

*Smartphones at the Workplace: An in Situ Mixed-Method Study of Smartphone Use During Intellectual Work*

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**ABSTRACT**

Smartphones and other ICTs have become permanent companions in our daily lives, and increased use of these devices has impacted and often changed our daily routines. Users are in constant negotiation and coordination between the online and offline worlds they inhabit, and decisions about how to use their time and attention are becoming increasingly challenging. This has serious implications for tasks that require undivided attention or longer periods of focus, with work perhaps being the most relevant. Particularly intellectual work is susceptible to be affected by these developments, as it makes heavy use of such technologies. This paper presents findings from a mixed-methods study using first-person wearable video cameras. The data set comprises 200 hours of audio-visual and self-confrontation interview footage with 1130 unique smartphone interactions, of which 462 took place while participants were working (N=37 users). Building upon a transdisciplinary body of literature on time-use and human-computer-interaction, we provide new empirical evidence on the perceived disruptiveness of ICTs at the workplace, and the decisions users make on where to direct their attention in real, naturally occurring contexts. We observe that (a) time management relates to a set of self-regulation strategies involving the smartphone that structure work tasks, breaks, and leisure activities, (b) interaction patterns and intervals between instances of smartphone use remain statistically invariant across activities despite users' expressed preferences to use their devices less during work tasks, (c) it is not notifications, but the thought of a potential notification that leads to interruptions, with 89% of smartphone interactions being user-initiated.

Keywords: Video Ethnography, subjective experience, smartphones, workplace, interruptions

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## 1. Introduction

Constant and ubiquitous access to the Internet afforded by smartphones has changed how people navigate their daily lives, and communicate with others. The immediacy with which smartphones relay messages and information has dramatic effects on the volume of external influences that users need to manage while engaged in virtually any task, be it work or leisure. At the same time, smartphones and other portable devices allow users to work flexibly both on the temporal and spatial dimension. They can thus be an enabling factor for, or a barrier to productivity, with research producing mixed results. Crucially, previous research has generally used either external observations or self-report measures independently, and it has de-contextualised the studied activities. We use Subjective Evidence Based Ethnography (SEBE), to document the individual experience of using the smartphone during work and make sense of these often complex situations (Lahlou, Le Bellu, & Boesen-Mariani, 2015). This creates a mixed method, *in situ* account of the lived experiences of users, the challenges they face, and the practical solutions they have developed based on first-person video recordings, in-depth interviews and quantitative analyses from a dataset of over 200 hours of video with 1130 unique smartphone interactions, 541 of which took place during work. We give an ethnographic account grounded in objective observations and subjective user interpretations to show pathways for further steps to improve our understanding of habitual smartphone use. Specifically, we address the questions:

- How do smartphones affect the flow of activities?
- How do users experience smartphones interactions during work?

## 2. Previous Research

Smartphone use at work is ultimately a question of time and attention allocation. For employees, it is a decision on work and leisure utility, balancing private and professional demands, and for employers it is a question of productivity and profit. Traditional studies have investigated decision-making related to time from an economic angle (Aguiar, Hurst, & Karabarbounis, 2012; Andorka, 1987; Hill, 1985; Perlow, 2011; Robinson, 1977; Szalai, 1966). For many occupations, and especially for intellectual and creative jobs, reaching a state of “flow”, i.e., full absorption in an activity is crucial (Csikszentmihalyi, 2008, 2012). To reach this state, undivided attention over a longer period of time is necessary. Here, smartphones enter the stage. The smartphone has become a steady companion to 3.5 billion people around the globe (Holst, 2019) and almost every employee in the developed world has access to one (Van Laethem, van Vianen, & Derks, 2018, p. 3). Always within arm’s reach, it caters to most of our needs instantaneously. But smartphones afford a constant *over*-supply of information, thus becoming drivers of time stress and complicating reaching flow.

Several studies show an association of *Media-Multitasking*, the use of multiple devices in parallel or in short consecutive turns (Wallis, 2010), with difficulties in focusing on an ongoing task (Baumgartner & Sumter, 2017; Cain & Mitroff, 2011; Ophir, Nass, & Wagner, 2009; Rosen, Mark Carrier, & Cheever, 2013; Shin, Webb, & Kemps, 2019; Uncapher et al., 2017) and reductions in working and long-term memory (Sanbonmatsu, Strayer, Medeiros-Ward, & Watson, 2013; Uncapher, K.

Thieu, & Wagner, 2016; cf. Minear, Brasher, McCurdy, Lewis, & Younggren, 2013). Early work found that “time spent uninterrupted on individual activities was spent in very short blocks of time, sandwiched between interactive activities. Seventy-five percent of the blocks of time spent uninterrupted on individual activities were one hour or less in length, and, of those blocks of time, 60 percent were a half an hour or less in length” (Perlow, 1999, p. 64). This study was published before the widespread use of smartphones, and things have changed dramatically since then.

