Computers in Human Behavior 169 (2025) 108680

Contents lists available at ScienceDirect

Computers in Human Behavior

journal homepage: www.elsevier.com/locate/comphumbeh

How digital technology can steal your time

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ARTICLE INFO

Keywords:
Digital technology
Social media
Time pressure
Time experience
Guilt

ABSTRACT

Digital devices are marketed as tools to improve efficiency and save time, however their use is also often associated with time pressure, time poverty and reduced wellbeing. Precisely how and why digital technologies reduce the availability of time is largely unknown. This study sought to explore the ways in which people experience a loss of time as a result of digital technology use. Semi-structured interviews were conducted with 300 people from Spain, Poland, Czechia, Germany, Switzerland and the United Kingdom. Thematic analysis of the interview data revealed that digital technology use impacted the way in which time was used, monitored and evaluated. Participants associated digital technology use with a loss of time, a desire to fill all time, a propensity to forget time and, as a result, a desire to gain greater control of time. As a result, the experience of loss of time to digital technology was associated with feelings of guilt, shame and a lack of self-control. The findings suggest that a combination of structural factors, including imperfect algorithm content provision and ease of device use, and attitudinal factors, including the belief that digital time was inauthentic, unintellectual or "bad for you", lead to the perception of time loss through digital device use. Improvements in algorithmic content generation and greater acceptance of the benefits of time on digital media may help reduce the sense that time is lost to digital technology, and the associated feelings of guilt and loss of control.

1. Introduction

Digital devices are often marketed as tools that help us accomplish tasks more quickly or save time (Morgan, 2024; Raphael, 2024). Grocery delivery apps, for instance, eliminate the need to go shopping in person, while email and instant messaging speed up communication, and online meeting platforms reduce the necessity of commuting to the office. As a result, it is frequently suggested that digital technologies enhance our flexibility and autonomy in managing and organising our time (Harpaz, 2002; Morgan, 2004). They are seen as increasing time availability and lowering time pressure (Peters & van der Lippe, 2007), which can create a sense of time abundance (Atanasova et al., 2022; Henderson et al.,

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https://doi.org/10.1016/j.chb.2025.108680
Received 13 December 2024; Received in revised form 29 March 2025; Accepted 18 April 2025
Available online 23 April 2025

2017).

However, despite high levels of Digital Technology (DT) adoption (Eurostat, 2024), societies in the global north are still characterized by a fast pace of life, high levels of busyness and technostress (Cazan et al., 2024; Levine & Norenzayan, 1999; Santarius & Bergener, 2020, pp. 107–115) and a sense of time pressure (Robinson & Godbey, 1997; Zuzanek, 2017), raising the possibility that despite saving time in some instances, DTs are costing time in others. Empirical research and theoretical accounts of the impact of DT on the availability of time suggest that DTs are associated with increased time pressure and reduced time availability (Adam, 2006; Castells, 2011; Eriksen, 2001; Rosa, 2013; Wajcman, 2015). Rosa (2013), for example, described the notion of the "acceleration-cycle" in which the socio-cultural transformations caused by digitalisation are characterized by self-reinforcing acceleration feedback loops which structure time in our lives. Similarly, Hassan (2003) described "network-time" to refer to the accelerated society that would result from digitalisation creating "networked-societies" and "networked-economies" which lack the time boundaries that existed prior to the information technology revolution.

The exact mechanisms by which DT reduces time availability remain unclear. One possible explanation is that DT accelerates the pace of life (Hassan, 2003) and contributes to a sense of time pressure by blurring the traditional boundaries between work time and personal time. Remote working via DT, for example, provides increased time autonomy and reduces time spent commuting but it is also associated with an undesired extension of working hours (Araújo et al., 2021; Vayre et al., 2022). Furthermore, while DT provides opportunities to save time and increase efficiency for existing tasks, existing research suggests that it also amplifies overall activity levels, leading to a net increase in tasks and a reduction in time availability (Entschew, 2021). This drive to accomplish more in less time (Nagy, 2020), combined with the societal emphasis on the value of being "time-pressured" (Wajcman, 2015), contributes to a heightened sense of time poverty (Frederick, 2017; Vickery, 1977).

Understanding the impact of DT on time availability is critical to improving health and wellbeing. Time pressure, or the sense that you do not have enough time to complete all required tasks, is associated with a range of negative outcomes for physical, cognitive and emotional health. Time pressure is associated with increases in levels of the stress hormone cortisol (Eller et al., 2006). Living with high levels of cortisol has been linked to many negative health outcomes including weight gain, reduced cognitive functioning and depression (Geerlings et al., 2015; Jia et al., 2019; Singh & Maurya, 2024). Time pressure can also result in reduced engagement with health care services (French et al., 2017), reduced customer satisfaction (Davis & Heineke, 1998), greater levels of burnout (Gusy et al., 2021), technostress (La Torre et al., 2020), and riskier decision making in professional and personal life (Ordóñez et al., 2015). Rates of divorce and emotional disorders are all greater in people who experience a chronic lack of time than those who don't (Johnson, 2004; Portela et al., 2005; Roxburgh, 2004). Reduced time availability and increased time pressure resulting from DTs may therefore have significant costs for individuals and societies.

Despite widespread adoption of DT in all aspects of life, and emergent evidence that DT is reducing time availability and changing time experience during day-to-day life, to date little research has systematically examined precisely *how* and why DTs are reducing time availability. The absence of such knowledge impairs our ability to mitigate the potential negative effects of DT on time availability and the subsequent negative impact on health and wellbeing. Greater understanding of the specific mechanisms through which DT alters our use, experience, perception and awareness of time is therefore critical to developing strategies for healthier relationships with technology.

The current study sought to explore how DT use impacts perceptions of the ways in which DT may be costing time and increasing time pressure during day-to-day life. Semi-structured interviews were conducted with 300 participants in the UK, Spain, Germany, Switzerland, Poland and Czechia. Interviews explored how participants used DTs during daily life and how they perceived DT use to benefit or impair their day-to-day lives. Critically, interview schedules were specifically designed to prevent participants being explicitly asked about whether DTs reduced time availability. The paper therefore presents the thematic analysis of participants' unprompted opinions and experiences of DT costing time.

Drawing on the existing literature presented above, it was hypothesised that participants would link the use of DT with alterations in their perception and utilisation of time in daily life. Specifically, it was expected that participants would view some of their time as being wasted due to DT use leading to a perceived decrease in the overall availability of time. Additionally, it was anticipated that participants would associate this perceived loss of time with feelings of diminished self-control and regret.

2. Methodology

2.1. Sampling

The methodology for this study is grounded in an exploratory phase of the TIMED (Time Experience in Europe's digital age) project, aimed at identifying key themes related to digitalisation and time perception. A total of 300 qualitative interviews were conducted across six countries, with a target sample size of 50 participants per country to allow for demographic diversity. This exploratory approach follows grounded theory's principles (Glaser & Strauss, 2017). The study's recruitment phase was guided by a focus on 5–7 pre-identified participant groups, each representing a distinct relationship to digitalisation and continuous connectivity.

Participants were categorised into several key respondent groups. These included individuals for whom digitalisation is central to their professional lives, such as content creators and developers; those whose careers have undergone transformation due to digital connectivity, particularly older white-collar and manual workers; and those for whom digitalisation poses potential risks, including gig economy workers, victims of online harassment, and individuals affected by mental health issues. Additionally, the study targeted individuals deeply integrated into digital life, such as smart home residents or frequent users of dating platforms, as well as younger participants who have grown up with digital technology, and those experiencing a digital divide due to barriers like low digital literacy or lack of access to devices. See Appendix A for the detailed table. These groups were selected to ensure a broad range of perspectives on time use and digital technology. Participants were eligible to take part in the study if they were aged 18 years or above, resided in the UK, Germany, Poland, Czechia, French-speaking Switzerland or Spain and had a good command of one of the languages being used for the interviews (English, German, Polish, Czech, French, Castiilian or Spanish).

Furthermore, recruitment followed a stratified purposeful sampling approach, i.e. we aimed for a gender-balanced sample of participants of a broad range of ages and with differing levels of education, occupations and employment situations. This involved targeting individuals across all secondary, tertiary and quaternary sectors as well as those in education, or who were retired or unemployed. This strategy was based on discussions with stakeholders and a review of literature showing that DT use (Bela et al., 2020; Elena-Bucea et al., 2021; Twenge & Martin, 2020) and time experience (DeVoe & Pfeffer, 2011; Hamermesh & Lee, 2007; Mullan & Wajcman, 2019; Sullivan & Gershuny, 2018; Winkler et al., 2017) vary as a function of gender, age, socioeconomic status or level of education and occupation.

Participants were recruited through a combination of social media outreach, email invitations, and leaflets distributed to the general public or displayed in public spaces. Recruitment was further supported by trade unions and NGO organizations, which facilitated access to a diverse range of employment sectors. Additionally, a snowball sampling

method was employed to expand the participant pool, allowing current participants to refer others within relevant networks.

2.2. Data collection

Fig. 1 shows a schematic of the process of data collection and analysis. A semi-structured interview schedule was co-produced following discussions between all research teams involved in the project, conversations with stakeholders and review of existing literature. It aimed to explore 1) how DT was used in participants' personal, work and social life, and 2) its perceived effects on these areas of life. This schedule was translated into all six languages of the project. The interview schedule did not contain any questions about subjective time to ensure that references to or accounts of time experience during digital engagement would be unprompted and spontaneous, and the researcher would not systematically label possible time-related experiences for the participant. Researchers therefore allowed participants to lead the conversation as far as possible in accordance with a semi-structured method. This was in line with the open explorative nature of the study, through which we hoped to gain a better impression of how time experience was relevant to participants' digital lives.

Data collection took place between December 2022 and May 2023 using face-to-face, telephone and online interviews. Interviews were on average 51 min long. Participants were free to choose the modality of data collection which best suited them. All participants gave recorded informed verbal or written consent. All interviews were audio recorded. Data collection was terminated once a sample of 50 or nearly 50 participants per country had been interviewed.

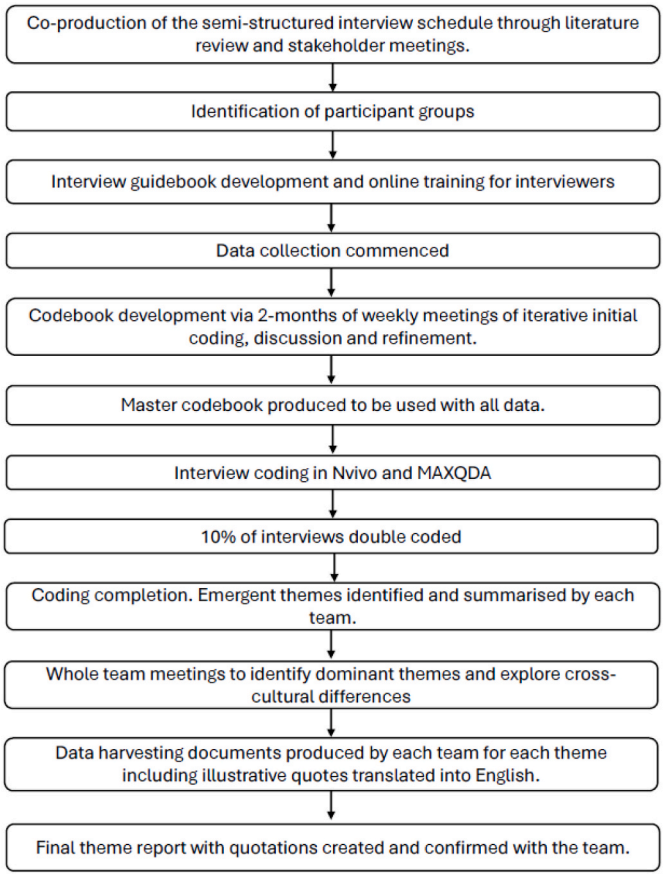

Fig. 1. Schematic of the data collection and analysis process.

2.3. Data processing

Verbatim transcriptions of recorded interviews were created manually, with the help of software such as Teams, Otter or Sonix and/or by professional transcription services. All transcripts produced were written in the language in which the interviews had been conducted and deletion or omission of identifying information, such as names of participants was completed upon transcription or once transcripts had been received from external transcription companies.

2.4. Data analysis

Inductive, data-driven and interpretative thematic analysis of all interviews, guided by Braun and Clarke (2006), was conducted. Each research team analysed the data that they had collected while following a method consisting of iterative joint coding. Analysis began during data collection.

After thorough reading and re-reading of transcripts, research teams coded their own data in Nvivo and MAXQDA. Coding was led via weekly team meetings during which a codebook, which consisted of codes generated collaboratively by all research teams, their definitions and illustrative quotes from the interviews was developed. These discussions were used to maintain the quality and robustness of the analysis, the codes and subsequent tentative themes were continuously reviewed, deliberated upon and improved throughout this process via email discussions and a series of analysis meetings between all authors. As data collection and analysis proceeded, the codebook was continuously updated by all research teams by adding new codes and refining existing ones to better capture emerging themes in the data. The codebook was then used to analyse newly conducted interviews. Code generation ceased when it was agreed that no important new patterns of meaning were being identified. Throughout, the authors upheld reflexivity by engaging in introspection and mutual discussions about their individual coding processes and decisions. This collaborative effort aimed to enhance the credibility of the analysis and its interpretations (Yardley, 2000). Excerpts from the data were consistently incorporated to illustrate and reinforce the analysis, ensuring that the results were firmly rooted in and aligned with the data. To ensure consistency, 10 % of all interviews were independently double-coded by at least two researchers. Double-coded interviews were randomly chosen. Analysts compared and discussed their analysis before agreed coding.

Following coding completion, major topic areas that appeared to reflect temporal experience during DT use across Europe were summarised by each team into an overview which included names of emerging themes, explanations and relevant quotes from the interviews from each country. Team summaries were then used to determine the final themes and subthemes reported in this paper. Team meetings were held to explore potential cross-cultural differences in the themes identified across countries. While these discussions revealed broad similarities in participants' experiences across the six countries, it is important to note that cultural differences related to digital technology use may exist. These differences could be influenced by varying levels of digital infrastructure, national policies, and the organisation of work and care, but our data does not allow for conclusive identification of such variations. As a result, the dataset is treated as a whole, and cross-cultural differences are not further explored in this paper.

2.5. Measures to ensure reliability and validity

To ensure a transparent and rigorous process, we developed a detailed guidebook outlining the conceptual framework, sampling strategy, and interview schedule. Additionally, we conducted two online training sessions for all research teams to align methodological approaches. Once initial data collection was completed, weekly online meetings were held to collaboratively develop the codebook, involving an iterative process of initial coding, discussion, and refinement. After

approximately two months, a master codebook was finalized, which all teams applied to their respective datasets. To further enhance reliability, 10 % of the interviews were double-coded, with coders meeting to discuss discrepancies before re-engaging with the data. The teams also completed harvesting templates summarizing key emerging themes, sample quotes (both in original languages and translated into English), and methodological reflections.

Internal validity: we incorporated peer debriefing, ensuring continuous discussion of findings and methodological approaches. We also engaged in ongoing critical reflection, acknowledging potential biases in sampling and interpretation. By maintaining meticulous record-keeping and decision trails, we ensured transparency and consistency in data interpretation. The iterative nature of our coding process (see Hall et al., 2005), where agreement was based on discussion and reassessment of themes, did not permit meaningful calculation of statistical measures such as inter-rater reliability. Instead, coder agreement was reached through qualitative consensus-building, which aligns with best practices in qualitative research (Noble, Smith 2015; Horsburgh 2003).

External validity: For external validity, we employed purposive sampling, carefully selecting participants based on their relevance to the research topic. The exploratory nature of our study aimed to identify key themes and issues that were further developed in subsequent project phases. Our approach followed grounded theory principles, seeking to generate meaningful insights rather than impose pre-existing theoretical frameworks.

3. Results

Following the collective coding and thematic analysis process, participant responses revealed that DT use shaped their experiences of time through how it was used, monitored, and evaluated. These experiences were organised into four overarching themes: 1) Time is lost, 2) All time is filled, 3) Time is forgotten, and 4) Time needs to be controlled. Fig. 2 depicts a thematic map of the themes, their associated subthemes and the relationships between themes. Each of these themes captures a distinct facet of how participants perceive and navigate their relationship with time in the context of DT use. Below, we explore these themes in greater detail, illustrating the nuanced ways in which DT influences temporal experiences across different aspects of daily life.

3.1. Theme 1: time is lost

This theme explores the ways in which participants described DT use reducing the availability of time during day-to-day life. Across all countries, participants reported that DT use took time away from them in three core ways; firstly, and most commonly, because time spent on digital devices was ultimately seen as wasted time. Secondly, through inefficiency and the sense that DT increased bureaucracy. Thirdly, through increased decision-making time as a result of information overload.

3.1.1. Time is lost because it is wasted

The majority of participants interpreted much of the time spent using digital media as lost or wasted time because it was time that could, or more importantly should, have been spent doing something more meaningful. Numerous participants used phrases such as "time thief" and "time bandit" to describe their smartphone.

A dominant reason digital time was perceived as lost and wasted time was that participants believed that the time could have been used in a more effective way. Participants frequently expressed a general sense that time spent off digital media, in the "real world" was a "better" use of time because real-world activities were more authentic or of higher value than digital activities. There was therefore a contrast between participants' dissatisfaction with time spent on DT with an imagined "ideal" form of *how* time should be spent. Ideal time was perceived to involve the mindful selection of a balanced range of activities which are meaningful and healthy, critically the non-digital time use was seen as superior to the digital.

> *"I don't like spending all my time in front of the computer, but I want to live real life, reality and have relationships with people or just walk around outside."* (Participant from Swiss sample)

When referring to time spent using DTs, some activities were perceived as less wasteful than others. "Good" digital time was predominantly considered to contain a degree of intellectual or personal development or required a degree of selectivity and commitment to fully engage with. Podcasts, TV streaming, audiobooks and gaming were therefore often perceived as good because of the commitment they require. "Bad" digital time was associated with a lack of intellectual depth, the absence of overt selection i.e. content was algorithmically driven and required little or no commitment to engage with. Watching "shorts" or scrolling social media was almost universally seen as the most wasteful form of digital time because the content lacked depth and was often poorly aligned with desires for personal growth. The absence of a "natural" end to this type of content also resulted in prolonged engagement, exacerbating the sense of wasted time.

> *I used to have Tik Tok. I uninstalled it because I got into these spirals a lot. Tik Tok, YouTube... it did happen to me a lot with these platforms that I*

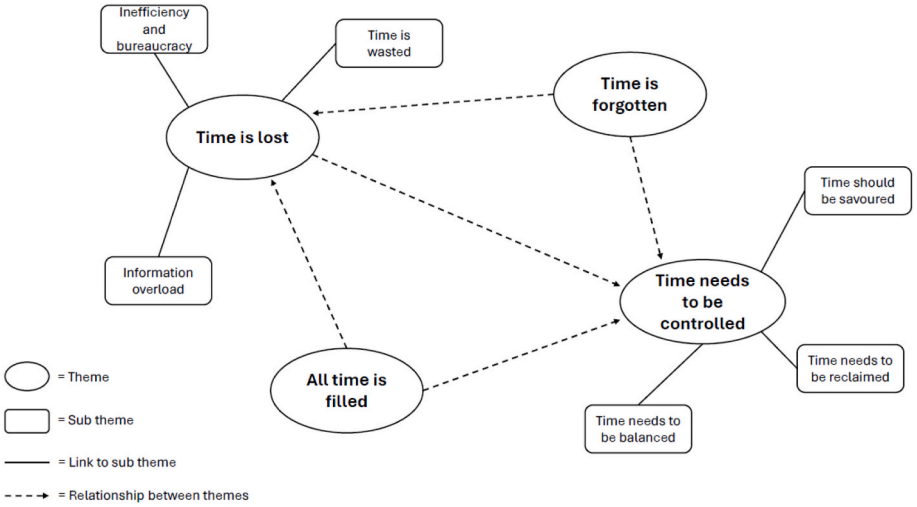

Fig. 2. Thematic map depicting the four main themes, their associated sub-themes and the relationships between themes.

got into these dynamics of consuming, for the sake of consuming, and then I felt super empty and even more anxious. (Participant from Spanish sample)

As a result, participants consistently expressed the opinion that they should be spending less time on digital devices because many of their digital acts failed to serve an observable purpose. Participants therefore reported feelings of regret, guilt and shame about the time they perceived to be wasted on DT and frustration that they could not use digital devices more "consciously" and were "sucked in". This resulted in a strong desire to regain control of their use of DT (see theme 4). For many participants, these feelings were exacerbated by an unwillingness or inability to acknowledge the value of the relaxation and enjoyment gained from digital acts. Interestingly, many participants did not articulate precisely *why* digital time was "wasted", or *why* it should be reduced, for them as individuals. Instead, participants held a generic belief that it was bad and resulted in them missing out on "better" or more productive activities.

I don't actually do anything, I just kind of scroll through and look at stuff, it doesn't serve a purpose it's [a] habit, you pick up your phone, you go through it, it's just a thing you do. Like I would say it's definitely a habit, a bad habit, but habit (Participant from UK sample)

Time loss was also associated with regular unintended use of DTs. Participants reported that they often found themselves checking their phones without consciously deciding to do so, or without a clear objective and purpose. In these instances, time was perceived to be wasted and lost time because there was no identifiable purpose to the activities being performed.

And the thing is, it's like for me it's a time thief. Evidently I can say, I catch myself doing it, that it would be better to read some collected thoughts... I mean on the basis that I could probably read more and bury myself in this crap less (Participant from Polish sample)

3.1.2. Time lost to inefficiency and bureaucracy

Whilst the majority of participants described a feeling that DT can save them time by enabling them to do things more quickly, with greater ease, or in parallel to other activities, a number of participants also indicated that digitalisation reduced time availability through inefficiency and bureaucracy.

