw from the study
If you withdraw from active participation in the study we will keep information which we have already collected from or about you, if this has on-going relevance or value to the study. This may include your personal identifiable information. As explained above, your legal rights to access, change, delete or move this information are limited as we need to manage your information in specific ways in order for the research to be reliable and accurate. However if you have concerns about how this will affect you personally, you can raise these with the research team when you withdraw from the study.

You can find out more about your rights in relation to your data and how to raise queries or complaints in our Privacy Notice.

Retention of research data

Project governance documentation, including copies of signed **participant agreements**: we keep this documentation for a long period after completion of the research, so that we have records of how we conducted the research and who took part. The only personal information in this documentation will be your name and signature, and we will not be able to link this to any anonymised research results.

Research results:

As described above, during the course of the study we will anonymise the information we have collected about you as an individual. This means that we will not hold your personal information in identifiable form after we have completed the research activities.

You can find more specific information about retention periods for personal information in our Privacy Notice.

Contact for further information

If you have any questions or would like further information, please contact: Janhavi K Ambat (researcher @ jkrishnadasambat@bournemouth.ac.uk) or Catherine Talbot (supervisor @ ctalbot@bournemouth.ac.uk)

In case of complaints
Any concerns about the study should be directed to (Prof Tiantian Zhang, Deputy Dean for Research & Professional Practice, Faculty of Science & Technology), Bournemouth University by email to researchgovernance@bournemouth.ac.uk.

If you would like to get help or require support for reducing the use of digital devices, thereby are the facilities you can get in touch in order to do so.

Bournemouth University Wellbeing centre by email studentwellbeing@bournemouth.ac.uk or contact them via telephone 01202 965020.

Charity Mind organisation by email info@mind.org.uk or contact them via telephone 0300 123 3393

Finally

If you decide to take part, you will be given a copy of the information sheet and a signed participant agreement form to keep.

Thank you for considering taking part in this research project.

Appendix D: Pre-screening Questionnaire

DEMOGRAPHICS:

Anonymity code:

Please insert your memorable four-digit anonymity code e.g., 46LS (house number and initials of name)

_____

Please select the option which best describes your gender?

- o Male
- o Female
- o Prefer to self-describe (please specify)
- o I prefer not to say

What age are you in years?

_____

PRE-SCREENING QUESTIONNAIRE:

Please score the following statements using a 7-point Likert scale (1: “strongly disagree” to 7: “strongly agree”

1. I have hard time concentrating in class, while doing assignments, or while working due to smartphone use

1Strong disagree 2 Slightly disagree 3 Disagree 4 Neutral 5 Agree 6 Slightly agree 7 Strong agree

2. I constantly checking my smartphone to not miss conversations on (eg., emails, blogs, social media, and other applications)

1Strong disagree 2 Slightly disagree 3 Disagree 4 Neutral 5 Agree 6 Slightly agree 7 Strong agree

3. I use my smartphone when I know I should be sleeping.

1Strong disagree 2 Slightly disagree 3 Disagree 4 Neutral 5 Agree 6 Slightly agree 7 Strong agree

4. When I am not having the smartphone, I think about what to do on it (eg., video games, social media, and texting, etc.)

1Strong disagree 2 Slightly disagree 3 Disagree 4 Neutral 5 Agree 6 Slightly agree 7 Strong agree

Please provide your email address to receive an invite link for the interview (you will be only contacted if you are eligible).
[In text]

Thank you for your participation.

Appendix E: Semi-structure interview questions

A INTERVIEW/FOCUS GROUP SCHEDULE:

I would first like to start by introducing myself and explain the goal of the interview/focus group (to understand attitudes towards excessive use of digital technologies and the internet). The research is ethically approved by Bournemouth University and can take part online or within the university premises. The interview/focus group will last for approximately 60 minutes. You can withdraw at any time during or after (by 31st December 2022) the interview without providing any justification and the information you will provide will remain anonymous even if you accidently reveal any personal information. However, if the participant has participated in the focus group then the participant will not be able to withdraw from the study out of courtesy and thoughtfulness towards other participants in the group. Remind the participants about the information sheet and confidentiality of the study. Also, thank the participants for taking their time out to participate in my study.

The participants will then be asked some prompting questions for achieving the goal of the interview/focus group.

1. Let's start by talking about the time when you first started using digital technology. What were your experiences and how did it make you feel?
2. What are your experiences of overusing digital technologies? Prompt: How does it make you feel when you overuse digital technologies?
3. Tell me about the triggers that motivate you to use digital devices? Are there any triggers that cause you to use digital devices excessively?
4. While you are using online applications such as social media (Instagram) or gaming (Pubg) how does it make you feel and what keeps you online?
5. According to you, what does excessive use of digital devices mean? Prompt: What does excessive use of digital devices look like?

6. Based on your experience would you classify yourself as an excessive user of online applications? Prompt: If so, how does that feel? Prompt: what makes you feel others are excessive users?
7. Have you considered or are you considering adjusting your internet usage? Why?

