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# Digital detox: An effective solution in the smartphone era? A systematic literature review

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## Abstract

Smartphone use, e.g., on social network sites or instant messaging, can impair well-being and is related to clinical phenomena, like depression. Digital detox interventions have been suggested as a solution to reduce negative impacts from smartphone use on outcomes like well-being or social relationships. *Digital detox* is defined as timeouts from using electronic devices (e.g., smartphones), either completely or for specific subsets of smartphone use. However, until now, it has been unclear whether digital detox interventions are effective at promoting a healthy way of life in the digital era. This systematic literature review aimed to answer the question of whether digital detox interventions are effective at improving outcomes like health and well-being, social relationships, self-control or performance. Systematic searches of seven databases were

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carried out according to PRISMA guidelines, and intervention studies were extracted that examined timeouts from smartphone use and/or smartphone-related use of social network sites and instant messaging. The review yielded $k = 21$ extracted studies (total $N = 3,625$ participants). The studies included interventions in the field, from which 12 were identified as randomized controlled trials. The results showed that the effects from digital detox interventions varied across studies on health and well-being, social relationships, self-control, or performance. For example, some studies found positive intervention effects, whereas others found no effect or even negative consequences for well-being. Reasons for these mixed findings are discussed. Research is needed to examine mechanisms of change to derive implications for the development of successful digital detox interventions.

**Keywords**
Mobile, disconnect, micro break, timeout, abstinence, unplug

## Introduction

Nowadays, smartphones are ubiquitous. On average, we spend nearly three hours per day on our smartphones (Markowetz, 2015). Unlike other electronic devices, smartphones enable the use of such functions almost anytime and anywhere, with numerous consequences for our daily lives.

Smartphones come with benefits, such as constant contact with friends, attractive leisure activities, Internet access to an endless supply of information, and positive consequences for knowledge sharing (Lepp et al., 2013; Omar et al., 2016). Conversely, smartphone use can impair well-being, a trend that has become an issue of great concern to both the public and researchers. For instance, research has shown that smartphone use affects health and well-being, performance, and social interactions. Regarding health-related problems, studies have found that smartphone use is related to higher depression rates and anxiety (Lepp et al., 2014), sleep difficulties (Thomée, 2018), and also musculoskeletal problems in case of smartphone overuse (İNal et al., 2015). Furthermore, a predominance of empirical results indicates a negative association between smartphone use and academic performance (Amez & Baert, 2020), which corresponds with results showing that smartphone overuse is related to lower work productivity and engagement (e.g., Duke & Montag, 2017). Moreover, smartphone use also increases negative affect or stress and reduces the quality of interactions when individuals focus on their own smartphones during social interactions (so-called phubbing; McDaniel & Radesky, 2018; Nuñez et al., 2020).

Even though some of the negative associations between digital technology use and health and well-being are small (Dienlin & Johannes, 2020; Orben & Przybylski, 2019a; Orben & Przybylski, 2019b), smartphone users are concerned about their own smartphone use. For example, research has demonstrated that smartphone users blog about the need to spend time away from their smartphones (Jorge, 2019; Kuntsman & Miyake, 2016), or even search for strategies to better manage their online time, e.g., with the help

of applications such as *iOS Screen Time*, *Android Digital Well-Being*, *Moment*, *Forest*, *Quality Time*, *Detox*, *Space*, or *OffTime*. Furthermore, groups have organized an annual National (and Global) Day of Unplugging, which have been held for several years now with many followers (National Day of Unplugging, n.d.). Thus, it is not surprising that mass media present unplugging from smartphones as a trendy way to reduce the negative impact from smartphone use on health-related outcomes. Self-help tips are available on many platforms, such as social media, websites, and books with titles such as *24/6: The power of unplugging one day a week* (Price, 2018; Shlain, 2019; Syvertsen, 2017). The concerns expressed in these texts reflect general concerns about smartphone use, and advice is given on how to rebalance one's life by restricting smartphone use (Syvertsen, 2017). In a similar vein, holiday tour operators promote so-called digital detox camps or centers and "mobile free" holidays. All aim to help people escape from everyday digital connectivity. Particularly in Asia such holidays and events are booming (Collier, 2009; Dickinson et al., 2016; Syvertsen, 2017).

## *Digital detox definition*

Both the public and scientific community use different terms when it comes to non-use of electronical devices. Usually, terms like *abstinence*, *break*, *disconnection*, *detox*, *time-out*, or *unplugging* are used (e.g., Brown & Kuss, 2020; Fioravanti et al., 2019). The important aspect that these terms have in common is they describe a period during which use of digital devices, e.g., tablets, is restricted. In our review, we used the umbrella term *digital detox* to encapsulate all these different terms. The term was introduced for the first time around 2012 (Felix & Dean, 2012). *Digital detox* is defined as a "period of time during which a person refrains from using their electronic devices, such as smartphones, regarded as an opportunity to reduce stress or focus on social interaction in the physical world" (Oxford Dictionaries, 2019). This definition conceives digital detox as temporary abstinence from electronical devices to cleanse oneself, similar to fasting. Thus, digital detox differs from detoxification therapies to abstain permanently from illicit drugs or alcohol (Syvertsen & Enli, 2019). Furthermore, this definition also highlights a difference when compared with abstinence from TV viewing, which was advertised in the 1990s and early 2000s. Digital detox emphasizes an effort to raise awareness of excessive use and boost self-optimization to reduce stress, whereas abandoning TV was promoted due to negative evaluations of the medium and its content (Syvertsen & Enli, 2019). However, the definition of digital detox (Oxford Dictionaries, 2019) remains unclear in relation to the following aspects. No conclusion can be drawn as to whether (a) a person can take a timeout from only one device (e.g., the smartphone) or whether, according to the definition, all devices may no longer be used, (b) it entails merely voluntarily or intentionally staying away from digital devices or includes involuntary, forced abstinence, (c) abstaining from any particular content is relevant or digital detox refers to a complete timeout from electronic devices only. Therefore, we suggest extending the definition.

In line with the hierarchical computer-mediated communication taxonomy (Meier & Reinecke, 2020), digital detox should not refer exclusively to a period of time during which a person refrains from using (a) electronic devices, but instead should be extended

to a time period during which individuals do not engage in using (b) certain types of applications (e.g., social media), (c) branded media (e.g., unplugging from Facebook), (d) special features (e.g., disconnect from chats), (e) interactions (e.g., active usage of WhatsApp), and/or (f) messages (e.g., voice messages). As indicated by Meier and Reinecke (2020), the distinction between the six levels is more than relevant to capture all different aspects of electronic media use in a systematic approach. Based on this taxonomy, we secondly suggest that digital detox includes breaks from just one device as well as from all digital devices. In line with the taxonomy of behavior change techniques (BCTs; BCT 7.5) from Michie et al. (2013), we thirdly understand digital detox to be a voluntary and intentional limited removal of this aversive stimulus, namely digital devices and/or specific subsets of smartphone use, to promote health behavior change. We assume that it is important to add the terms *voluntary* and *intentional*, as research has shown that individuals' intentions and motivations are important for successful health behavior change (e.g., Hardcastle et al., 2015; Miller & Rollnick, 2013; Vitinius et al., 2018).

## *The present systematic review's context*

Although digital detox is ubiquitous and, per its definition, an opportunity to reduce stress or focus on social interactions in the physical world, it remains unclear whether digital detox is an effective strategy to promote a healthy way of life in the digital era. Surprisingly, no systematic review has been published on the efficacy of digital detox, yielding a body of literature with isolated findings. However, digital detox interventions can only be used as a strategy to reduce the possible negative impact of digital technologies on health and well-being in case of a synthesized overview of existing empirical evidence. Furthermore, the identification of effective digital detox interventions might guide the development and dissemination of future digital detox interventions. Thus, the present systematic review aims to compare findings regarding digital detox interventions systematically. This paper will focus on studies that have investigated timeouts from the device of smartphones instead of timeouts from other devices, e.g., TVs, radios, or other portable devices, e.g., music players. This decision is based on the circumstance that unlike other electronic devices, the smartphone enables the use of several functions anytime and anywhere, leading to constant connections among individuals, each creating a greater source of distraction and stress (e.g., Demirci et al., 2015). Furthermore, as already discussed above, the history of the term *digital detox* is closely related to the proliferation of the smartphone and can be distinguished from abandoning TV (Syvertsen & Enli, 2019).

*Use of social network sites (SNS) and instant messaging (IM) as part of smartphone use.* Along with the focus on digital detox interventions regarding the smartphone as a device, we also want to draw attention to digital detox interventions regarding the use of certain types of applications as the use of SNS, e.g., Instagram, as well as IM like Threema, or texting. As is remarkably obvious, a significant amount of smartphone use worldwide entails the use of SNS/IM (Markowetz, 2015; Statista, 2020). Therefore, we focused on this specific subset of electronic media use. However, we decided to exclude other types of use, like shopping or gaming, as their usage frequency is lower in the population worldwide. In addition, reviews on hazardous gaming and prevention approaches already

exist (Costa & Kuss, 2019; King et al., 2018). Furthermore, abstinence treatment programs that target excessive gaming usually combine their treatment with psychopharmacology or psychotherapy (Singh, 2019). In contrast, this review focuses on interventions that have studied digital detox as the main behavior change strategy among individuals without diagnosed Internet gaming disorders, according to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) and the International Classification of Diseases (ICD-11; WHO, 2018). This also corresponds with the definition of *digital detox*, which states that it entails creating well-being and opportunities to reduce technology-related stress (Oxford Dictionaries, 2019).

*Voluntary and intentional abstinence from smartphones.* As the use of digital devices is an integral part of life, making it unrealistic to live without them, we further aim to summarize studies of limited abstinence periods in contrast to complete abstinence approaches (e.g., giving up Facebook). This procedure takes into account the definition of *digital detox* and recommendations on behavioral addiction research that aim for controlled use, rather than complete abstinence (e.g., alcohol; Yau et al., 2014). As already indicated above, we clarified that *digital detox* also should be defined as voluntary abstinence from digital devices. Therefore, we will not include involuntary detox interventions or restrictions imposed by others, e.g., school restrictions, parental allocation of screen time to their children, or employer restrictions (Chun, 2018, for a conceptualization). Furthermore, we will not focus on laboratory studies that investigated involuntary separation from smartphones with the help of a cover story (e.g., Clayton et al., 2015; Schmidt et al., 2018).

### *The review's aims*

This review aims to compare studies systematically regarding digital detox interventions based on the conditions outlined above. Furthermore, an in-depth evaluation of digital detox interventions also should identify different digital detox components – e.g., content that individuals disconnect from, duration of timeouts, or studies' quality – to provide a basis for further research on digital detox interventions. The Participants, Interventions, Comparisons, Outcomes and Study design (PICOS) approach (Miller, 2001) was used to develop research questions to guide the search strategies and data review (see Method section below). The first research question is: Do digital detox interventions differ in terms of (a) the content that individuals disconnect from, (b) the duration of the timeouts, and c) studies' quality? In addition, the second and main research question asks about the effectiveness of digital detox interventions: Are digital detox interventions effective at improving outcomes such as duration of use, performance, self-control, health and well-being, and/or social relationships?

## Method

This systematic review proceeded in accordance with Preferred Reporting Items for Systematic Review, and Meta-Analysis (PRISMA) guidelines (Moher et al., 2009; see also Supplemental 1).

## Search strategy

Relevant studies published between January 2008 and September 2020 were searched. This time period was chosen to exclude studies published before 2008 because the smartphone gained importance with the introduction of the iPhone in 2007. From then on, the smartphone changed many people's daily lives (Addo, 2013), and more attention was given to timeouts from new technologies like the smartphone.

The literature search was done in seven databases: PsycINFO, PBSC, PsycArticles, PubMed, Cochrane Library, Web of Science, and Google Scholar to identify additional articles. Search terms can be found in Supplemental 2 in addition to an example of the search strategy. The search strategy's sensitivity was tested by checking whether it retrieved articles by Turel and Cavagnaro (2019) and Wilcockson et al. (2019), identified as key publications in preliminary searches. In addition, the reference lists of all included articles were screened to capture further relevant studies missed by the electronic searches. Finally, important journals in this research area were searched manually for recently added publications, particularly *Computers in Human Behavior* and *Cyberpsychology, Behavior, and Social Networking*. After identifying and deleting duplicates, citations and full texts were imported into a literature database.

## Inclusion and exclusion criteria

*Type of studies.* The included studies in our review needed to fulfill the following criteria: (a) written in English; (b) investigated a digital detox intervention with a voluntary limited absence of use; (c) examined abstinence from digital devices, including the smartphone or a specific subset of digital device use, e.g., the use of SNS/IM; and (d) conducted inferential statistics that examined the intervention's effect compared with a control group or baseline assessment.

*Type of sample.* This review will not be limited to a particular population, but studies must provide information about the sample type, allowing for classification of participants.

*Type of outcome.* No focus on specific outcomes was predefined to ensure a broad overview on the effects from digital detox interventions, including health-related outcomes, social relationships, cognitive performance, or other aspects.

*Exclusion of studies.* As a consequence of the inclusion criteria, we excluded studies that focused on external restrictions, e.g., school restrictions. Corresponding with this, we also excluded studies that masked the reason for the period of abstinence from the smartphone with a cover story, e.g., to not disturb others during the experiment. Furthermore, studies focusing on behavior change techniques other than BCT 7.5 or in combination with the BCT 7.5 – e.g., mindfulness, resilience, or self-control trainings – were excluded from further consideration. In addition, studies on Internet gaming disorders were excluded, as were studies that only examined Internet addiction, but not in the context of smartphone use. Finally, qualitative studies were excluded.

### Study selection

Two reviewers independently screened titles, abstracts, and full-text articles to decide whether an article was relevant to the review based on the inclusion and exclusion criteria. Inter-rater reliability between the two reviewers was assessed using the Cohen's kappa statistic (Cohen, 1960). In the event of a disagreement, a third person was consulted.

### Data extraction

Data were extracted from the selected articles and entered into an electronic data sheet, which recorded year of publication, research question or purpose, study design, outcome and measurement types, and the main results (see Supplemental 3).

### Studies' quality

To evaluate the identified studies' quality, a tool by Kmet et al. (2004) was applied to address the following criteria: clarity of research objectives; description of study design, participants, measures, randomizations, blinding, and selection of outcomes; rationale for the sample size and analytic method; estimates of variance reported for the main results/outcomes; a control of analyses for confounding effects; and the reporting of results in sufficient detail. Each component was rated using a three-point response scale (two points for "yes," one point for "partial," 0 points for "no"). If one criterion was not applicable for a study, its score was excluded from the computation of the overall score. The quality scores were used to determine the relative quality of the studies included in the review. According to Kmet et al. (2004), a value above 75% of the possible scores indicates high quality (conservative cut-off point), whereas a value below 55% indicates low quality. Two reviewers (TR and TA) assessed the studies independently. Subsequently, inter-rater agreement was computed. Disagreements were resolved via discussion and consultation with a third author. The level of agreement between the two reviewers was measured with the interclass correlation coefficient (ICC), which was .946 (95% CI [.868, .978]), indicating a very good level of agreement (Koo & Li, 2016).

## Results

### Overall search findings

Figure 1 shows the PRISMA flow diagram (Moher et al., 2009), indicating the search process to select the final studies that satisfied the inclusion criteria. Accordingly, the results from this systematic review are based on $k=21$ studies from 20 published articles.

### Descriptive results

Table 1 provides an overview of the studies' characteristics. The studies were conducted in 11 countries, mostly the United States ($k = 7$), followed by Australia ($k = 3$). The other studies originated from Belgium, Denmark, Germany, Italy, South Korea, New Zealand, Norway, United Arab Emirates, and the United Kingdom. A total of

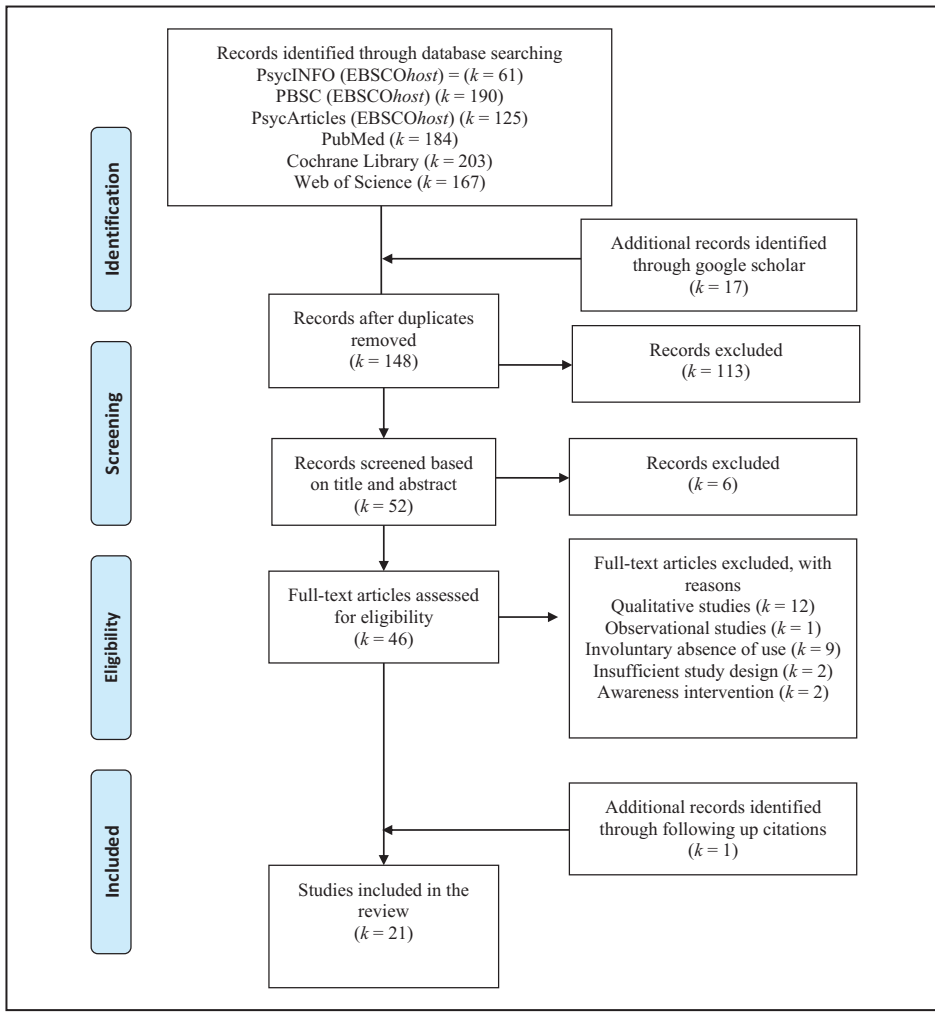


**Figure 1.** PRISMA flow diagram depicting the systematic search process.

3,625 participants were enrolled in all 21 studies, ranging from $n = 15$ to $n = 1{,}095$ participants per study. The average sample size was 173 participants with a $Mdn = 98$ ($n = 104$ [$Mdn = 80$] if excluding studies with more than 500 participants). The vast majority of the studies investigated students as the enrolled sample ($k = 15$). Other studies used non-student opportunity samples ($k = 3$), elite athletes ($k = 1$), or Instagram ($k = 1$) or Facebook users ($k = 2$).

## *Descriptive results according to the first research question*

Table 1 presents the summary of all studies reviewed in this paper (for a detailed overview of the findings, including effect sizes, please see Supplemental 3).

**Table 1.** Studies' characteristics and results.

| Study | Sample | Design | Digital detox: Duration[1] Content to disconnect from Type of assessment[2] | Main outcome variable(s) (Type of assessment) | Main findings | Categorization of results |
|---|---|---|---|---|---|---|
| Anrijs et al., 2018 Belgium | $N = 15$ Students (Female $n = 10$) | Baseline 1 week – followed by a one-week intervention | • 1 week<br>• Smartphone usage<br>• App-based measurement of usage time | • App use (mobileDNA app)<br>• Stress (Skin conductance response rate Imec Chillband) | • App events lower during intervention days<br>• Skin conductance response rate was higher during normal days than during intervention | + |
| Brown & Kuss, 2020 United Kingdom | $N = 61$ Opportunity sample (Female $n = 41$) | Baseline 7 days – followed by a 7-day intervention | • 7 days<br>• Social media<br>• App-based measurement of usage time | • Smartphone use (Screen Time app, ActionDash or Tracky app)<br>• FoMO<br>• Mental well-being (MWB)<br>• Social connectedness (SC) | • Decrease in smartphone use after abstinence<br>• Decrease in perceived FoMO scores after abstinence<br>• Increase in perceived MWB scores after abstinence<br>• Increase in perceived SC scores after abstinence | + |
| Dunican et al., 2017 Australia | $N = 23$ Elite judo athletes (Female $n = 11$) | Pre-test – followed by a 2-day intervention period, test at first and second day of the intervention – Post-test | • 48 hours<br>• All electronic devices<br>• Removal of all electronic devices | • Cognitive performance (Cogstate research tool)<br>• Physical performance (SL-THT)<br>• Sleep (Actigraph) | • Speed of performance and errors, as well as performance in distance were unchanged during intervention in the device restricted group<br>• No difference in any sleep measure between groups | no effect |
| Eide et al., 2018 Norway | $N = 127$ Mostly students (Female $n = 92$) | Pre-test – followed by a 4-day intervention period | • 72 hours<br>• Smartphone usage<br>• Smartphone stored in a locked cabinet | • Withdrawal symptoms (Smartphone Withdrawal Scale)<br>• FoMO<br>• PANAS | • Smartphone restriction provokes psychological withdrawal symptoms compared to the CG<br>• FoMO scores were significantly higher for the restricted condition, compared to the CG<br>• Restriction was not related with positive or negative affect | −, no effect |
| Fioravanti et al., 2019 Italy | $N = 80$ Instagram users (Female $n = 40$) | Pre-test – followed by a 1-week intervention period – Post-test | • 1 week<br>• Instagram | • Life satisfaction (Satisfaction with Life Scale)<br>• PANAS | • Women in EG reported significantly higher post-test satisfaction with life levels; no effect in CG and no effect for men<br>• Women in the EG reported significantly higher post-test positive affect scores<br>• Effect of TimeXGroup on positive affect was only significant among those who scored above the median on the Social Comparison Appearance Scale | + |
| Hall et al., 2019 United States of America | $N = 130$ Community and student participants (Female $n = 102.5$) | Daily diaries during the 28 days of the intervention period | • 1–4 weeks<br>• Social media use | • Loneliness<br>• Affective well-being (SF-36)<br>• Quality of day (Quality of Life Measure) | • The duration of abstinence was not associated with change in outcomes<br>• Loneliness, affective well-being, quality of day did not differ before compared to after periods of abstinence | no effect |
| Hanley et al., 2019 Australia | $N = 78$ Opportunity sample (Female $n = 43$) | Baseline 1 week – followed by a one-week intervention | • 1 week<br>• Social network sites<br>• App-based measurement of usage time | • Life satisfaction (Quality of Life Enjoyment and Satisfaction Questionnaire-18)<br>• PANAS | • No effect on life satisfaction<br>• Positive affect decreased from T1 to T2 for more active users in the EG compared to passive users<br>• Interaction of EG and use style on negative affect<br>• Negative affect increased in EG compared to active users | −, no effect |

*(Continued)*

**Table 1.** (Continued)

| Study | Sample | Design | Digital detox: Duration[1] Content to disconnect from Type of assessment[2] | Main outcome variable(s) (Type of assessment) | Main findings | Categorization of results |
|---|---|---|---|---|---|---|
| Hinsch & Sheldon, 2013 United States of America | *N* = 143 Introductory psychology students (Female *n* = 63) | Baseline –followed by 48-hour intervention period – Follow-up 1 week later | • Individual goal during 48 hours<br>• Facebook | • Use of Facebook<br>• Life satisfaction (Life Scale)<br>• Procrastination (Melbourne Decision Making Questionnaire) | • Significantly less time on Facebook directly after the intervention and 1 week later compared to the baseline<br>• Participants' life satisfaction increased, whereas the level of procrastination decreased from baseline to 48 hours later | + |
| | *N* = 104 University students (Female *n* = 32) | Baseline – followed by 48-hour intervention period – Follow-up 48 hours later | • 48 hours<br>• Facebook | • Use of Facebook<br>• Life satisfaction (Life Scale)<br>• Procrastination (Melbourne Decision Making Questionnaire) | • Participants' life satisfaction increased, and their levels of procrastination decreased between baseline and 48 hours later, as well as between baseline and follow-up | + |
| Hunt et al., 2018 United States of America | *N* = 143 Undergraduate students (Female *n* = 108) | Baseline 1 week – followed by a three-week intervention period – Follow-up 1 month later | • 10 minutes per day per platform across 3 weeks<br>• Social network sites<br>App-based measurement of usage time | • Social support (ISEL)<br>• FoMO<br>• Loneliness (UCLA Loneliness Scale)<br>• Anxiety (STAI-S)<br>• Depression (BDI-II)<br>• Self-Esteem (Rosenberg Self-Esteem Scale)<br>• Well-being (PWB) | • EG used less social media than the CG<br>• EG scored significantly lower on the Loneliness Scale compared to CG<br>• In EG clinically significant declines in depressive symptoms<br>• No difference between EG and CG for social support, fear of missing out, anxiety, self-esteem, and psychological wellbeing | + |
| Ko et al., 2015 Korea | *N* = 62 Students (Female *n* = 20) | Baseline 1 week baseline assessment – followed by a 2-week intervention period – Follow-up | • 10 minutes – 2 hours per day across 2 weeks<br>• Smartphone usage<br>• App-based measurement of usage time | • Self-efficacy of self-regulation of smartphone use (General Self-Efficacy Scale)<br>• Smartphone Addiction (SAS) | • Participants in group intervention significantly decreased app use, whereas the alone users did not<br>• Participants in the group intervention decreased SAS scores significantly greater than those in the alone group<br>• No significant differences for self-efficacy improvements between the two groups<br>• Participants in the group intervention tended to set longer timeouts than the alone users | +, no effect |
| Liao, 2019 New Zealand [Master thesis] | *N* = 60 Psychology students (Female *n* = 45) | Baseline 1-week baseline assessment – followed by a 2-week intervention period – Follow-up | • 2 weeks<br>• Smartphone usage<br>• App-based measurement of usage time | • Stress (PSS-10)<br>• Depression (CES-D)<br>• Anxiety (HADS)<br>• Flourishing (Flourishing scale)<br>• Self-regulation (Self-Regulation Scale)<br>• Sleep Quality (Pittsburgh Sleep Quality Index) | • Participants in mild and moderate depression symptomology groups significantly reduced their smartphone use<br>• Low group: improvements in self-regulation; no other changes in psychological outcomes<br>• Mild–moderate group: reductions in depression symptoms, perceived stress; improvements in flourishing, and sleep quality; no reductions in anxiety, or improvements in self-regulation<br>• Low anxiety symptomology participants: reduction of smartphone use and increased self-regulation; Mild–moderate anxiety symptoms participants: reduction of anxiety, and improvements in sleep quality | +, no effect |

*(Continued)*

**Table 1.** (Continued)

| Study | Sample | Design | Digital detox: Duration[1] Content to disconnect from Type of assessment[2] | Main outcome variable(s) (Type of assessment) | Main findings | Categorization of results |
|---|---|---|---|---|---|---|
| Sheldon et al., 2011 United States of America | *N* = 98 University students (Female *n* = 33) | Baseline followed by 48-hour intervention period – Follow-up 48 hours later | • 48 hours<br>• Facebook | • Connection (Need Satisfaction Scale)<br>• Disconnection (Need Satisfaction Scale) | • Connection declined during the intervention period, and disconnection was unchanged during this period<br>• Participants who experienced increases in disconnection engaged in more use afterwards | –, no effect |
| Skierkowski & Wood, 2012 United States of America | *N* = 23 Students (Female *n* = 13) | Baseline 5 days – followed by a 3- or 5-day intervention period | • 3 or 5 days<br>• Texting | • Anxiety | • No main effects for the restriction groups on anxiety<br>• No main effect on anxiety for high or low texting use | no effect |
| Stieger & Lewetz, 2018 Germany | *N* = 152 Opportunity sample (Snowball sampling; Female *n* = not indicated) | Baseline: 4 days – followed by a 7-day intervention period – Follow up: 4 days post-intervention | • 7 days<br>Social media use | • PANAS<br>• Boredom<br>• Craving<br>• Social pressure<br>• Social media use | • No significant effect was found on negative affect<br>• Social media use frequency and duration was substantially smaller in the intervention period, whereas social pressure was higher<br>• Participants reported higher levels of boredom and craving in the intervention period | ±, no effect |
| Tromholt, 2016 Denmark | *N* = 1,095 Facebook users (Female *n* = 971.7) | Pre-test – followed by a one-week intervention period – Post-test | • 1 week<br>• Facebook | • Life satisfaction<br>• Depression (CES-D)<br>• PANAS | • Participants in the EG reported higher life satisfaction compared to CG<br>• Participants in the EG reported higher levels of positive emotions compared to the CG<br>• Heavy Facebook users experienced greatest effect on well-being<br>• Participants who reported to feel high Facebook envy had a significant effect on well-being<br>• Greater effect on well-being for people using Facebook passively | + |
| Turel & Cavagnaro, 2019 United States of America | *N* = 415 University students (Female *n* = 186) | Pre-test – followed by a 1-week intervention period – Post-test | • 1 week<br>• Facebook | • Time distortion (Ratio of estimated time over actual time for completing the survey) | • The growth in time distortion was much more pronounced in the EG than in the CG<br>• In both groups the low-risk cluster presented a significant downward time distortion | – |
| Turel et al., 2018 United States of America | *N* = 555 University students (Female *n* = 238) | Pre-test – followed by a 1-week intervention period – Post-test | • 1 week<br>• Facebook | • Stress (PSS-10)<br>• Grade point average | • Experimental group reported a significantly larger absolute decrease in stress compared to the control group<br>• No significant difference regarding relative stress reduction<br>• Interaction of treatment and SNS use type: Stress reduction for excessive SNS users larger in the experimental group compared to typical users. No difference in the control group<br>• No effect of the stress reduction on grade point average | +, no effect |

*(Continued)*

**Table 1.** (Continued)

| Study | Sample | Design | Digital detox: Duration[1] Content to disconnect from Type of assessment[2] | Main outcome variable(s) (Type of assessment) | Main findings | Categorization of results |
|---|---|---|---|---|---|---|
| Vally & D'Souza, 2019 United Arab Emirates | *N* = 78 University students (Female *n* = 41) | Pre-test – followed by a 7-day intervention period – Post-test | • 7 days<br>• Social media use | • Stress (PSS)<br>• Well-being (SWLS)<br>• PANAS<br>• Loneliness (SELSA-S) | • Participants in the EG reported lower levels of subjective well-being compared to the CG<br>• Participants in the EG reported higher levels of negative affect compared to the CG<br>• No significant difference was found for positive affect or perceived stress (despite a decline in the experimental group)<br>• No moderating effect regarding use frequency or active/passive use was found | –, no effect |
| Vanman et al., 2018 Australia | *N* = 138 Active Facebook users (Female *n* = 54) | Pre-test – followed by a 5-day intervention period – Post-test | • 5 days<br>• Facebook | • Stress (PSS)<br>• Well-being (SWLS)<br>• PANAS<br>• Loneliness (SELSA-S)<br>• Cortisol measure | • Participants in the EG reported more negative words, compared to the CG regarding the anticipation of the next five days<br>• EG reported lower life satisfaction over time<br>• No effect of the intervention on perceived stress, PANAS, and SELSA-S<br>• EG showed a decline in cortisol levels compared to the CG | ±, no effect |
| Wilcockson et al., 2019 United Kingdom | *N* = 45 Psychology students (Female *n* = 14.85) | Baseline 1 week before plus directly before the timeout – followed by 24-hour intervention period – a third and fourth Post-test | • 24 hours<br>• Smartphone usage<br>• Smartphone secured in a plastic bag | • Mood (BMIS)<br>• Anxiety (STAI-6)<br>• Craving (Adapted: Desire of Alcohol Questionnaire) | • No significant main effect of session on mood or anxiety<br>• A significant main effect of session was observed on craving. Craving was highest directly after the smartphone abstinence | –, no effect |

Note. EG = Experimental group; CG = Control group; BDI-II = Beck Depression Inventory; BMIS = Brief Mood Introspection Scale; CASP = Diagnostic Analysis of Nonverbal Behavior and the Child and Adolescent Social Perception Measure; CES-D = Center for Epidemiologic Studies Depression Scale; FoMO = Fear of Missing Out Scale; HADS = Hospital Anxiety and Depression Scale; ISEL = Interpersonal Support and Evaluation List; MWB = Warwick-Edinburgh MWB Scale; PANAS = Positive and Negative Affect Schedule; PSS(-10) = Perceived Stress Scale; PWB = Ryff Psychological Well-Being Scale; RAT = Remote Associates Test; SAS = Smartphone Addiction Scale; SC = Social Connectedness Scale –Revised; SELSA-S = Social and Emotional Loneliness Scale; SF-36 = Short Form Health 36; SL-THT = Single Leg Three Hop Test; STAI = Spielberger State-Trait Anxiety Inventory (S = Short; 6 = Six); SWLS = Satisfaction with Life Scale; [1]If not mentioned otherwise, the digital detox intervention was instructed for the complete duration of the intervention period. [2]If not mentioned otherwise, it was not assessed whether participants followed the instruction of the digital detox intervention in terms of time. + = positive effects of digital detox; − = negative effects of digital detox; ± = positive and negative effects of digital detox.

*Content that individuals disconnect from.* Most of the studies investigated digital detox interventions regarding SNS ($k = 13$), mainly Facebook ($k = 6$), Instagram ($k = 1$), social media use in general ($k = 4$), or the most prominent SNS ($k = 2$). Only one study examined texting. Furthermore, several studies examined timeouts from smartphones ($k = 5$) or from all electronic devices, including smartphones ($k = 1$).

*Duration of the timeout.* The range of the instructed detox duration was from 24 hours to four weeks. Most of the studies investigated a separation from digital devices or specific subsets of use one week long ($k = 9$). A total of $k = 7$ studies examined intervention periods that were shorter than one week, particularly 24 hours, 48 hours, or three to five days. In contrast, $k = 4$ studies examined longer breaks.

*Studies' quality.* All selected studies included interventions conducted in the field. Of the 21 studies, 12 were randomized controlled trials (Eide et al., 2018; Fioravanti et al., 2019; Hall et al., 2019; Hanley et al., 2019; Hunt et al., 2018; Ko et al., 2015; Skierkowski & Wood, 2012; Tromholt, 2016; Turel & Cavagnaro, 2019; Turel et al., 2018; Vanman et al., 2018; Vally & D'Souza, 2019), from which 10 studies also reported a pre- and post-intervention measurement of the variables. The remaining eight non-randomized controlled trials all had pre- and post-intervention measurements.

Furthermore, studies' quality was evaluated according to a tool by Kmet et al. (2004). Overall, none of the studies was below the cut-off point of 55% and $k=6$ studies were above the 75% cut-off point.

## Findings according to our main research questions

According to the main research question, the effectiveness of the digital detox interventions is presented in a structured overview according to the categories: duration of use, performance, self-control, health and well-being, and social relationships.

## Duration of use

Six studies used a device-based measurement of the smartphone use (Anrijs et al., 2018; Ko et al., 2018; Liao, 2019) or SNS/IM use (Brown & Kuss, 2020; Hanley et al., 2019; Hunt et al., 2018). Applications such as ActionDash, Moment, Quality Time, Rescue Time, Screen Time, and Tracky were used. Three other studies used self-reports to measure changes in time spent on social media (Hinsch & Sheldon, 2013, study 1 and 2; Stieger & Lewetz, 2018). Overall, all studies reported a significant decrease in smartphone or app use with medium effect sizes during intervention days or after the intervention compared with pre-intervention days and/or a control group.

## Performance

*Cognitive and physical performance.* Only three studies investigated performance outcomes. As shown by Dunican et al. (2017), no significant effect from a digital detox intervention was found on cognitive and physical performance among judo athletes

compared with a control group. In the same vein, Turel et al. (2018) found no effect from abstinence from SNS on grade point averages, but Turel and Cavagnaro (2019) demonstrated that participants who abstained from using Facebook for over a week had higher time-distortion estimates compared with a control group when they had to estimate the time they needed to complete the survey. Participants with lower risk for social media addiction indicated a downward time distortion, whereas participants high at risk for social media addiction showed an upward distortion.

## *Self-control*

*Self-regulation.* A study by Liao (2019) examined self-regulation in attention control after a two-week digital detox intervention period. Participants with low depression and anxiety symptoms showed an increase in their self-regulation skills, and the effect sizes were large. Another study (Ko et al., 2015) that investigated self-efficacy of self-regulation in smartphone use found no improvements compared with a control group.

*Procrastination.* Two studies from Hinsch and Sheldon (2013) showed that a reduction/cessation of Facebook use resulted in a decrease of procrastination directly after the intervention and at a 48-hour follow-up.

## *Health and well-being*

*Sleep.* Sleep was assessed in two studies (Dunican et al., 2017; Liao, 2019). While Liao's (2019) measured sleep quality using the Pittsburgh Sleep Quality Index (Buysse et al., 1989), Dunican et al.'s (2017) used a device-based measurement, the ActiGraph, to assess sleep quality. While Dunican et al. (2017) found no effects on sleep quality, Liao (2019) reported that people with mild-to-moderate anxiety and depression symptoms improved their sleep quality with medium to large effect sizes.

*Life satisfaction.* Eight studies examined the effect from digital detox interventions on life satisfaction (Hanley et al., 2019; Fioravanti et al., 2019; Hall et al., 2019; Hinsch & Sheldon, 2013, study 1 and 2; Tromholt, 2016; Vanman et al., 2018; Vally & D'Souza, 2019). Most of the studies used the Satisfaction With Life Scale (SWLS; Diener et al., 1985). Two of the studies found no effect from timeouts from SNS on life satisfaction (Hanley et al., 2019; Hall et al., 2019), whereas two studies observed a decrease in life satisfaction as a result of detox interventions (Vanman et al., 2018; Vally & D'Souza, 2019). In contrast, four studies found an increase in life satisfaction after taking a break from SNS use (Hinsch & Sheldon, 2013, study 1 and 2; Fioravanti et al., 2019; Tromholt, 2016), although one study could confirm this finding only for women. Effect sizes were small to moderate.

### *Subjective well-being*

*Affect.* Seven studies assessed the effect from digital detox interventions on affect (Eide et al., 2018; Fioravanti et al., 2019; Hall et al., 2019; Hanley et al., 2019; Stieger & Lewetz, 2018; Tromholt, 2016; Vanman et al., 2018; Vally & D'Souza, 2019).

All studies except those from Hall et al. (2019) used the Positive and Negative Affect Schedule (PANAS) (Watson et al., 1988). Most of the studies reported no effect on either positive or negative affect, but two studies (Hanley et al., 2019; Vally & D'Souza, 2019) found that participants after a digital detox intervention reported higher negative affect compared with a control group. Only two studies found beneficial effects from a break from Facebook (Tromholt, 2016) or Instagram (only valid for women) (Fioravanti et al., 2019) on affect.

*Mood.* One study (Wilcockson et al., 2019) focused on mood by utilizing the Brief Mood Introspection Scale (BMIS) (Mayer & Gaschke, 1988). No effect from the 24-hour digital detox intervention on mood was found.

*Mental and psychological well-being.* A study by Brown and Kuss (2020) investigated mental well-being using the Warwick-Edinburgh MWB Scale (WEMWBS; Tennant et al., 2007). A medium effect from the seven-day digital detox intervention through an increase in mental well-being was observed, corresponding with results by Liao (2019) showing that participants with mild–moderate depression symptoms reported improvements in flourishing after a smartphone-use reduction period. In contrast, a study by Hunt et al. (2018) found no effect from their digital detox intervention on psychological well-being.

*Boredom.* One study (Stieger & Lewetz, 2018) found that a social media abstinence period of seven days led to higher boredom levels.

*Anxiety.* Four studies (Hunt et al., 2018; Liao, 2019; Skierkowski & Wood, 2012; Wilcockson et al., 2019) examined anxiety using the State and Trait Anxiety Inventory (STAI) (Spielberger et al., 1970) or the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). Only one study (Liao, 2019) found a decrease in anxiety for participants with mild–moderate anxiety symptoms after the intervention compared with the baseline assessment, whereas the other three studies found no effect.

*Stress.* Five studies investigated the effect from a detox intervention on stress (Anrijs et al., 2018; Liao, 2019; Turel et al., 2018; Vanman et al., 2018; Vally & D'Souza, 2019). Four of the studies used the Perceived Stress Scale (PSS) (Cohen et al., 1983), whereas one study also measured cortisol levels (Vanman et al., 2018). The study by Anrijs et al. (2018) measured skin-conductance response rate. Whereas two studies found no effect from a digital detox intervention on perceived stress (Vanman et al., 2018; Vally & D'Souza, 2019), the other three studies found a significant decrease in perceived stress (Liao, 2019; Turel et al., 2018), cortisol level (Vanman et al., 2018), and skin-conductance rate (Anrijs et al., 2018) with medium to large effect sizes. However, one study found a significant reduction in perceived stress only among participants with mild–moderate depression symptomology (Liao, 2019). Furthermore, it was found that excessive users of SNS benefited from abstinence to a larger degree compared with typical users of SNS (Turel et al., 2018).

*Depression.* Three studies (Hunt et al., 2018; Liao, 2019; Tromholt, 2016) measured the effect from a digital detox intervention on depression. All three studies found a significant decline in depression symptoms after a break from social media use or smartphone use in general.

*Addiction.* Only one study measured the effect from a timeout from smartphone use on smartphone addiction (Ko et al., 2015). It was shown that participants' smartphone addiction scores decreased after a two-week-long group digital detox intervention compared with an individual digital detox intervention. Furthermore, three studies investigated withdrawal symptoms in relation to a digital detox intervention. As shown by all three studies, symptoms of craving and withdrawal significantly increased during and after abstinence from smartphone or SNS use (Eide et al., 2018; Stieger & Lewetz, 2018; Wilcockson et al., 2019).

## *Social relationship*

*Fear of missing out.* Three studies (Brown & Kuss, 2020; Eide et al., 2018; Hunt et al., 2018) examined fear of missing out (FoMO) using the FoMO scale (Przybylski et al., 2013). While one study found no effect from a smartphone limitation on FoMo scores compared with a control group (Hunt et al., 2018), the two other studies revealed contrary findings. Eide et al. (2018) found an increase in FoMO scores, whereas Brown and Kuss (2020) reported a medium effect from the digital detox intervention on FoMO score reduction.

*Social connectedness.* Two studies focused on social connectedness (Brown & Kuss, 2020; Sheldon et al., 2011) while investigating the effect from digital detox. The intervention from Brown and Kuss (2020) that examined a one-week abstinence from social media use showed a small to medium effect on the increase in social connectedness. Conversely, Sheldon et al. (2011) noted a decrease in feelings of relatedness after a 48-hour abstinence from Facebook. Participants who experienced a larger increase in disconnection engaged in more Facebook use afterward.