Participants, particularly those in Czechia and Spain described a sense that the proliferation of DT in government and national services had led to an increase in bureaucracy for citizens accessing services and for the staff providing them. Many of the increases in bureaucracy were perceived as carry-overs from the COVID-19 pandemic which, perhaps due to rapid development during a time of crisis, were not intuitive or streamlined.

… to make an appointment, I've been at the door of I don't know where, to pay for something and they made me make an appointment. To get in, like I am here at the door, I mean … So, well, for me it's like … you must invest some time as well. And hey, this time is my time (Participant from Spanish sample)

There was a sense that a piecemeal approach to digitalisation meant that time was lost through system-to-system incompatibility resulting in the need to manually transfer information from one location to another. Time was also lost through duplication of information into multiple systems, or, through the acquisition of data despite a lack of clear use or purpose for this data. There was a general sense that the people who designed or commissioned systems did not have an understanding of their use, or how they integrated with existing systems. Lack of oversight or planning therefore produced systems which stole time rather than saved time.

The only thing I would say about probation, it is in some ways, there's still absolute lunatics and I'm like "guys, if I have to copy and paste another Word document from information we've already got on [name of system] and then [name of system], I'm gonna lose my mind." You don't need to do this. (Participant from UK sample)

Time loss due to bureaucracy and inefficiency was not experienced equally across the population. Instead, older individuals, and those who identified as having lower levels of digital literacy, were disproportionately affected because it took them longer to navigate the new digital environments and to acquire the skills required to achieve their goals.

But I actually have to say that the older I get, the more I wish for my retirement. I am more and more stressed by having to learn a new system again, which is really getting more complicated for me every day (Participant from German sample)

DT was also perceived as a source of time loss because of communication inefficiency. Participants highlighted that many digital forms of communication, for example, email and messaging, resulted in inefficient communication leading to a slowing of activity or a loss of time. Specifically, participants noted that iterative text-based conversations took longer and were more drawn out than telephone conversations, or where possible, face-to-face discussions. Time loss occurred because of delays in waiting for people to respond to messages and due to the level of explanation required in text communications. Indeed, some participants reported reverting to voice-based communications to reduce the sense of time loss.

I get really annoyed when I see that dot dot dot and it's like "if you'd just picked up the phone, you could have told me what you wanted to tell me in less time than it's taking you to [type in a message] (Participant from UK sample)

3.1.3. Time lost to information overload

Many participants noted that whilst an advantage of digitalisation was easier access to information, the amount of information available was overwhelming and therefore constituted a barrier to efficiency.

Yeah, I think it can be quite overwhelming to always have information coming your way and then you're not getting things done as much, definitely, (Participant from UK sample)

This was particularly notable during personal time when the vast, at times seemingly limitless availability of information and options for entertainment, resulted in decision inertia which ultimately reduced the time available for the activity when it was eventually chosen. However, it was also observed in the context of work-based activities and other domestic tasks.

Do not try to read everything, with everything, because it is simply impossible. And also having a bad influence, yes. And in terms of time spent, but also sort of mentally, yes, burdening very much. (Participant from Polish sample)

A further source of time loss though overload was digital communications. In all countries participants discussed how, on a daily basis, time was lost sifting through and replying to high volumes of digital communications.

There are then on WhatsApp 334 notifications. […] if you look at it strictly rationally, that's already a lot of information that takes up a lot of time as well (Participant from German sample)

Such messages also caused time loss because the frequent notifications provided by digital devices about new messages interrupted work, domestic and social activities, distracting participants from ongoing tasks and increasing the time needed for task completion. Interruptions caused time loss because participants felt the need to read and respond to messages promptly due to a fear of missing out and requirements of immediacy in communications. Notifications therefore caused time loss

through the work they generated and because they interrupted "flow" in ongoing tasks.

3.2. Theme 2: all time is filled

This theme examines the ways in which participants described a change in their use of and perception of time as a result of DT. Participants overwhelmingly reported using DT as a way of filling time to prevent it from being empty, idle or dead. Across all countries, participants consistently reported that they used DT to fill time when there was an absence of other forms of activity. This was particularly prevalent during periods of waiting, or during periods of transition, for example, when first waking, when commuting and when going to bed. However, it was also reported for even brief moments in-between or during other discrete activities.

> *"part of it is just boredom. […] If I'm watching […] TV and then an advert comes on and like before you had phones, you would just sit and watch the adverts. I'm like "ohh, I'll just check my phone" and then you just click on something that you don't really need to click on."* (Participant from UK sample)

Participants' use of DT to ensure that time was filled and not empty or wasted appeared to be driven by their desire for a greater sense of productivity in their time. Here, productivity is not defined in economic terms but is instead referring to being in a state of action or engagement, as opposed to a state of inaction or nothingness. That is, participants described a clear preference for time to be always spent doing "something" rather than "nothing". As a result, participants had fewer periods of time in their lives in which they simply did nothing.

> *If I get 5 minutes to play yes, game on the phone. Just something to pass away the time. If you're waiting in the dentist or something like that, yeah* (Participant from UK sample)

The desire to increase productivity by filling time with *something* resulted in conscious and unconscious DT use. Some participants noted a conscious decision to use DT to help time to pass more quickly, particularly when waiting. However, many others considered their use of digital media to fill time to be unconscious or "automatic" in the sense that they engaged in time filling with their devices without planning to, or without the clear objective of "filling time" in mind.

> *Sometimes I just think it's the doomscrolling, that I catch myself that it's already three in the morning and I didn't even want to be awake at that moment. And mostly I just wasn't doing anything, I was just like staring at my phone. So that definitely happens to me sometimes, and I don't like that.* (Participant from Czech sample)

Participants described a preference for time filling with DT, rather than other non-digital activities, because of the ease and rapidity with which digital content could be accessed and absorbed. This, coupled with the growing success of algorithmic content selection, meant that when participants fill time, it was filled with content aligned to their interests. However, participants noted a paradox between their desire to fill their time productively and a sense of regret because their use of DT to fill time actually resulted in time being perceived as wasted (theme 1).

> *TIK TOC is-, I probably spend a bit too much time on TIC TOK. It's probably embarrassing, but it's just one of those things. It's it's easy content. So yeah, you haven't got to focus too much on anything longer than about 60 seconds, which is great for people that have a terrible attention span like myself. It's easy watching. You haven't gotta do anything, you haven't really gotta read anything, and it's just a way of, I suppose, killing time in the evening, isn't it?* (Participant from UK sample)

One consequence of filling time with DT was a growing sense that time was becoming fuller and denser and as a result less free time was available. This density of time was noted in work-based scenarios where large proportions of the day were filled with back-to-back online meetings, leaving little time for comfort breaks or spontaneous free thought and action. Dense time was also evident in non-work based activities whereby participants discussed a tendency to use DT to perform multiple acts at the same time, or to rapidly switch between different activities. For example, watching TV whilst also using social media. Critically, the majority of participants did not indicate that this digital multitasking was a result of increased time pressure, i.e. they were not doing multiple things at once because they didn't have time to do them separately.

> *There's simply no other way. But when I listen to a podcast, for example, I'm cleaning or doing something at the same time. You watch TV, then you have to be on your cell phone and write at the same time. So I think that very much, you can't just be engaged with one technology.* (Participant from German sample)

3.3. Theme 3: time is forgotten

This theme examines the ways in which participants described a loss of awareness of the passage of time during DT use. Participants in all countries described persistent experiences of forgetting about time or losing track of time when using DT. This experience was particularly associated with the use of social media platforms and resulted in activities extending long beyond their intended duration.

> *I think there are many aspects to it, just the way time passes there. You're sitting there and suddenly find out you've been on Instagram for half an hour, and you don't even know what happened. That's what scares me about it.* (Participant from Czech sample)

Whilst respondents acknowledged that they used DT to fill time, none reported intending to lose track of time during its use. Instead, they described the loss as an unconscious process, with algorithms continually providing engaging content that made time slip away unnoticed. Despite participants reporting repeated and persistent losses of temporal awareness during social media use, this did not alter their temporal processing during subsequent digital activities. It was not therefore the case that a single experience of a lack of temporal awareness led to more conscious temporal monitoring in the future. Instead, participants appeared to perceive the lack of temporal awareness as an inevitable consequence of digital media use which they could not combat without the use of external systems (e.g. content restrictors – see theme 4).

> *Time goes by faster, we just don't realize it. If we do 10 minutes or half an hour, just that, sometimes we want to look for something quickly and all of a sudden there's... Me, I set alarm clocks so I don't forget and all of a sudden I think "Oh my God, it's already time to go". So yes, I'm like everyone else, I lose track of time when I'm on my phone too.* (Participant from Swiss sample)

Whilst respondents acknowledged that they used DT to fill time, none reported intending to lose track of time during its use. Instead, they described the loss as an unconscious process, with algorithms continually providing engaging content that made time slip away unnoticed.

> *But with those social networks, I feel like it's actually hard for me to kind of manage it or use a strategy there, because I feel like it's kind of this thing that's creeping into my attention that I don't even know about, and I'm like, damn, I'm just spending all this time here, I don't even really want to do it.* (Participant from Czech sample)

3.4. Theme 4: time needs to be controlled

The loss of time that resulted from time wastage (theme 1), unnecessary time filling (theme 2) and a loss of temporal awareness (theme 3) led to many participants expressing a desire to control or limit their time on DT. Control was deemed necessary to 1) restore a healthy balance

between digital and non-digital time, including work and personal time and 2) to enable time savouring. However, in order to achieve this, participants conveyed a need to reclaim their time, which they felt was being stolen by other parties, such as apps designed to capture attention, their employer or society. However, measures taken to control time were not always effective.

3.4.1. Time needs to be balanced

Participants perceived their time use to be "out-of-balance" as too much time was dedicated to digital activities and too little to non-digital ones. The threshold at which time became "unbalanced" seemed to be subjective. Using a smartphone first thing in the morning, checking the phone frequently, external reminders to stop digital activity (such as children demanding attention) or spending "hours" on social media were all reported as perceived signs of an unbalanced use of time, which was viewed as unhealthy or even harmful.

> *I try to use the time or the free time differently and actually only for urgent topics that need to be clarified, because it's something administrative, private or just of course for socializing- networking with friends to arrange to meet, but (I also then try) to direct the whole thing away from the digital again, simply to have a balance and variety* (Participant from German sample)

To restore a perceived equilibrium, participants strived to control digital time often by completely avoiding use of certain digital tools, most often social media, or by deactivating notifications for communication apps or taking temporary "breaks" from DT.

> *I was able to kill a solid, I don't know, 45 minutes scrolling through Facebook or Instagram in a row and I was like, that's probably not time well spent. So then I instituted it so that I had a timer of 15 minutes for both Facebook and Instagram and 30 for YouTube. But even that felt like an hour of time a day [was too much] and like I was always wasting it, so then I went more radical and uninstalled both Facebook and Instagram* (Participant from Czech sample)

The association of balanced time with a separation from the digital was also reflected in participants' views of work-life balance. Participants consistently described the perception that DTs were facilitating an extension of work hours, and the intrusion of work-related issues into unpaid time, resulting in less leisure time and in stress or frustration. Broader adoption of DT for work-based communications since COVID-19, coupled with the continuation of working from home or hybrid working since COVID-19 was seen as a critical driver of the deterioration of work boundaries.

> *We were solicited day and night every Saturday and Sunday, we didn't have any, we don't have any free days if we don't unplug. I force myself for 24 hours, sometimes more, so I start on the whole Saturday, I unplug it [the digital device used for work] and then sometimes I plug it back in on Sunday at noon because you still have to go over e-mails if there's something urgent. But from Saturday to Sunday at noon, I really try to disconnect* (Participant from Swiss sample)

Despite the wish to regain the personal or leisure time absorbed by out-of-hours work, interviewees often did not act on this. The receipt of work-related digital communications around the clock and checking of work-related technologies, combined with participants' perception that speedy responses were expected, led to interruptions of their free time. In addition, some participants expressed that work was intensifying as a result of digitalisation leading to more work having to be completed in shorter periods of time. The need to "get things done" therefore took priority over a wish to regain personal time.

> *The worst part is that we are willingly putting our heads in the noose. Like nobody's forcing us, but you want to get the task done so you can move on to the next one. And there's more and more of them. Well, it's kind of weird, like, a situation where you can always say: Look, I'm not gonna do it, but you either earn the stigma of being the black sheep, or you can even say: Look, I don't want to do this anymore. You can walk away, but very few people actually do it as part of that self-reflection. So we are now a herd that is going somewhere towards that goal, towards the new digitalisation.* (Participant from Czech sample)

The ideal of "work-life balance" was however at times associated with the opposite of separation, namely the freedom to intersperse personal with work-related activities, which was sometimes described as an advantage of remote work. Some participants seemed to derive a sense of autonomy from the ability to decide when and where to work, and the capability to switch between work and personal time.

> *Now cause I can do things like I go to the, go to the gym at lunchtime, erm, rather than in the evening when I just don't want to go and then I'll work later on my computer and on my stuff, you know, I'll work later, but I'm fine with that because I've done my exercise. I've seen to the kids, they're sorted, I'm happy to sit here on my laptop at 8 till 9 because it's not like I've been here since 8:00 AM in the morning, you know.* (Participant from UK sample)

Disconnecting from the digital or limiting work-related device use during free time to improve work-life balance was therefore only seen as necessary when DT intruded into personal time against participants' will, and participants felt compelled to work out of hours in addition to their usual work time or experienced stress, frustration or tiredness as a result of it.

3.4.2. Time should be savoured

As explained in themes 1, 2 and 3, time with DT was reported to lead to mindless, automatic or habitual actions. These were contrary to participants' preference to savour time, i.e. to spend it attentively and mindfully while obtaining enjoyment from it. Participants often believed that if they reduced time with DT they would be better able to savour time by (1) increasing the connection with the non-digital world and with the present, which was thought to be lost as a consequence of digital devices dominating attention through digital intrusions, distractions or time filling and, (2) by doing "nothing", which some participants considered desirable.

> *And when I go by train or bus, and I taught my son that, I say: no no no, no reading, no phone calls, look how beautiful it is here. So I enjoy it that way. But when I come to see my son at the cabin, as soon as everybody sits down, either somebody is talking to somebody or they just go to the mobile phone and they just don't notice the beauty or they don't have the need and I have the need.* (Participant from Czech sample)

However, it was also reported that digital immersion could lead to focused states of enjoyment, e.g. in the case of videogaming. Yet, this form of immersion was often connected with "escapism" from the non-digital world so that time was savoured within the digital world.

> *I like to immerse myself in in video games, you know, really feel because when I'm when I'm, when I'm immersed into a video game and open world game, I feel really immersed and with my imagination I'm in that world and it just takes me to a totally different world and it's an escape from, you know, the general tightness of my daily life* (Participant from UK sample)

3.4.3. Time needs to be reclaimed

Participants implied that regaining control of the time lost to digital activity was their own responsibility, which was also reflected in the guilt that participants experienced when temporal control failed (see theme 1). Remaining aware of the purpose and duration of one's device use and how digital time was spent, as well as self-discipline to resist perceived digital overuse were seen as necessary or helpful to take back control of time. This suggests that achieving true temporal autonomy was considered a matter of personal capabilities, especially in the case of

use of digital entertainment or social media.

> *Bans work on me, mental bans... I had to go about it that way because I was fucked up. I had a time when I didn't look at social media after 8 o'clock, but I guess everybody's different. The main principle is to realise whether you're doing it consciously. To realise if you really want to look at Twitter. What are you going to get out of it?* (Participant from Czech sample)

However, at the same time participants suggested that their time was "stolen" by digital apps designed to be "addictive" or capture attention, expectations of permanent remote availability and intense working paces. Critically, creators of digital apps were believed to be exclusively interested in maximising the use of their product even at the expense of participants' wellbeing. Therefore, taking control of time by reducing digital activity could become a fight against smartly designed app features likely to draw participants in as well as against human needs.

> *Because the business model on the Internet is "attention" and attention, that is, you don't... attention in the end goes against all this that you are saying, right? "of giving the user control over what they want and what they don't want". If the company's business model is that people are hooked to the screen, scrolling for hours and hours and hours, it is very difficult for that same company, later, altruistically, to say "no, no, no... we are going to give people tools to control such and such a thing* (Participant from Spanish sample)

While making efforts to reclaim time, DT was often perceived as being both the culprit and the saviour in that the design of technology promoted a loss of time, but the same technologies' restriction functions were also the remedy. In line with this, some participants reported fond memories of "digital detox periods", during which they experienced a sense of enrichment and even temporal abundance after reallocating time to non-digital activities, which they had not engaged in for a while.

> *When, I stopped using anything on Internet for 24 hours, well phone, computer, I started playing the piano again, I started harp lessons, I learned a language, I went out, I did some gardening. I mean, I've done lots of things, I've made recipes in cookery books because I couldn't, I didn't allow myself to go on the Internet and I said to myself it feels good. And then I have time for my family. If I put down the phone, I've got time.* (Participant from Swiss sample)

4. Discussion

This study aimed to examine experiences of time loss associated with DT use. The results show that regardless of gender or country of residence, participants consistently described the sense that some of the time they spend on digital devices is wasted time. The way in which digital devices negatively affected the use and experience of time could be subsumed into four distinct themes; 1) Time is lost 2) All time is filled, 3) Time is forgotten, 4) Time needs to be controlled.

The experience of loss of time to DT through the viewing of unrewarding content, increased bureaucracy and information and communication overload reflects participants' perceptions that DT is not enabling them to use their time well, or more efficiently, and is instead creating opportunities for wasting time and barriers to efficient decision making and action. Paradoxically however, despite this, participants consistently reported a tendency to fill their time with digital activities, resulting in the sensation of a denser fuller life, albeit with content which is often regretted. Despite negative appraisals of the value of much DT use, participants consistently reported a loss of the awareness of time during DT use. This resulted in the overextension of DT use, beyond its desired duration, and a subsequent reduction in available time for more desirable or purposeful actions.

These four themes suggest that DT use negatively affects our experience of time by changing our use of time in a manner that results in retrospective negative appraisals of time itself. The endemic loss of time to DT reflected in these themes led to a strong desire to regain control over the time spent on DT, by savouring available time and balancing it more carefully between DT and non-DT. With failures to successfully manage digital time compounding feelings of guilt, regret and shame resulting from digital engagement.

There therefore appears to be an inherent conflict between peoples' desires for their time on DT and their lived experiences of that time. Whilst marketed and utilised to save time, increase efficiency and enhance social connectivity (Apple Inc., 2024; Dias, 2016; Morgan, 2024; Raphael, 2024) and knowledge (Akyina et al., 2019; Srivastava & Singh, 2023), people associate DT use with a loss of time, an increase in inefficiency and a reduction in the authenticity of experience, which results in feels of guilt, shame and a sense of lacking control.

The reasons for a sense of time loss through technology use are complex, but this data suggests that a combination of structural and attitudinal factors contributes to the experiences described. Attitudinal drivers of a sense of time loss included negative appraisal of the content consumed through digital devices, particularly social media, and a perceived lack of self-regulation to enable balanced use of DT. Structural drivers included poorly designed systems which created inefficiency, ease of access resulting in unconscious use, and algorithmic content selection which provided unrewarding experiences with no automatic ending. This combination of attitudinal and structural factors creates a situation where individuals perpetually spend more time on DT than intended, often without clear purpose, resulting in the sense that time could have been better spent.

Attitudinal drivers of time loss to DT centred from the belief that time spent on digital devices was less authentic and therefore less valuable than time spent on real-world activities. Digital time appeared to be perceived as less authentic because much of the content failed to provide the sense of intellectual, social, emotional or personal growth which was found in real-world interactions. The sense of guilt and regret which often results after time spent on DT therefore appears to stem in part from the conflict between a desire to use all time "well" and fully and the unfulfillment provided by much of the content engaged with. This perhaps suggests a form of fear of missing out, where engagement in DT engenders concerns that individuals are somehow missing out on higher quality real-world experiences, leading to guilt and regret and a desire to have more balanced time.

Senses of guilt and regret experienced from "wasting time" on DT appear to be exacerbated by structural factors embedded into the design of DT. Imperfect algorithmic content selection provides individuals with content which is close enough to their general interests to keep them engaged, often for extended periods of time, but not content which is sufficiently aligned to their needs for esteem and self-actualisation (Maslow, 1954) to enable them to feel rewarded and fulfilled. The provision of a continuous, at times seemingly endless, supply of content means that individuals lose time sifting through unsatisfactory content in search of the often-unobtainable truly satisfying content.

Why individuals dedicate undesired amounts of time to engaging in DT use, despite broadly negative assessments of that time in retrospect is unclear. One potential explanation is that, although much of the content encountered is perceived as uninteresting or a waste of time, there is a sufficient amount of content which is "somewhat interesting but not ideal" to maintain engagement. The intermittent reward provided by this type of content may therefore serve as a form of intermittent reinforcement for further searching, prolonging search duration. As this search is attention capturing, it reduces available attention to time (Zakay & Block, 1996) resulting in a loss of awareness of time further extending time on DT. Even when highly desirable content is located, its duration is too short to satiate individuals' desires for entertainment/relaxation, resulting in further searching of the next "perfect" piece of content. This cycle of prolonged searching then drives individuals' beliefs that they lack self-regulation and that their DT use needs to be better controlled. Indeed, the absence of continuous searching may explain why the consumption of long-form content (TV

series, films, podcasts) is seen as a "better" form of digital time.

Imperfect algorithmic content selection is however only one structural cause of time loss. The ease of access, and in many cases, ease of use built into device design (Ahmad et al., 2018) has led to a proliferation of communication and information, and processing this reduces overall time availability (Bawden & Robinson, 2020; Kern et al., 2024). This has been exacerbated by post-pandemic changes in working practices which are eroding the boundary between work and personal time. This, coupled with the desire to avoid periods of empty time, means that engagement with DT is perceived as habitual and non-goal directed. Critically, the data therefore suggests that rather than simply speeding up the pace of life (Santarius & Bergener, 2020, pp. 107–115), DT is actually producing denser time in which all moments are filled. The inability to "do nothing", therefore contributes to an overall reduction in available time.

One the basis of our findings, we tentatively propose a framework (Fig. 3) to explain how perceptions of time loss impact on wellbeing and experiences of DT. This framework identifies key structural, behavioural and attitudinal factors which together, contribute towards the negative emotional outcomes sometimes associated digital media use. Structural factors include ease of use, inefficient system design, imperfect algorithms, the absence of natural ends to content and information excess. These structural factors lead to behaviours such as prolonged searching and an overestimation of time on DT. The combination of these structures and behaviours contribute to the development of negative attitudes about DT at a societal level (the social norm that DT is bad) and individual level, DT can be inauthentic, under stimulating, overloading, frustrating and that use can become dysregulated. Critically, these structural, behavioural and attitudinal factors can lead to negative emotional appraisals of DT use for situations in which DT us is task based (i.e. being used to perform a discrete task e.g. administration) or when it is just being used to fill time. Addressing these structural, behavioural and attitudinal factors may be one way to attenuate the sense of time loss associated with some DT use.

The feelings of guilt, shame and regret associated with time lost to DT highlight the importance of improving our relationship with the time that we spend on DT. This may not be as simple as "reducing" DT use, as limiting use with reminders and app usage duration limits has been shown to enhance feelings of shame and guilt (Prasad & Quinones, 2020). Instead, what is perhaps required is an attitudinal shift which enables us to appreciate and acknowledge the benefits that digital time provides. One possibility is that feelings of shame and guilt from spending time on digital tech stem from broader societal messaging that screen time is harmful and associated with a range of negative outcomes (Lanette et al., 2018). Such narratives are common with the emergence of any new form of technology (Enli et al., 2013; Konzack, 2007; Sutton, 2024), and often fade as the technology and its use become normalised (Heritage & Humphreys, 2024; Zaman et al., 2020). Societal norms, which depict time on DT as bad for health and wellbeing may also explain why we did not identify any consistent gender or age related differences in experiences of stress, guilt and shame resulting from time loss to DT. Public health messaging and media discourses often focus on the negative impacts of DT use. Because these narratives are applied to the population as a whole, it is possible that, regardless of age or gender, people feel guilt, shame and regret about their DT use because societal norms tell them that most people *should* feel these emotions. At present, the absence of a counter argument that digital time has positive value, even when the content is "low brow" and consumption passive, perhaps exacerbates the negative emotions associated with DT use. This may also mask inequality in the negative impact of DT on wellbeing and experiences of time, whereby predominant social norms overshadow lived experience. Increasing public awareness of evidence that DT can enhance wellbeing (Marciano et al., 2024), even when unintentional (Terzimehic et al., 2023), improve access to social support (Erfani & Abedin, 2018) and enhance knowledge (Şot, 2023) may be one way to alleviate the guilt experienced by users.

Our relationship with time on DT may also be improved through structural changes. Our data shows that there is significant scope to improve the ability of algorithms to provide content which truly meets our needs. When this content is easier to find, less time will be lost to the search for the satiation and DT engagement may be perceived as more valuable and authentic. However, such improvements may ultimately reduce the amount of time people spend using digital devices. Changes which reduce usage duration may, at present, be unattractive to the tech industry, where a primary indicator of device success is length of use (Barbaro et al., 2020; Carrino et al., 2017; Greenberg, 2023). However, a growing desire to develop user-wellbeing indicators of app/device success (O'Brien & Lebow, 2013; O'Brien et al., 2020) may facilitate a move from indexes of time spent to indexes of time valued.

5. Limitations

The current study sought to analyse unprompted accounts of time wastage during DT use. The approach was adopted to ensure that the experiences reported were not the result of demand characteristics. However, because we did not directly ask participants to explain how they feel DT is affecting their experience of time, it is possible that some aspects of digital time loss are unrepresented in this data. Building on

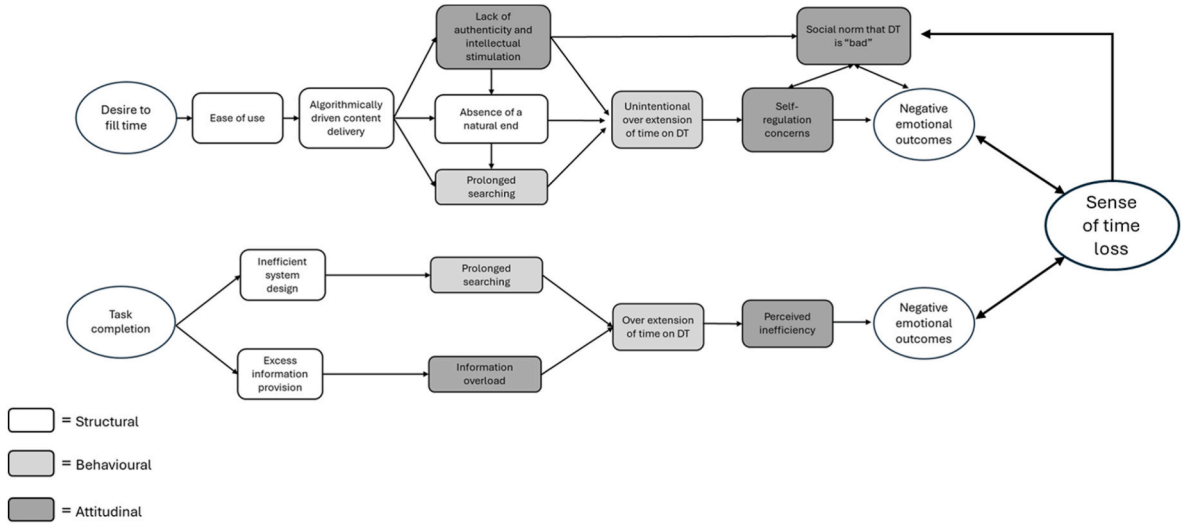

Fig. 3. Framework through which time is lost to digital technology.

the spontaneous accounts reported here, future research should therefore seek to further establish the perceived impact of DT on time availability through explicit investigation.

This manuscript focuses solely on the ways in which DT is costing us time. It does not comment on the ways in which DT saves time. The findings should not therefore be taken to suggest that DT only causes time loss and that there are no time savings associated with DT use. Improvements in efficiency during day-to-day life and employment are well documented (López-Nores et al., 2022; Özmen & Sancar, 2021; Sathwika et al., 2024, pp. 1–6), and the data reported in this paper does not seek to suggest that these benefits do not exist, it simply highlights that there are also time costs to DT.

The sampling strategy employed in this study ensured a broad range of participants who varied in terms of employment, age, gender and education. However, this strategy did not enable the recruitment of sufficient numbers of people who would be more likely to experience digital marginalisation or exclusion, for example, those with physical disabilities, mental health problems, learning difficulties or those of low socio-economic status (Helsper & Reisdorf, 2017), to enable specific conclusions to be drawn about how their experiences may differ from others. Furthermore, although attempts were made to recruit participants from emergent forms of digital platform economies (e.g. delivery drivers), insufficient numbers were recruited to enable analysis of the potential impact of this new form of digital working, which often purports to promote flexibility (Cano et al., 2021) on experiences of time loss. Further research should therefore seek to establish how these groups experience time loss as a result of DT.

6. Conclusion

There is an inherent conflict between individuals' desires for time saving through DT and their experiences of time loss as a result of DT. Despite being designed and marketed as tools to increase efficiency and save time, digital devices are associated with significant loss or wastage of time. This appears to be driven by structural factors, such as imperfect content identification and information overload, coupled with the attitude that digital content is often of lower value or less authentic than real-world experiences appear. The guilt, regret and shame associated with time loss to DT result in an increased desire to regain control of digital time and develop a more balanced approach to digital and non-digital time use. Our findings suggest that whilst modifications to technology itself to improve content provision and reduce the propensity for habitual use may help to improve our perception of our time on DT, broader changes in societal norms regarding when it is acceptable to be required to work and more information on the potential benefits of time on DT may be required before individuals can release themselves of the guilt associated with time spent on DT.

CRediT authorship contribution statement

Vanda Černohorská: Writing – review & editing, Writing – original draft, Validation, Supervision, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation. **Christine Schoetensack:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Tereza Klegr:** Writing – review & editing, Investigation, Formal analysis, Data curation, Conceptualization. **Joanna Witowska:** Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Katarzyna Goncikowska:** Writing – review & editing, Investigation, Formal analysis, Data curation, Conceptualization. **Georgina Giner-Domínguez:** Writing – review & editing, Investigation, Formal analysis, Data curation, Conceptualization. **Julie Papastamatelou:** Writing – review & editing, Investigation, Formal analysis, Data curation, Conceptualization. **Sébastien Chappuis:** Writing – review & editing, Investigation, Formal analysis, Data curation. **Mónica Fernández Boente:** Writing – review & editing, Investigation, Formal analysis, Data curation, Conceptualization. **Quentin Meteier:** Writing – review & editing, Investigation, Formal analysis, Data curation, Conceptualization. **Marc Wittmann:** Writing – review & editing, Investigation, Funding acquisition, Formal analysis, Data curation. **Nuria Codina:** Writing – review & editing, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **José Vicente Pestana:** Writing – review & editing, Investigation, Formal analysis, Data curation, Conceptualization. **Rafael Valenzuela:** Writing – review & editing, Investigation, Formal analysis. **Chantal Martin-Söelch:** Writing – review & editing, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Ruth Ogden:** Writing – review & editing, Writing – original draft, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Data statement

The authors do not have permission to make the data publicly available.

Funding declaration

The CHANSE Project TIMe experience in Europe's Digital age (TIMED) is supported by the National Science Centre, Poland, no UMO2021/03/Y/HS6/00241; Economic and Social Research Council, United Kingdom no ES/X005321/1; Bundesministerium für Bildung und Forschung, Germany, FKZ: 01UX2208; Swiss National Science Foundation, Switzerland, no 10CH11_205687; the Institute of Philosophy of the Czech Academy of Sciences, Czech Republic, 922027/0500; Ministerio de Ciencia e Innovación de España, Spain, PCI2022-135016-2 under CHANSE ERA-NET Co-fund programme, which has received funding from the European Union's Horizon 2020 Research and Innovation Programme, under Grant Agreement no 101004509.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The work reported in this paper was conducted as part of the CHANSE funded project Time Experience in Europe's Digital Age (TIMED).

Appendix A

Participants

300 individuals (164 women, 132 men, 3 non-binary or transgender participants and 1 participant whose gender was not recorded) aged between 18 and 93 years (M = 40.91, SD = 16.99) who resided in the UK (n = 50), Germany (50), Poland (50), Czechia (50), French-speaking Switzerland (51) and Spain (49) at the time of data collection were interviewed for the study. Table 1A shows participant age, gender and education. Table 1B shows

participant occupation.

Table 1A
Sample age and gender.

Participants	Total	UK	Germany	Poland	Czechia	Switzerland	Spain
N	300	50	50	50	50	51	49
Age, mean (SD)	40.91 (16.99)	41.98 (17.37)	43.46 (15.84)	42.96 (17.20)	42.22 (16.60)	33.31 (15.65)	41.69 (17.86)
Gender, n (%)							
Women	164 (54.67)	24 (48.00)	24 (48.00)	26 (52.00)	26 (52.00)	31 (60.78)	33 (67.35)
Men	132 (44.00)	25 (50.00)	25 (50.00)	24 (48.00)	24 (48.00)	19 (37.25)	15 (30.61)
Other gender identity	3 (1.00)	1 (2.00)	0	0	0	1 (1.96)	1 (2.04)
Missing	1 (0.33)	0	1 (2.00)	0	0	0	0
Highest level of education, n (%)							
≥ Bachelor	201 (67.00)	35 (70.00)	42 (84.00)	36 (72.00)	33 (66.00)	21 (41.18)	34 (69.39)
Vocational, trade or technical education	22 (7.33)	5 (10.00)	6 (12.00)	0	2 (4.00)	9 (17.65)	0
Secondary education	67 (22.33)	10 (20.00)	1 (2.00)	14 (28.00)	14 (28.00)	14 (27.45)	14 (28.57)
Primary education	1 (0.33)	0	0	0	0	0	1 (2.04)
Missing	9 (3.00)	0	1 (2.00)	0	1 (2.00)	7 (13.73)	0

Table 1B
Participant occupations.

Participants	Total	UK	Germany	Poland	Czechia	Switzerland	Spain
N	300	50	50	50	50	51	49
Occupation, n (%)							
Secondary sector occupations	5 (1.49)	1 (1.75)	2 (4.00)	1 (1.72)	1 (1.79)	0	0
Tertiary sector occupations	40 (11.90)	7 (12.28)	11 (22.00)	8 (13.79)	0	6 (10.00)	8 (14.55)
Tertiary office jobs	122 (36.31)	17 (29.82)	27 (54.00)	23 (39.66)	33 (58.93)	12 (20.00)	10 (18.18)
Tertiary manual jobs	31 (9.23)	8 (14.04)	0	4 (6.90)	2 (3.57)	8 (13.33)	9 (16.36)
Quaternary sector occupations	35 (10.42)	4 (7.02)	3 (6.00)	6 (10.34)	5 (8.93)	3 (5.00)	14 (25.45)
Retired	24 (7.14)	8 (14.04)	0	8 (13.79)	3 (5.36)	2 (3.33)	3 (5.45)
Student	70 (20.83)	10 (17.54)	7 (14.00)	8 (13.79)	10 (17.86)	25 (41.67)	10 (18.18)
Unemployed	8 (2.38)	2 (3.51)	0	0	1 (1.79)	4 (6.67)	1 (1.82)
Missing	1 (0.30)	0	0	0	1 (1.79)	0	0
Participant employment groups, n (%)							
Individuals where DT is central to their profession	69 (16.43)	12 (18.75)	5 (7.04)	21 (26.92)	8 (16.00)	15 (15.15)	8 (13.79)
People whose careers have transformed due to DT	114 (27.14)	25 (39.06)	26 (36.62)	17 (21.79)	23 (46.00)	11 (11.11)	12 (20.69)
People for whom digitalisation poses potential risks	34 (8.10)	5 (7.81)	7 (9.86)	6 (7.69)	1 (2.00)	8 (8.08)	7 (12.07)
Individuals deeply ingrained into digital life	81 (19.29)	3 (4.69)	17 (23.94)	15 (19.23)	2 (4.00)	37 (37.37)	7 (12.07)
Individuals who grew up with DT	78 (18.57)	9 (14.06)	9 (12.68)	10 (12.82)	11 (22.00)	25 (25.25)	14 (24.14)
Individuals experiencing a digital divide	29 (6.90)	10 (15.63)	7 (9.86)	6 (7.69)	0	3 (3.03)	3 (5.17)
Other	14 (3.33)	0	0	3 (3.85)	4 (8.00)	0	7 (12.07)
Missing	1 (0.24)	0	0	0	1 (2.00)	0	0

Data availability

The authors do not have permission to share data.

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