Studies find that users switch to their phones from work activities every four to six minutes (Rosen et al., 2013; Yan, Chu, Ganesan, Kansal, & Liu, 2012), while the numbers for general use are slightly higher (Van Berkel et al., 2016; Visuri et al., 2017). Experimental work found that half of adolescents and one third of adults stay on their main task for less than two minutes before switching to another media activity (Baumgartner & Sumter, 2017). More generally, due to the reduction in continuous time spent on tasks and an increase in interruptions, the nature of work itself has changed (Yeykelis, Cummings & Reeves, 2014, 2017). Paradoxically, strong media-multitaskers appear to be worse at switching between tasks effectively (Ophir et al., 2009). Finally, dividing one’s attention between tasks was related to reduced overall task performance (Bowman, Levine, Waite, & Gendron, 2010).

Interventions to address media-multitasking have considered three pathways so far, awareness, restriction, and mindfulness, with evidence being inconclusive, particularly for restrictive approaches (Parry & le Roux, 2019). Since most studies also did not control for long-term effects, it is necessary to examine media-multitasking in context before meaningful interventions can be made. This is further underlined by the finding that smartphones are “habit-forming” devices (Oulasvirta, Rattenbury, Ma, & Raita, 2012) and robust data from large scale studies showing a convergence of fast-paced app launching and switching behaviours among users (Böhmer, Hecht, Schöning, Krüger, & Bauer, 2011; Ferreira, Goncalves, Kostakos, Barkhuus, & Dey, 2014; Morrison, Xiong, Higgs, Bell, & Chalmers, 2018). Given that children and adolescents are particularly susceptible to media-multitasking, future “media generations” (Sun & Zhong, 2020) might need additional support.

These general findings are reproduced in workplace environments. Qualitative studies find that users associate smartphones with increased mobility and flexibility at work, an enhanced capacity to engage with colleagues and clients, as well as reduced uncertainty and fewer mistakes (Li & Lin, 2019; MacCormick, Dery, & Kolb, 2012). On the downside, this reliance on smartphones can turn into dependence, leading to anxiety, uncontrolled use, and ultimately decreases in productivity (Li & Lin, 2019). Quantitative evidence supports these perceptions, linking smartphone addiction to lowered work-related and non-work-related productivity and finding a negative relationship between total hours spent on the smartphone and total hours worked (Adamczyk & Bailey, 2004; Czerwinski, Cutrell, & Horvitz, 2000; Duke & Montag, 2017). Another issue is cyberslacking, the personal use of devices at work (Lavoie & Pychyl, 2001; Mills, Hu, Beldona, & Clay, 2001). Cyberslacking becomes particularly problematic when it is triggered by dysphoric states or repetitive, boring tasks (Vitak, Crouse, & Larose, 2011). Messaging applications are one of the key tension lines between smartphones enhancing work and cyberslacking, with researchers suggesting to separate private and work conversations within individual apps (Jeong, Jung, & Lee, 2020).

Smartphone use at work also increases the duration of smartphone use after work and reduces the emotional well-being of users (Cambier, Derks, & Vlerick, 2019; Derks, van Mierlo, & Schmitz, 2014; Duke & Montag, 2017; Van Laethem et al., 2018). As people use their work phones at home or their private phones for work, job pressures can intrude into their private lives (Derks et al., 2014). This, together with the feeling of having to respond to work communication as soon as possible creates *telepressure* (Barber & Santuzzi, 2015). Responses to being constantly connected vary tremendously between, and fluctuate even within individuals (Cambier et al., 2019), making it difficult to recommend straightforward policies. Importantly, telepressure intrudes back into the workplace, increasing smartphone use at work and reducing perceived engagement (Van Laethem et al., 2018). Similarly, *nomophobia*, a feeling of discomfort related to not being reachable and potentially missing out on information when users do not have access to their devices has mixed effects on productivity (King et al., 2013). Workers high in nomophobia perceive themselves as more engaged and productive when they use the phone to enhance their work performance. On the other hand, these users also experience reduced levels of productivity, emotional stress, and exhaustion when they cannot check their device (Wang & Suh, 2018). Simply restricting the use of smartphones will, therefore, result in unintended consequences.

Frequent interruptions also cause *disruption* as users need time to return to their previous task and make more errors completing them after having been interrupted (Borst, Taatgen, & van Rijn, 2015). An early study found that people only return to their previous work task in 40% of cases after an interruption (O’Conaill & Frohlich, 1995). More recently, it was shown that tasks interrupted externally were more likely to be resumed, and resumed faster than the ones users self-interrupted (Mark, Gonzalez, & Harris, 2005), with observational research suggesting that users interrupt themselves about as often as they get interrupted (González & Mark, 2004). External interruptions furthermore significantly increase subsequent self-interruptions in following hours, suggesting that certain environments condition people to self-interrupt (Dabbish, Mark, & González, 2011). Workers who are constantly interrupted seem to adapt their working style to their experience and one study found that interrupted work was performed faster than uninterrupted work (Mark, Gudith, & Klocke, 2008). However, interrupted workers also experience more stress, time pressure, and effort, as well as a higher workload and frustration (Mark et al., 2008, p. 110). Importantly, workers with high levels of self-control experienced significant costs when blocking software was installed on their devices as interruptions serve as structuring elements and breaks for them (Mark, Czerwinski, & Iqbal, 2018).

### **3. The Present Study**

Current literature either relies on qualitative and survey data, which is susceptible to *self-report bias* (Andrews, Ellis, Shaw, & Piwek, 2015; Boase & Ling, 2013; Ellis, Davidson, Shaw, & Geyer, 2019), or logging techniques that can be limited to data from the device. This contrasts with the importance context plays for human behaviour. Some researchers have begun to collect visual data to provide empirical evidence of how users interact with their devices in context (Brown, McGregor, & Laurier, 2013; Brown, McGregor, & McMillan, 2014, 2015; Licoppe & Figeac, 2013; McMillan et al., 2017; Pizza, Brown, McMillan, & Lampinen, 2016). We propose to

take this further with Subjective Evidence-Based Ethnography. The SEBE protocol consists of three phases: First, participants are given unobtrusive, miniature cameras worn at eye-level (*subcams*) to gather first-person audio-visual material (*subfilms*). In the *replay interview*, participant and researcher watch the subfilms together and discuss salient moments. Finally, the researcher conducts the analysis and consults participants for feedback on her interpretation to triangulate the results (Lahlou, 2011, pp. 8–9; Lahlou et al., 2015). As users often misremember their actual behaviour, the use of SEBE provides clarification and enables the researcher to obtain rich data on situated multi-media processes, and interpretations, even if the participant did not notice her behaviour in the moment. The SEBE protocol also upholds the highest ethical standards and participant privacy by design (Everri, Heitmayer, Yamin-Slotkus, & Lahlou, 2020; Lahlou, 2018).

The experience of time stress is an ailment typical of the young, urban, working population (Hamermesh & Jungmin, 2007). We created a typical case sample for this group with international, but predominantly European participants aged 21-29, mostly living in London, UK (N= 37, 54% female). Participants were asked to wear their subcams throughout the day doing what they would do normally. Overall, this has generated a data corpus of over 200 hours of video materials. This extraordinarily large and rich data corpus enabled an analysis of situated user behaviour on an unprecedented level.