Is there anything else that you would like to share about your use of the internet and digital devices that you feel is important and we haven't covered today?

Lastly, I would like to thank and appreciate the time and information provided by the participants. And debrief the participant about the study.

Do you use multiple devices at the same time for different kinds of activities? what triggers multiple uses of devices?

Do you think people need to consider the excessive use of digital devices a concern?

What are points you find concerning which lead towards excessive digital devices usage? Prompt: does it have a mental/psychological impact?

How do you feel when you are unable to connect to the internet and conduct online activities on your digital devices?

How do you feel when you don't have access to any of the devices? when you are unable to use it?

Others influence on using digital devices?

Appendix F: Participant Debrief Sheet

Debrief Sheet

Firstly, I would like to thank you for your time and participation. The current study is a part of MPhil research. The aim of this study is to gather participants experience of using internet and digital technology. The study is interested in understanding and evaluating general populations experiences and get an ideological perspective on internet usage.

The use of internet has demonstrated to have both positive and negative effects on the people (Fernadez, Williams, Griffths and Kuss, 2019). Previous research has suggested that problematic Internet usage may be related to self-regulation (LaRose et al., 2003), for example self-control and impulsivity. However, currently little is known about how these factors relate specifically to social-media dependency. Previous evidence also suggests that participants who were clinically identified as internet addicts demonstrated that some the reason for using social media was lack of friends, feeling of fulfilment, fear of missing out. Most of the research is regarding social media addiction.

There are no right or wrong answer to the prompt questions asked. Please also remember you have the right to withdraw your data from this study at any time up by the 31st of December 2022. Kind reminder to remember the four-digit anonymity code to track your data for withdrawal. Please contact, the researcher Janhavi K Ambat on jkrishnadasambat@bournemouth.ac.uk or the supervisor Catherine Talbot on ctalbot@bournemouth.ac.uk along with your anonymity code as all the personal information will be coded.

Please remember that all of your answers in this interview/focus group will be kept confidential, stored anonymously and securely.

Appendix G: Approved Risk Assessment

Bournemouth University

Risk Assessment Form

About You & Your Assessment

Name	Janhavi K Ambat
Email	s5324939@bourenmouth.ac.uk
Your Faculty/Professional Service	Faculty of Science and Technology
Is Your Risk Assessment in relation to Travel or Fieldwork?	No
Status	Approved
Date of Assessment	05/11/2021
Date of the Activity/Event/Travel that you are Assessing	

What, Who & Where

Describe the activity/area/process to be assessed	The current risk assessment is for a qualitative study (attitude towards internet use and digital devices). It will be assessed via interview/focus groups, online or on university campus based on the situation. The participants will collected online (university students, friends and family).
Locations for which the assessment is applicable	Online using Teams or Zoom or Bournemouth university campus
Persons who may be harmed	Staff, Student, Visitors, Members of the public

Hazard & Risk

Hazard	Covid-19
Severity of the hazard	High
How Likely the hazard could cause harm	Medium
Risk Rating	High
Control Measure(s) for Covid-19 : Researcher and the interviewee should be wearing a face mask for the entire time Researcher and the interviewee should sit at least two metres apart Participant encouraged to take a lateral flow test prior to interview/focus group	
With your control measure(s) in place - if the hazard were to cause harm, how severe would it be? High	
With your control measure(s) in place - how likely is it that the hazard could cause harm? Low	

The residual risk rating is calculated as: Medium	
Hazard	Electrical hazards
Severity of the hazard	Low
How Likely the hazard could cause harm	Low
Risk Rating	Low
Control Measure(s) for Electrical hazards: Participants will be requested to use a reliable network connection to avoid disconnection of the internet during that interview.	
With your control measure(s) in place - if the hazard were to cause harm, how severe would it be? Low	
With your control measure(s) in place - how likely is it that the hazard could cause harm? Low	
The residual risk rating is calculated as: Low	

Review & Approval

Any notes or further information you wish to add about the assessment	
Names of persons who have contributed	Catherine Talbot;John MacAlaney;Janice Johnson
Approver Name	Dr. Catherine Talbot
Approver Job Title	Supervisor
Approver Email	ctalbot@bournemouth.ac.uk
Review Date	

Uploaded documents

No document uploaded

Appendix H: Poster to advertise the study

Bournemouth University

Ref & Version: 2
Ethics ID number: 39472
Date: 25/02/2022

'Research on excessive digital device usage'

Are you interested to discuss about the experiences of excessive usage of digital devices.

We are looking for participants who experiences excessive use of digital devices on daily bases.

https://bournemouthpsych.eu.qualtrics.com/jfe/form/SV_5iHrkopP4UZWD0a

Here is what will happen:

- You will be asked to complete a short survey to determine your eligibility. The survey will take about 10 minutes to complete and involves answering four questions about your smartphone usage and demographics.
- If you are eligible, you will be asked to take part in an interview/focus group which will last for about 60 minutes.
- The end date of participation is 30th November 2022.

If you wish to participate:

Please contact: jkrishnadasambat@bournemouth.ac.uk, or click on the survey link for more information: