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DISTURBING DISTRACTIONS: INVESTIGATING THE IMPACT OF DIGITAL AND NON-DIGITAL DISTRACTIONS ON TASK PERFORMANCE

Research in Progress

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Abstract

Connection norms have forced individuals to keep their smartphone within arm's length to be reachable anytime-anywhere. This has led to strong connection habits that, paired with the boundless nature of the smartphone, have increased the possibilities of being exposed to distracting (auditory) cues triggering smartphone related habits. In this study we investigate whether digital (sound) distractions were more distracting compared to non-digital (sound) distractions as a result of smartphones being highly prevalent in our society and how a local distraction effect might impact overall task performance. We found that digital distractions did have a local distraction effect, but these local distractions did not amount to any significant group differences in terms of overall task performance. Although, it was found that individuals exposed to digital distractions reported increased perceived mental effort, -task difficulty, -subjective distraction and reduced perceived attention paid to the task compared to the non-digital and control groups.

Keywords: Distraction, Mental Effort, Task Performance, Working Memory, Attention.

1 Introduction

Smartphones have become an integral part of most people's everyday life (Jacobsen et al., 2011; Rainie & Wellman, 2012; Campbell et al., 2014; Taipale & Fortunati, 2014). Through social norms and societal habits, communication via digital devices has interjected itself into our social lives as a way of connecting and staying connected with others (Bayer et al. 2016). Digital devices, especially the smartphone, has cemented the expectations of ambient accessibility (Ito & Okabe, 2005) heightening the collective pressure of being accessible anytime-anywhere, and especially with the introduction of social media the number of spaces to which an individual can belong to at once has been expanded (Fortunati, 2002; Humphreys & Liao, 2011).

Connection norms and expectations of accessibility is assumed to increase the probability of forming connection habits (i.e., automatically checking one's phone) due to repetition of behavior (LaRose et al., 2014; Bayer et al., 2016). Research suggests that our behavior involving digital devices is predicated primarily on habitual processes (Peters, 2009; LaRose, 2010; Bayer & Campbell, 2012; Oulasvirta et al., 2012), which can be triggered by their preceding cues (Orbell & Verplanken, 2010). The context-independence of smartphones increases the range of potential habit-triggering cues (Bayer et al., 2016), making smartphone specific habits unbound from environmental constraints.

Constantly having our smartphone at arm's length to uphold this norm of accessibility, increases the possibility of being exposed to habit-triggering cues, which can arise either externally (e.g., receiving a message) or internally (e.g., thinking about unanswered messages) (Kahnemann, 2013; Koessmeier & Büttner, 2021). These cues can be distracting as they activate pre-learned normative schemas (e.g., connection norms) leading to the cued habitual behavior (e.g., physically, or mentally interacting with one's smartphone) (Bayer et al., 2016). Previous research has found that distractions have a negative impact on performance (e.g., academic performance) and well-being (Junco & Cotton, 2012; Brooks, 2015; Stothart et al., 2015; Jeong & Hwang, 2016; Giunchiglia et al., 2018). Distractions can be problematic as they can divert attention from the primary task, and thereby interrupt goal-directed behavior (Clapp & Gazzaley, 2012) increasing the probability of reduced performance on the primary task (Jett & George, 2003). However, it is not well understood how digital (e.g., smartphone) distractions differ from non-digital distractions as they are usually investigated separately.

Therefore, in this study we seek to provide a deeper understanding of auditory distractions (e.g., sounds) specifically, by comparing a sound originating from a digital source such as a social media notification sound (here: digital sound) with a sound originating from a non-digital source such as a bell (here: non-digital sound). Based hereon, our research question is the following: *How do digital sounds differ from non-digital sounds in terms of distraction effects and impact on task accuracy and task performance?* Our society is getting more and more digital, and the possibly ever-intensifying expectations of accessibility, societal norms, and habits surrounding our smartphones makes it important to investigate the distraction effect of smartphones (i.e., digital distractions) and how they differ from non-digital distractions to provide users with a deeper understanding of distractions originating from digital devices such as the smartphone.