## 4. Results

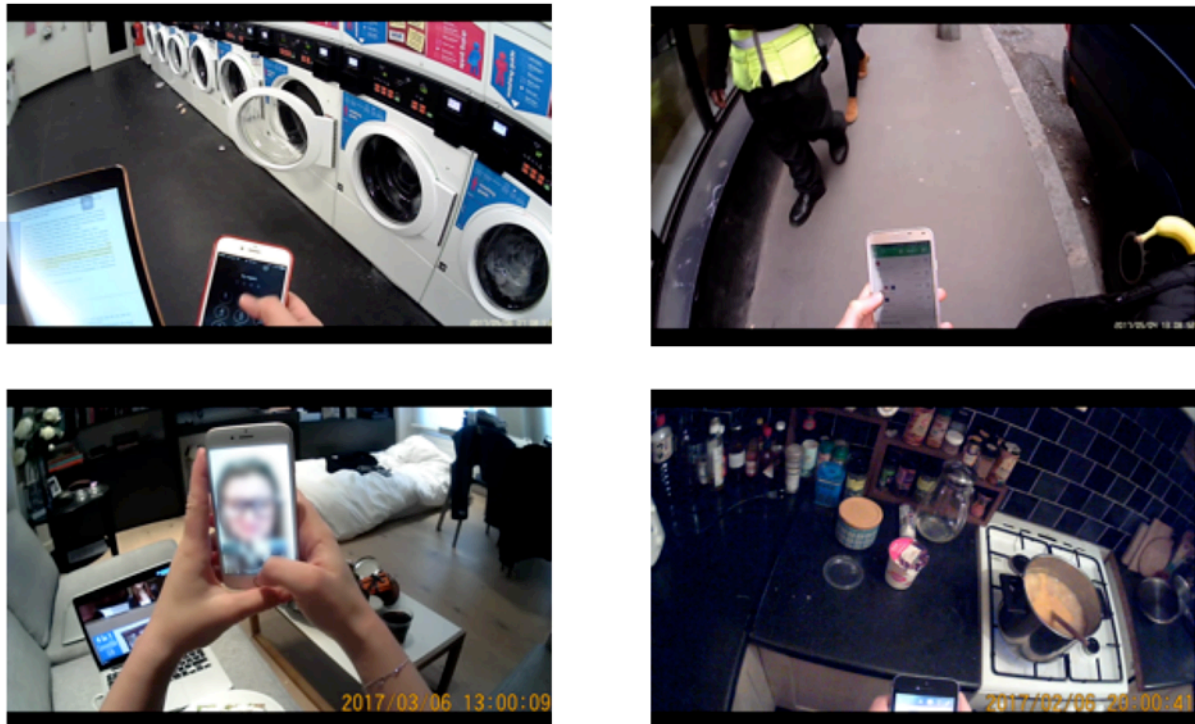
### 4.1 Qualitative Analysis

Interviews were transcribed literally and analysed using directed Qualitative Content Analysis to describe emerging themes in a systematic way (Mayring, 2000, 2015; Schreier, 2014). Participants were enthusiastic about the research experience and generally concluded that the material they gathered constituted an accurate and representative depiction of their behaviour, with many of them reporting that they forgot about the camera after wearing it for a short time. The interviews covered a broad range of smartphone activities users engaged in. In this paper, we focus on two key themes that emerged from the analysis: *Managing the use of time* and *Notifications*.

All participants described *managing their use of time* through the phone, both for work and for leisure. Participants use asynchronous conversations through chat to do multiple things at the same time as “full attention is not needed” (P18) and to stall for time while figuring out responses. They also frequently used short phone breaks to plan their schedules, from the bus ride to an appointment, to a night out with friends.

Smartphones were further used to *pass time*, for example while waiting for friends or commuting to “make it feel like time is going faster” (P24). Low levels of engagement in work tasks and other activities that were perceived as non-rewarding like cooking, cleaning, or commuting, led participants to take their phones “looking for something to do with it” (P8). Importantly, almost all participants ‘fidget’ with their phones occasionally. Fidgeting is user-initiated and includes opening and closing apps without an evident purpose and even typing. Most participants could not give a

reason for their behaviour beyond stating that it felt natural to regularly check the phone.



**Figure 1: Various instances of smartphone use (clockwise): Tablet and Smartphone while doing laundry, looking up public transport on the go, watching videos and sending selfies during dinner, sharing pictures of food while cooking.**

Most participants check all apps and notifications in preparation of putting their phone aside to *settle into work*: “I try to get rid of the messages before I work, so I can focus. Otherwise, it is in the back of my mind” (P7). Similarly, participants described that ‘getting into the flow’ with work depended on their surroundings (“It’s like the atmosphere has changed now. You know, sometimes there’s this ‘ebb and flow’ while working. I also think I was more focused because people before me were working as well”, P4), and the presence of the smartphone (“If I really want to get into the flow, the smartphone needs to be gone”, P5). Though most participants described feeling pressed for time during work, they usually allowed themselves to check their phones as a short break:

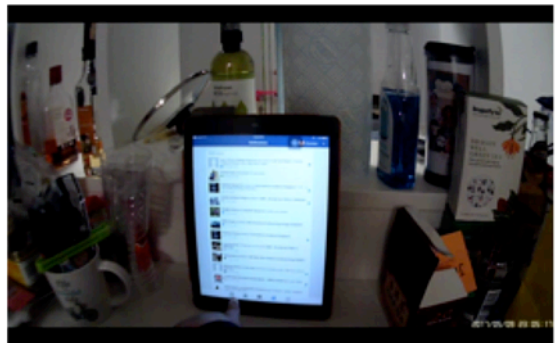
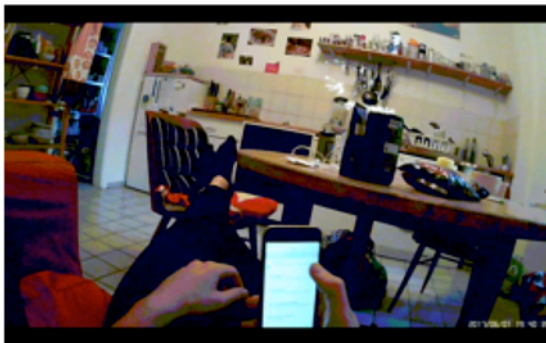
*But my thought process is like I don’t have enough time to take an actual full-time break, I don’t have enough time to go outside or read a book. So, I’ll only allow myself 2 minutes and really it’s the only thing that I can do in that time. It’ll be like I’ve been typing for a while and I can feel my attention dropping and I know if I just stop for like two minutes I can carry on. (P24)*

At the same time, participants acknowledged that their break time could be spent differently, and breaks often become longer than planned:

*Sometimes that time for easing your mind would be better spent just stretching instead of going on Facebook. Because it gets you in a loop. Like, ‘I’m gonna be here for five seconds. Oh, but this video is fun. Okay, I’m gonna see just one more video. Okay*



*wait, this video is funny and down here, another video that I wanna see. And I'm gonna see those two videos and then I'll go back to work...' And then five seconds turn into five or ten minutes. (P3)*



**Figure 2: Various habits and routines of ICT use (clockwise): Smartphones during commute, Smartphone hidden behind Laptop during lecture, 'Coming home' with groceries still on the table, Tablet while preparing tea.**

Participants also used their phones to *structure the flow activity*. Phones, thus, helped to 'fill in' unproductive spaces between activities:

*I'm waiting for the machine to do a calculation and I want to use this break time efficiently, so I'm checking maps to figure out how to get to the event tonight. (P28)*

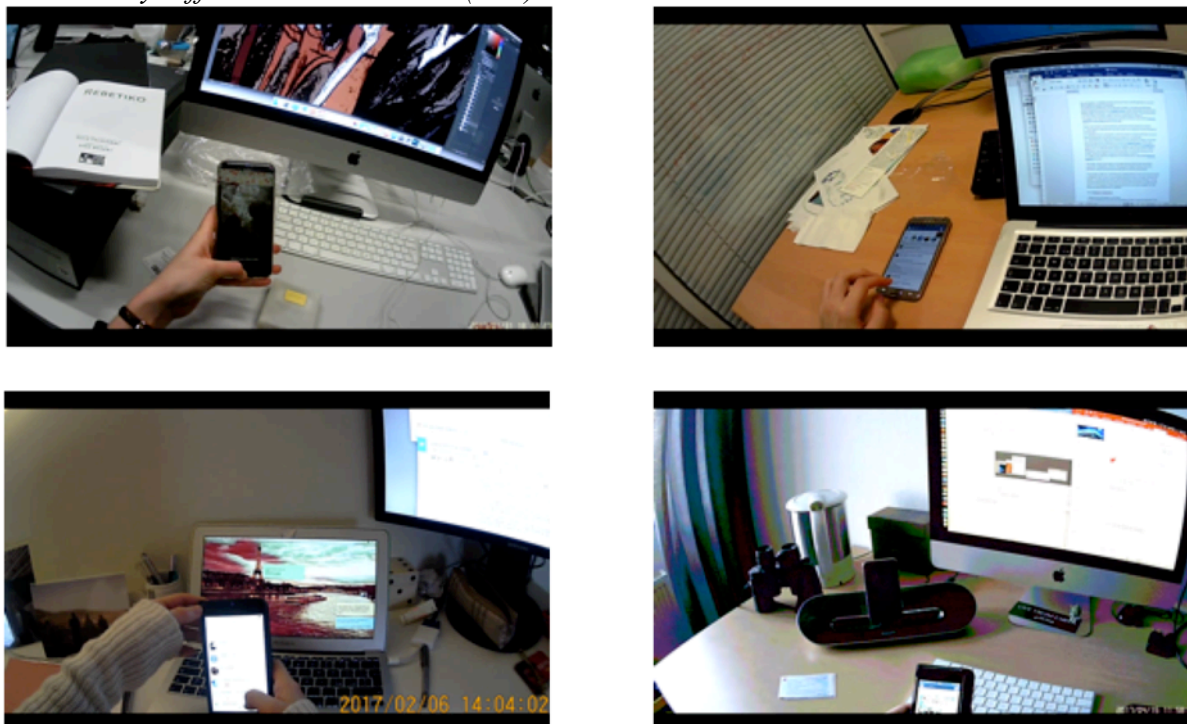
Similarly, participants use the phone to organise their private lives during work to help with nomophobia:

*I'm gonna send a message to one of the groups and see if someone wants to do something. It's awesome. Because you know, in ten minutes you can make up a plan and enjoy the night. Which would be harder if you don't have your device. (P17)*

But distractions were also welcomed under certain circumstances. Many participants mentioned being more lenient with themselves and 'wanting to be distracted' after completing a task, or when the workday comes to an end ("Mentally, it's like: Oh, it's five! You've worked so much, you can be on the phone", P7). This depended on the type of work participants were doing, and could even carry on into the next day:

*It depends on how interesting and close to my goals the things I'm doing are. If I finished or delivered something and the day after I'd go to work, I'd be really*

*distracted and would probably use my phone more. Here I was doing an analysis and it was really difficult to distract me. (P19).*



**Figure 3: Various instances of smartphones disrupting intellectual work.**

Participants also enjoyed being able to briefly distract themselves whenever they want, and suggested that they evaluate these distractions based on the utility they gain:

*But here I reach out for the phone and social media for a purpose, so it's okay, it's not just a waste of time (P4).*

*I feel like I'm scrolling for a long time, and I haven't found anything interesting. Which means that I have been wasting my time and start feeling guilty. At least I should be getting something interesting, otherwise it's obvious that I am not using my time wisely. (P3)*

The second key theme figuring in the interviews was *notifications*. All participants described varying *preferences for receiving* notifications for different settings. Strategies for achieving the right level of 'distance' include muting the phone, putting it out of reach, or turning off notifications for specific apps, but also harsher measures such as switching off the phone, leaving it at home, wearing earplugs, and even handing over passwords to social media accounts to friends.

*Actually, that's something important from my housemate. All chats are silenced except for this one. If it's something that I haven't pre-programmed as important then the phone isn't even going to vibrate. (P19)*

Participants also perceived different levels of *urgency to respond*, depending on the nature of the message. Overall, participants agreed that most notifications are unimportant. One frequently mentioned exception to this were notifications connected



to coordinating offline activities. Another exception were E-Mails, which were generally regarded as high priority, demanding quick responses and turning other notifications into distractions and nuisance. Particularly client-facing messages demanded immediate responses:

*I tend to put off my standard deadlines because it's always less urgent than dealing with an annoying client who's breathing down your neck like 'I need it now'. (P11)*

Constantly *being available* was cited as negative for well-being by most participants due to being 'mentally tiring' and spouses, family and friends 'getting mad when you don't answer'. Particularly group chats were characterised as sources of 'information overload' and distress. Notably, for several participants this pressure extended into sleeping hours:

*No, I never turn it off. Only at night sometimes. But sometimes I get paranoid and think what if something happens back home? I want to be reachable, but I feel I should turn it off more because you don't get that sense of freedom. It's a nice feeling to be unreachable. (P28)*

Finally, notifications were also perceived as *disruptions*. Receiving a notification led participants to almost immediately attend to their phones (see fig. 3). Several participants also reported having a folder for 'disruptive' apps on their phone. Interestingly, some users were aware that their notifications might distract colleagues within earshot:

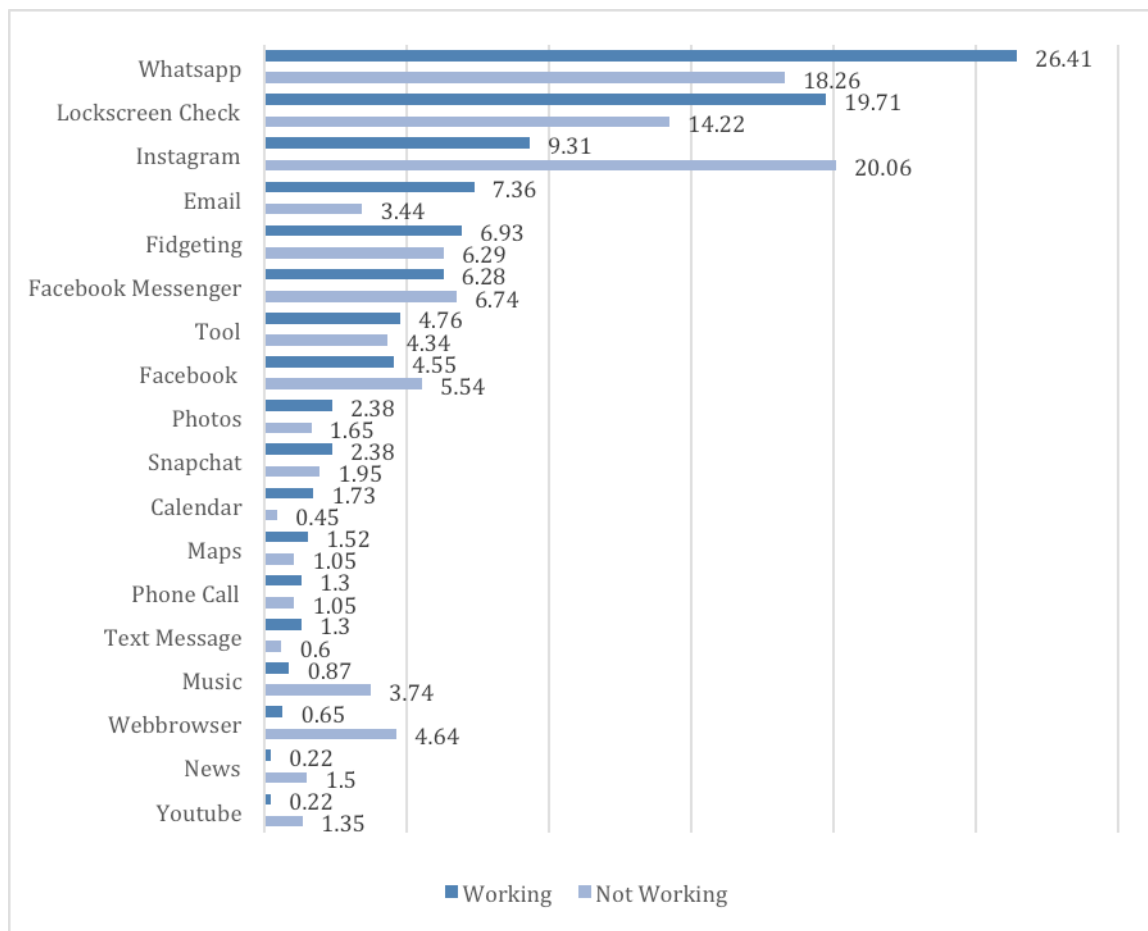
*I have my phone on my notebook cuz sometimes it's going to buzz, and I don't want people to hear it, but I also don't want to turn it off completely in case there's something important. It kinda muffles the sound, cuz on the table it goes like "naa, naa" and I get a bit embarrassed. (P11)*

The disruptiveness of smartphones at the workplace became especially evident when other disruptions were present too. When a ringing phone, an incoming Email or talking colleagues interrupted participants, they usually picked up their phones. This was most salient in open-plan offices where ambient noise levels tend to be high ("Ok, too much talking around me. I can't do any work. So, Facebook." P12). Adjusting notification settings, thus, was often not sufficient to regulate engagement with a device to the desired level. In fact, most participants were annoyed with how regularly they check their phone for messages. In that context, the phone has been poignantly described as a 'vice' that is pleasurable to indulge in, but needs to be avoided to attain daily goals (P19).

## **4.2 Quantitative Analysis**

After the qualitative analysis we quantitatively coded smartphone use in the subfilms. For every instance in which participants used their smartphones, we recorded duration, location, type of interaction, and other variables characterising the interaction. Overall, this resulted in a dataset of N=1130 smartphone interactions. We did not observe significant differences in use across age, sex, and education levels. Smartphone interactions lasted 64.4s on average. Note that this value is affected by a few longer outlier cases; 25% of interactions lasted 8s, and 50% 23s or less. A similar

picture emerged for the time between smartphone interactions, which averaged at 290.5s, with 25% of intervals between use being 40s, and 50% being 137s or less. Based on



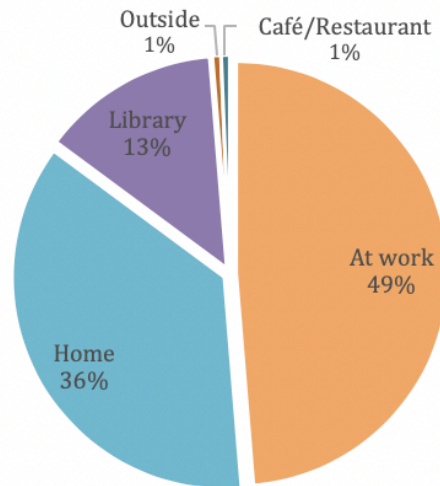
**Figure 4. Observed smartphone activity categories by frequency while participants were working vs. not working (Activities with a frequency <1% in both contexts have been excluded).**

the averages, our findings indicate that participants interact with their phones for 10 minutes every hour in a ‘one minute every five minutes pattern’ (note that data collection was limited to waking hours).

The most frequent smartphone activity we observed in our sample was using WhatsApp, a popular messaging app in most of Europe, which represented one quarter of all interactions in working, and one fifth in non-working contexts. The lock screen check, i.e., briefly activating the screen without fully unlocking the phone, Instagram, and Email followed after. Calls, text messages, and maps only made up about 1% each of the sample (see fig. 4). Especially for work contexts, it would be insightful to examine the distribution of tasks across devices (landline, smartphone, computer, etc.) to understand which devices participants use for which activity, and why.

Smartphone usage lasts longer when users were interacting with their phones before, compared to when they come from a different activity (104s vs. 46s,  $p < 0.000$ ). This confirms the notion that users can get caught in a loop when they engage with their

devices more in-depth. Furthermore, while the type of activity participants were engaged in did not significantly influence time between pickups, its influence on the duration of use was highly significant ( $p < 0.000$ ). Interactions with Facebook, Instagram, and the browser, apps conducive to prolonged scrolling, lasted significantly longer than others ( $p < 0.000$ , respectively; see fig. 5).



**Figure 5. Distribution of observed smartphone interactions while working between different locations.**

Moreover, interactions initiated by users lasted longer on average than those initiated by devices (67s vs. 43s), suggesting that participants respond to prompts when their phones are calling their attention, but actively engage with them when they pick them up out of their own initiative. While this is aligned with the qualitative analysis, the difference is marginally insignificant in our sample ( $p < 0.095$ ), making further investigation necessary.

Participants worked at their workplace in roughly half of cases, at home in a third, and at other locations in the rest (see fig. 5). We find that interactions were significantly shorter when participants were working (37s vs 83s;  $p < 0.000$ ), but we, again, did not find a significant effect for time elapsed between interactions ( $p = 0.201$ ). We further did not find significant differences when participants worked from home, suggesting that the activity participants are engaged in matters more than the context they are in. We also found that people were alone roughly half of the time, both when they were at work and when they were working, suggesting an even spread of social contexts participants worked in.

Importantly, 89% of smartphone interactions in our sample were initiated by users. There were no significant differences for being at the workplace or in other locations, which is not surprising as most participants keep their phones muted most of the time. However, when participants were working, significantly less interactions were initiated by the phone compared to when they were not working (7% vs 17%,  $p > 0.000$ ). Given that the intervals between smartphone interactions do not vary between working and non-working contexts, users actually self-interrupt more to attend to their phones while working, which is in line with previous research. In

situations where notifications were not muted, there was no significant difference in response time across working and non-working activities ( $p=0.078$ ).

## 5. Discussion

The analysis revealed the smartphone as the key logistical tool that connects the professional and private lives of participants and helps managing experienced workload by segregating larger tasks into smaller portions. We further observed a strong tension between the desire to engage with smartphones to obtain information and communicate with others, and the desire to focus and avoid frequent distractions. To deal with this tension, participants have developed nuanced habits that help them achieve the desired ‘distance’ to their devices. Yet, the data shows that contexts are blurry and motivations to engage with or avoid the phone overlap.

The quantitative analysis revealed that phone interactions were shorter, and proportional use of ‘time-consuming’ apps like Instagram or Facebook was lower when participants were working. This suggests a more task-oriented approach to smartphone use while working, compared to a focus on discovery and distraction in non-working contexts. However, the intervals between smartphone interactions remain statistically invariant across every context we observed and tested. Hence, though participants use their phones in a more focused manner while working, they cannot resist the urge to check their phones every five minutes. This urge to interact with the phone in such frequent intervals stands as the central finding of this paper and appears to be both cause and effect of the patterns of smartphone interactions we observed.

Notifications are the key to understanding these patterns, both when they occur, and when they do not. First, they attract the attention of users. Participants have, thus, described various preferences on which, and what type of notifications they allow in different contexts. While, generally speaking, the more demanding the task, the less participants wanted to receive notifications, when tasks became too intense or difficult, participants actually welcomed notifications as means for escapism. Settling into work was usually preceded by dealing with notifications and then switching them off. Switching them back on helped participants transition back into their private lives and often occurred before participants completely stopped working.

We observed that phones were set to silent in most situations and, consequently, that 89% of interactions were initiated by users. With notifications muted, participants checked their phones proactively much more, which is in line with the predictions of telepressure and nomophobia. This draws into question the sentiment of many users that notifications are disrupting them. Rather, the *thought of a potential notification* seems to drive smartphone interactions. Hence, it is not push-based information delivery that causes disruption and needs to be addressed, but user-initiated pull-based information searching. Supporting evidence for this can be found in other studies as well (Banovic, Brant, Mankoff, & Dey, 2014; Church, Ferreira, Banovic, & Lyons, 2015).

We further found that natural breakpoints occurring between and within activities are key for understanding when and why participants pick up their phones. Moments like turning a page, switching software, but also drinking or stretching in one’s seat

routinely led participants to interact with their phones. After a natural break, three types of interactions occurred (lock screen checks, regular interactions, and fidgeting) with the first two being the most common. Participants generally exhibited surprise when they saw themselves fidgeting aimlessly, and were unable to reconstruct what they were doing (typically, fidgeting interactions entailed rapidly opening and closing apps, sometimes before they had fully launched, and swiping around on the touchscreen). A tentative interpretation points to participants' descriptions of phone use as being natural, automatic, and the device being "an extension of the body" (P23). Given that the patterns and triggers of fidgeting appear deeply embodied, cues from natural breakpoints may lead participants to perform these unconscious interactions while their minds remain preoccupied with another activity. Investigating this phenomenon further is important to develop strategies and interventions to help users reduce the frequency in which they interact with their phones. Although it had already been suggested that phone-checking may be more automatic than users believe (Duke & Montag, 2017), the extent to which habitualised smartphone interactions occurred in this study has greatly exceeded what we expected.

Based on our findings, we do not think that limiting the use of devices or certain apps at the workplace will benefit productivity and well-being. Apart from the problem that private and professional are hard to separate sometimes, our findings lead us to believe that people will be more productive if they can quickly check their devices if needed. It is not the nature of the interaction that causes slacking, but the reason why the phone is in the user's hand: When responding to a prompt, both private and professional matters can be dealt with without running a large risk of slacking. Picking up their phone proactively, users are likely to spend more time than intended in work and private contexts alike.

## **6. Conclusion**

This paper investigated smartphone use with a situated first-person technique, providing empirical evidence on the subjective experience of using a smartphone in working and non-working contexts. Not too long ago, it was argued that "in practice, time must be allocated in large discontinuous 'lumps', often between 'packages' of activities" (Perlow, 1999, 114). Since then, the widespread use of smartphones and other devices has drastically changed how users spend their time: Smartphones now are the key tool participants use to structure the flow of their daily lives and a much larger share of smartphone interactions than expected was habitualised and even occurred without participants taking conscious note.

89% of interactions in our sample were initiated by users, not devices. Strikingly, our participants interacted with their phones roughly every five minutes irrelevant of any external influence. We have thus observed 'lived' telepressure and nomophobia on an unprecedented scale. Hence, we believe that limiting the use of smartphones or apps at work will not only not yield the desired results, but also create substantial negative externalities. Rather, it appears that users need to re-learn how to engage with their devices purposefully. Given that participants in our study have developed successful coping strategies that are fine-tuned to their specific use, an exciting avenue for the design of policies and interventions is to build upon these strategies and co-create natural, embodied, and applied interventions with users in the contexts of their workplace.

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