2 Theoretical Background

In order to investigate whether digital sounds (i.e., sounds originating from a digital source, e.g., a smartphone), as defined above, might differ in their distraction effect when compared to sounds that are similar in nature and volume but originating from a non-digital source we need to understand digital distractions; what they are, how they influence perception as well as behavior, and how this might be different to non-digital distractions.

2.1 Digital Distractions

Smartphones provide an endless array of distractions that can deter users from performing any task as they provide access to unlimited amounts of content especially through the internet and social media platforms. Having no physical restrictions, the smartphone can be carried anywhere at any time; and paired with access to endless content and the possibility of connecting with people around the globe it opens the door to endless distractions (Turel & Serenko, 2012; Bayer et al., 2016; Koessmeier & Büttner, 2021). In managerial contexts, distractions are generally defined as being: *"incidents or occurrences that impede or delay organizational members as they attempt to make progress on work tasks"* (Jett & George, 2003, p. 494). In more general terms, distractions are stimuli that are irrelevant to the primary task and therefore interrupting to goal-directed behavior (Clapp & Gazzaley, 2012). Social media, especially, has a strong pull-factor making users more likely to be drawn to social media related distractions (Aagaard, 2015), making it increasingly distracting to goal-directed behavior (i.e., performing a task). According to the uses and gratifications approach, users utilize digital devices (e.g., a smartphone) to fulfill specific needs and gratifications (Katz et al., 1974), such as fulfilling the need for social connectedness or getting a sense of reward from consuming highly stimulating content (e.g., through social media platforms) (Ruggiero, 2000; Papacharissi & Mendelson, 2010; Whiting and Williams, 2013).

2.2 Reinforced Habitual Behavior

According to Koessmeier & Büttner (2021), there are two main reasons as to why individuals are more susceptible to disengage with goal-directed behavior to attend to social media distractions: (1) they strive for social connection and/or fulfilling others' expectations (e.g., answering a message right away in order to uphold normative expectations of accessibility), or (2) they want to avoid unpleasant tasks or make uncomfortable situations more pleasant (e.g., scrolling through social media to procrastinate on a difficult task or to eliminate feelings of boredom). Using social media platforms to gain pleasant feelings (e.g., social connectedness) and/or terminate unpleasant feelings (e.g., inadequacy) rests on the mechanisms of reinforced learning. Positive reinforcement is when behavior is strengthened by rewards which then leads to repetition of the reward inducing behavior, whereas negative reinforcement is when an unpleasant state is terminated through a behavioral response (Hoyer et al., 2017). These learned associations are neurobiologically strengthened through repetition of the reinforcement whether it be negative (i.e., termination of unpleasant state) or positive (i.e., repetition of reward inducing behavior) leading to formation of habitual behavior, with research suggesting that social habits are a dominant form of habitual behavior (LaRose, 2015).

Certain triggers (i.e., cues) relating to these habits will then be able to trigger this learned habitual behavior (Orbell & Verplanken, 2010; Wood et al., 2014). These cues can arise internally (e.g., feelings of inadequacy) or externally (e.g., hearing the sound of an incoming social media message). Habit-triggering cues can be distracting as they are often irrelevant to the primary task and can divert attention away from the primary task by interfering with an individual's cognitive processes. According to the memory-of-goals theory (Altmann & Trafton, 2002), being exposed to habit-triggering cues when performing goal-directed behavior can be distracting as these cues can redirect our attention and thereby inhibit our ability to remember the task-specific goal(s) and strategies to obtain the set goal(s) (Cades et al., 2011; Trafton et al., 2011; Brumby et al., 2013). This redirection of cognitive resources is also called cognitive interference; a concept resting on the theory of working memory (Jett & George, 2003).

2.3 Working Memory and Attention

Our working memory is responsible for retaining a limited amount of information accessible in short-term memory to use it in ongoing cognitive tasks (Baddeley & Hitch, 1974). Working memory can be separated into two main mechanisms: the control- and the scope of attention. Attention control is the ability to focus only on the relevant information, filtering out the information that is irrelevant, while the scope of attention is the amount of information actively maintained (Coulacoglou & Saklofske, 2017). Performing an unfamiliar task will almost exclusively rely on working memory processes, as the unfamiliarity of the task does not allow for long-term memory retrieval, since the task has not been (repeatedly) performed to the extent that it can be performed automatic and hence relatively effortless. Performing an unfamiliar task therefore leaves individuals especially vulnerable to the effects of distractions because the processing of the distraction and the execution of the unfamiliar task both rely on the limited capacity of working memory (Jett & George, 2003). The ability of the working memory to retain information in a state, where it is highly active and accessible, is thought to be crucial when encountering cognitive interference, such as distractions during a primary task, as well as blocking the effects of distractions (Kane & Engle, 2002). Individual differences regarding this ability of the working memory may be reflective of the individual's capability to prevent their attentional focus being pulled away from the primary task to a potential distraction, whether it occurs internally or externally (Kane & Engle, 2002).

3 Hypotheses Development

It is assumed that the distraction effect of social media related cues can be explained by the underlying mechanisms of the mentioned uses and gratifications approach (Katz et al., 1974) which can lead to reinforced learning mechanisms being manifested in habitual behavior as explained above. These social media related habits can be triggered by the exposure to digital sounds related to social media (e.g., a social media message sound) making this specific type of sound (i.e., digital) more distracting than a sound related to a non-digital source. The schema for connection habits (e.g., social media habits) is predicated on connection norms (i.e., societal accessibility expectations) (Bayer et al., 2016) and with smartphones being an integral part of our daily lives, it seems reasonable to assume that the schema triggered when exposed to a cue related to existing connection habits (e.g., a social media message sound) is much more salient in memory and making sounds related hereto more distracting when performing a task compared to a non-digital cue that is unrelated to social media. Assuming that the non-digital sound is not conditioned to be associated with the expectancy of either a reward or punishment (i.e., a neutral stimuli), we expect this to be a distraction that is more easily ignored, and therefore having a limited distraction effect. This distraction effect could be observed in two directions. The distractions could affect task accuracy in the moment of or following the distraction which we term a *"local distraction effect"* or it could affect the overall task performance as an accumulation of several local distractions which we term an *"overall distraction effect"*. Thus, we hypothesize:

> **H1** *(local distraction effect)***:** The distraction effect caused by a digital sound (e.g., social media message) will decrease task accuracy (a) in the moment (i.e., *decision distractions*) or (b) following (i.e., *memory distractions*) the exposure of the sound compared to the distraction effect caused by a non-digital sound.

> **H2** *(overall distraction effect)***:** Being exposed to a digital sound (e.g., social media message) will decrease the overall task performance significantly compared to being exposed to a non-digital sound.

Furthermore, as our ability to enact attentional control is dependent on higher-level cognitions embedded in the executive functioning of our brains (i.e., self-control) (Soror, 2015), ignoring potentially reward inducing cues (e.g., message notification) is cognitively difficult, as attentional control demands cognitive resources (i.e., mental effort). As discussed above, digital sound distractions related to social media are presumably more prevalent and persuasive compared to non-digital sound distractions in society, increasing the perceived subjective distraction when hearing the digital sound. Due to the prevalence of digital sound distractions, increased cognitive resources might be necessary to keep attention on the primary task and block out this digital sound distraction. The division of attention due to the increased distracting effects of the digital sound could lead to divided attention between the task and the digital sound distractor, hence less attention will be paid to the task. We therefore hypothesize:

> **H3:** The distraction effect caused by a digital sound (e.g., social media message) will lead to an increase in perceived mental effort, perceived task difficulty, perceived subjective distraction, and decreased perceived attention paid to the task compared to the effect of a non-digital sound.

4 Method

4.1 Experimental Design

Since being introduced by Kirchner (1958), the n-back task has been widely used as working memory measurement paradigm, in particular within the field of neuroscience and psychology, and it has increasingly been used to measure individual differences in working memory capacity (Jaeggi et al., 2010). The n-back task is a visuo-spatial task with up to four loading factors, i.e., 0-, 1-, 2-, and 3-back task. The task consists of a stream of stimuli spaced several milliseconds apart (e.g., different words). The task is for the participant to decide, if the stimulus currently presented is the same as the stimulus presented n-steps prior, depending on the chosen loading factor. The different loading factors make it easier to manipulate the working memory load. By increasing *n* the working memory load increases as well. Independent to the stimulus used in the task, the number of errors and the reaction times will increase with an increasing working memory load, n (Jaeggi et al., 2010). The n-back task involves processes of maintaining and updating the stream of stimuli presented while responding to each item, explaining why it has face validity as a task representative of working memory (Kane et al., 2007).

The modified n-back task used in this experiment was programmed using PsychoPy (2022 1.1). Instructions were given prior to the 1-back and the 2-back task respectively. During the trials, a series of words were presented on a black background on a computer screen. Each trial lasted for 1 second. Participants were instructed to pay attention to the word on the screen and to answer as accurate and fast as possible. They responded correctly by pressing the SPACE key on the keyboard if the word presented on the screen was the same as the word presented *n* words ago. Task performance was assessed based on percentage of accurate responses out of a total of 150 possible. In between trials an intertrial interval of 1 second was presented in the form of a black screen with a white fixation cross in the centre of the screen. Both the 1-back and the 2-back task, consisting of 150 trials (1 second) and intertrial intervals (1 second), lasted 300 seconds equalling to 5 minutes (see Figure 1).

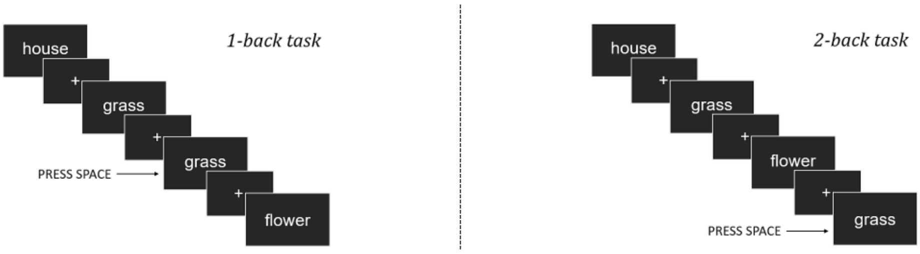

Figure 1. 1- and 2-back task.

4.2 Experimental Procedure

Starting the experiment, participants were asked by the experimenter to place their smartphone next to them on a marked location on the table after which they were given a brief overview of the following procedures before proceeding to a short online questionnaire. Participants were asked for their gender and age as well as their social media use adopted from Zhang et al. (2020) (5 items; Cronbach's' alpha = .7; "*I often check my friends' status on social media.", "I often check social media to get information about events.", "I check social media to see what's going on at least once per day.", "I often use social media to get to know about the world.", "I often use social media to connect with my friends and social groups."* on a 5-point Likert scale with 1="not at all" to 5="extremely"). No differences between groups were found for age (F(2, 74)=0.78, p=.46), social media use (F(2,74)=2.25, p=.11), and gender (p=.72).The following experiment consisted of two modified n-back tasks – 1-back and 2-back – to measure task accuracy and overall task performance.

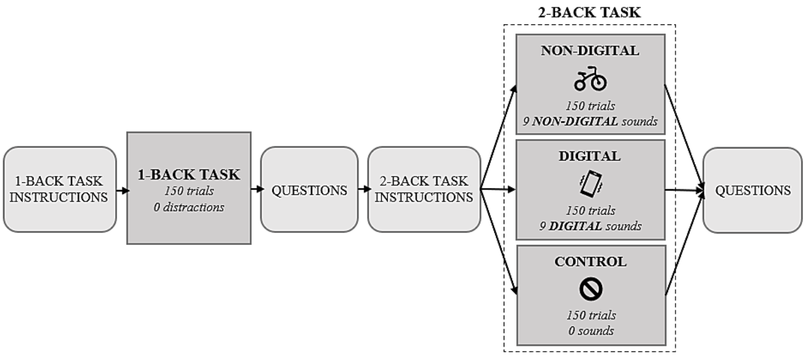

Figure 2. Overview of experimental conditions.

During the 2-back task, in the digital condition, a "digital sound" in the form of a social media notification sound (Facebook Messenger) was played. In the non-digital condition, participants were exposed to a "non-digital" sound in the form of a bike bell sound and in the control condition participants were not exposed to any sounds. The two sounds were chosen as the nature of both sounds are quite similar. In both conditions the sound level was kept constant. The similarity in nature of the sounds and consistent volume across both sounds enables a better comparison between the distraction effect of both sounds, as this eliminates any distraction effects that does not relate to the source of the distraction (i.e., digital vs. non-digital).

In both the digital and the non-digital condition each participant was exposed to the sound for a total of nine times spacing the sounds pseudo randomly throughout the 150 trials (see Figure 2). The duration between the sounds varied to avoid that the participants would recognize any patterns. Four of the sounds were placed on a trial where participants had to press the space key (i.e., *decision distraction*), while another set of four sounds were placed 2 trials before participants had to press the space key (i.e., *memory distractions*). One sound was placed independently from a decision[1].

After both the 1-back and the 2-back task participants were asked four questions with regard to their (1) perceived mental effort (1 item, "*How much mental effort did you use on this task*?" on a 9-point Likert scale with 1="no effort at all" to 9="extensive effort") (Paas & Van Merriënboer, 1993; Paas et al., 1994), (2) perceived task difficulty (1 item, "*How difficult did you find the task you just completed*?" on a 9-point Likert scale with 1="not difficult at all" to 9="extremely difficult") (Paas & Van Merriënboer, 1993; Paas, 1994), (3) perceived subjective distraction (1 item, "*How distracted did you feel while performing the task?*" on a 9-point Likert scale with 1="not distracted at all" to 9="extremely distracted") and (4) perceived attention paid to the task (1 item, "*How much attention were you able to pay to the task?*" with 1="extensive attention paid" to 9="no attention at all").

4.3 Participants and Experimental Groups

A sample of 75 participants (females=42; M_{age} = 23.52, SD=3.14) was recruited through CoBe Lab's internal recruitment database. The study procedures were reviewed and approved by an internal review board. Exclusion criteria included pregnancy, dyslexia, hearing disability, as well as any diagnosed psychiatric disorders (e.g., anxiety disorders, attention deficit/hyperactivity disorder). Upon arrival, participants were pseudo-randomized distributed to three conditions: (1) a non-digital group (G1: n=25; females=14; M_{age} = 23.84, SD=3.31), (2) a digital group (G2: n=25; females=15; M_{age} = 22.88, SD=2.60), and (3) a control group (G3; n=25; females=13; M_{age} = 23.84, SD=3.46). All participants gave informed consent and received a monetary payment after finishing the study.

5 Results

First, with regard to the experimental manipulation, we controlled for significant differences between the 1-back and 2-back task with regard to (1) lower accuracy shares in the 2-back task ($M_{1\text{-back}}$ =96.96, SD=4.55; $M_{2\text{-back}}$= 74.64, SD=14.09; t(74)=14.70, p<.001), (2) higher perceived task difficulty in the 2-back task (TD; $M_{1\text{-back}}$ = 3.19, SD=1.64; $M_{2\text{-back}}$=7.40 SD=1.20; t(74)=-12.44, p<.001), (3) higher perceived mental effort in the 2-back task (ME; $M_{1\text{-back}}$ =5.15, SD=1.92; $M_{2\text{-back}}$= 7.69, SD=1.21; t(74)=, p<.001), and (4) higher perceived subjective distraction in the 2-back task (SDi; $M_{1\text{-back}}$ = 3.71, SD=1.73; $M_{2\text{-back}}$=5.65 SD=2.23; t(74)=-7.58, p<.001), which could be confirmed.

Task	G1: Non-Digital (M/SD)	G2: Digital (M/SD)	G1: Control (M/SD)
1-back (overall performance)	97.56/5.19	95.91/4.67	97.39/3.66
2-back (overall performance)	77.08/12.83	72.08/14.48	74.75/14.99
2-back (decision distractions)	82/23.41	85/19.09	78/25.33
2-back (memory distractions)	71/23.58	60/20.41	86/20.51

Table 1. Overview of Accuracy Shares (in %).

Second, with regard to H1 – a local distraction effect in the form of (a) *decision distractions* and (b) *memory distractions* – we entered accuracy shares for both tasks (1-back, 2-back) and the experimental groups (non-digital, digital, control) as between factor into an ANOVA corrected for repeated measures and found for *(a) decision distractions*, a significant main effect of task, F(1, 72)=33.80, p<.001, but no significant main effect of experimental groups, F(2, 72)=0.37, p=.69, as well as no interaction effect of task*experimental group, F(2, 72)=0.87, p=.42. For *(b) memory distractions*, a significant main effect

[1] A preliminary study of the experimental procedure was part of a non-published MA thesis of the first author.

of task, $F(1, 72)=111.18$, $p<.001$, experimental groups, $F(2, 72)=8.42$, $p<.001$, as well as a significant interaction effect of task*experimental group, $F(2, 72)=9.36$, $p<.001$ was found. Post-hoc tests between groups (Bonferroni-corrected) found especially a significant effect between the digital and control group ($p<.001$), but not between non-digital and control ($p=.09$) and between non-digital and digital ($p=.19$). Thus, H2 can be partially confirmed for (b) *memory distractions* through digital sounds (see Table 1 for an overview of accuracy shares).

Third, with regard to H2 – an overall distraction effect – we entered accuracy shares for both tasks (1-back, 2-back) and the experimental groups (non-digital, digital, control) as between factor into an ANOVA corrected for repeated measures and found a significant main effect of task, $F(1, 72)=87.89$, $p<.001$, but no significant main effect of experimental groups, $F(2, 72)=1.07$, $p=.35$, as well as no interaction effect of task*experimental group, $F(2, 72)=0.41$, $p=.67$. Thus, H2 is rejected.

Fourth, with regard to H3 – increased mental effort to fulfill the task – a bivariate correlation analysis showed only for the digital experimental group a significant correlation between perceived mental effort and accuracy shares (*condition: memory distractions)* ($r(25)=.44$, $p=.03$, but not for the non-digital group ($r(25)=-.12$, $p=.56$) and control group ($r(25)=-.10$, $p=.62$). Furthermore, we found significant differences between experimental groups for subjective distraction ($F(2, 74)=4.93$, $p=.01$) with higher values for the digital group (G1: $M=5.68$, $SD=2.10$; G2: $M=6.60$, $SD=2.04$; G3=4.68, $SD=2.34$) and for attention paid with less attention paid within the digital group (G1: $M=3.72$, $SD=1.79$; G2: $M=4.56$, $SD=1.64$; G3=3.20, $SD=1.23$). Corrected post-hoc tests revealed especially differences mainly between the digital (G2) and control group (G3) for perceived subjective distraction ($p=.007$) and attention paid ($p=.009$). Thus, H3 can be confirmed.

6 Discussion

First, no difference in the overall distraction effect was found regarding the overall task performance when comparing the three groups (H2). This could be due to participants being able to upkeep their performance level overall despite being distracted, as distractions can be seen as several attentional micro-disengagements with the primary task (Fletcher et al., 2018), allowing individuals to keep engaged with the task overall and therefore upkeep their overall performance.

Second, no group differences were found regarding the effect of *decision distractions* (i.e., local distraction effect in the moment of exposure to the sound). One explanation could be that participants already have memorized their intended answer before the trial during which they were exposed to the sound. However, group differences were found regarding the effect of *memory distractions* (i.e., local distraction effect following the moment of exposure to the sound) (H1b). Being exposed to the digital sound significantly decreased task accuracy following the sound distraction compared to the control group, which was not the case when comparing the non-digital group with the control group. When performing the n-back task participants need to retain several words in their working memory to decide when to accurately press the space key. Thus, a key finding of our study is that the digital sound distraction seems to be more intrusive to this memorization process than the non-digital sound, thereby decreasing task accuracy in the trials following the sound. Participants are involuntarily paying attention to the digital sound distraction, hence shortly reducing the attention they are able to pay to the task.

Third, it was found that the digital group exerted increased mental effort to accurately perform the task (H3). This could be an indication of digital distractions increasing the demand on mental effort invested in the task compared to non-digital distractions and no distractions. The mental effort needed to achieve the same level of overall task performance between groups is seen to differ based on the type of distraction, where increased mental effort is needed when exposed to a digital sound distraction to perform on the same level overall as the two other groups. It was also found that the digital group perceived to be increasingly distracted during the task compared to the non-digital and the control groups. Participants also reported decreased attention paid to the task.

6.1 Limitations and Future Research

Even though we have not observed a significant overall difference between experimental groups, the investigated effects associated with *memory distractions* (H2b) as well as increased perceived mental effort, -task difficulty, -subjective distraction, and decreased perceived attention paid to the task (H3) calls for future research involving the use of neuroscientific methods. Human attention is everything but infinite. Our attention is limited by our neurophysiology, making the time we are able to pay attention finite (Terranova, 2012). As the working memory is part of higher-level cognitive processes within the brain's prefrontal cortex (Constantinidis & Klingberg, 2016) it is relevant to further investigate the neurological impact of digital distractions. We therefore plan to do so with the use of functional magnetic resonance imaging (fMRI). More specifically, we intend to investigate if and to what extent digital distractions activate areas of the brain involved in (1) reward processing (i.e., the Nucleus Accumbens (NAc)), (2) cue-reactivity (i.e., the amygdala), and (3) inhibitory control (i.e., the midcingulate cortex (MCC) more specifically the dorsal region of the anterior cingulate cortex (dlACC)) (Turel et al., 2014; He et al., 2017). Additionally, we intend to explore the anatomical brain modulations in terms of grey matter volume (GMV) making up the mentioned brain regions, as these regions have been argued to be rather flexible (i.e., prone to anatomical modulations) (He et al., 2017). Adding to this, other neuroscience tools are considered appropriate as well. As an example, in the present study we found that the digital group had to exert more mental effort to accurately perform the task compared to the non-digital and control groups, measuring mental effort based on a self-report instrument. Various EEG measures are related to mental effort and related constructs such as mental load and cognitive workload (Müller-Putz et al., 2015). These and further EEG measures could serve as a starting point in future NeuroIS studies as well as in the proceedings of the present study (e.g., Dimoka et al. 2012; Riedl & Léger 2016).

Previous research has argued for individual differences regarding social media distractibility (Koessmeier & Büttner, 2021), thus we plan to investigate individual differences regarding cue-reactivity as well as self-regulating abilities in response to digital social media related distractions both with the use of self-report measures (e.g., problematic social media use (*s-IAT-SNS*; Wegmann et al., 2015) the Barratt Impulsiveness Scale (*BIS-11*; Patton et al., 1995)) as well as neuroscientific methods as mentioned above. It could also be relevant to explore individual differences regarding the psychological response towards the two distractions using facial emotion recognition (FER) technology, which could add to the understanding of individual differences in perceived strain in the exposure to the digital versus non-digital sounds. In addition, other tasks could be used besides/supporting the n-back task. A Go/No-Go or a Stop-Signal task assessing response inhibition (i.e., impulse control) and/or a Stroop task assessing self-regulatory abilities (i.e., self-control) could be included in the proceedings of this present study to further investigate individual differences regarding reactivity to digital social media related distractions.

A better understanding of how digital distractions differ from non-digital distractions can assist users of technology (e.g., smartphone users) in developing appropriate coping mechanisms specific to digital distractions. This study indicates that there might be underlying coping mechanisms compensating for the effect of the memory distractions leading to the insignificant difference observed between the groups in terms of the overall task performance. Future studies should investigate the coping responses underlying digital distractions, more specifically in relation to a more local distraction effect, as this might give an insight into how technology users might have become accustomed to digital distractions enabling them to perform on the same overall level, but with the cost of increased (perceived) mental effort, perceived task difficulty, perceived distraction, and a decrease in the perception of attention paid to the task at hand. These underlying mechanisms and subjective perceptions can have a negative long-term effect both in organizational and private settings calling for more longitudinal studies in the future.

We recognize the broadness of the sound categories (i.e., digital vs. non-digital) as non-digital sounds could in its overall essence include everything from chirping birds to construction work. Our study was based on the premise of comparing sounds that were close in nature to focus on the distraction effect produced as a result of the source of the sounds and neither the volume nor nature of the sound. Future studies could look into different types of sounds within or beyond the two categories defined in this study.

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