*Loneliness.* Loneliness was captured in four studies (Hall et al., 2019; Hunt et al., 2018; Vanman et al., 2018; Vally & D'Souza, 2019) with mostly different scales. One study (Hunt et al., 2018) found a decrease in loneliness compared with a control group, whereas another study (Vally & D'Souza, 2019) found an increase in loneliness. The other two studies reported no effect from the digital detox intervention on loneliness.

*Social support and social pressure.* Two studies investigated social support (Hunt et al., 2018) and social pressure (Stieger & Lewetz, 2018) based on a timeout from social media use. While no effect from social media abstinence was found on social support (Hunt et al., 2018), Stieger and Lewetz (2018) showed that participants reported higher social pressure during social media abstinence compared with the pre-intervention measurement.

## Discussion

This systematic review provides a synthesis of existing evidence of associations between digital detox and different outcomes, e.g., time of use, performance, self-control, health and well-being, and social relationships. Generally, our review shows that the results across the studies and the different outcomes are quite diverse. Even though a few more studies revealed positive, rather than negative, consequences from digital detox interventions, most of the studies showed either no effects or mixed findings regarding digital detox efficacy. These diverse and contradictory findings are equally evident across randomized controlled trials and non-randomized controlled trials, as well as across studies with different sample sizes. Furthermore, diverse findings are also observable across studies with similar digital detox intervention periods and subsets of smartphone use the individuals disconnected from. However, in reviewing the various outcomes, it becomes apparent that there are some outcomes for which there appear to be consistent findings. It was demonstrated that the duration of smartphone or SNS/IM use decreased during the intervention period. Furthermore, all three studies that investigated depression symptoms found a decline in such symptoms after a digital detox intervention. Nevertheless, no effect across studies was found consistently among cognitive and physical performance measures after a digital detox intervention. For all other presented outcomes in this review, the included studies revealed mixed and contradictory findings. Thus, the answer to our main research question of whether digital detox interventions are effective in improving outcomes such as duration of use, performance, self-control, health and well-being, or social relationships is that *mixed findings exist*, but no clear answer can be given yet.

### *Explanation of the findings*

We identified several possible reasons for inconsistent findings. First, wide variety in the implementation of digital detox interventions was found. For example, some studies (e.g., Ko et al., 2015; Turel & Cavagnaro, 2019) allowed participants to define individual goals about the length of the timeout or to interrupt the timeout earlier than planned, whereas other studies (e.g., Eide et al., 2018; Sheldon et al., 2011) instructed a complete separation from the use of smartphones or certain apps. Although both approaches have their justifications, the different instructions for the digital timeouts can lead to different findings regarding outcomes. Second, not all studies used the same measurements to assess the same outcomes. For example, life satisfaction was measured using the Satisfaction With Life Scale (Diener et al., 1985), Quality of Life Enjoyment and Satisfaction Questionnaire (Endicott et al., 1993), or other unspecified scales. Thus, the findings might differ due to different assessments, but a large number of studies used the same scales to measure affect, depression, and anxiety. Third, the studies differed in terms of measurement time points. Some studies assessed the change in outcomes during the intervention, whereas others assessed change after the intervention with different time spans (e.g., directly after the intervention or one week later). Furthermore, only a few studies included follow-up measurements (e.g., Hunt et al., 2018). Thus, it remains unclear whether the effects are valid only during the digital detox intervention,

immediately after the intervention, short term, or long term. A fourth reason that needs attention is the fact that the studies differed in terms of their samples. Next to a large deviation in sample sizes, the sample types were quite diverse across the studies, even though most of the studies used student samples. Future research should investigate digital detox interventions in large-scale studies with the general population (cf. Dienlin & Johannes, 2020). In addition, some studies distinguished between participants with higher and lower (smartphone/SNS/IM) addiction scores and higher and lower depression scores, whereas other studies did not. By doing so, the advantage is to identify for whom the intervention is effective. Thus, future research should focus on possible moderating variables – e.g., gender, or usage frequency – and triggers to use smartphones/SNS/IM to get more insight on which digital detox intervention might be beneficial or harmful for whom.

### *Limitations of the studies included in this review and recommendations for future research*

Several limitations in the included studies in this review need to be mentioned that also might explain the findings, as only six of the 21 studies had a high quality according to criteria suggested by Kmel et al. (2004). One limitation in most of the studies is the lack of device-based measurements of smartphone and SNS/IM use that would allow for reliable assessments of the duration of usage (cf. Dienlin, & Johannes, 2020; Orben & Przybylski, 2019b). Furthermore, it would be helpful to measure physiological indicators of health-related outcomes, such as the skin-conductance response rate (cf. Anrijs et al., 2018), as a stress indicator. Thus, future research needs to incorporate device-based measurements. Another limitation belongs to the aspect of compensatory behaviors during the digital detox intervention. Most studies did not control whether participants used other electronic devices instead of their smartphones or switched to other SNS/IM use during the separation phase. However, this is of great importance to derive the right conclusions from the digital detox interventions. Most studies included in our review had rather small sample sizes with non-representative samples. Furthermore, not all studies were randomized controlled trials. As a consequence, the studies' internal validity needs be considered with caution, as it is most likely that not all confounding variables have been controlled for. A possible solution would be to use laboratory studies (e.g., Clayton et al., 2015; Schmidt et al., 2018; Turgeman et al., 2020), though laboratory studies might confound ecological validity, especially when considering variety and diversity in everyday smartphone use. In addition, in all these laboratory experiments, the smartphone was taken away from the participants upon presentation of a cover story. Thus, apart from the lack of external validity, intention to take a smartphone break or reduce SNS/IM use is not considered. Therefore, it is highly recommended to investigate the effect from digital detox interventions with (a) large sample sizes, (b) randomized controlled field experiments, (c) valid measurements like device-based assessments, (d) long-term intervention periods, and (e) short- and long-term follow-ups. Overall, more high-quality research on the consequences of digital detox interventions is needed, as only a few studies per outcome exist, as can be seen in the results section. In addition, only three studies (Hinsch

& Sheldon, 2013; Skierkowski & Wood, 2012; Turel et al., 2018) investigated possible mediators of the effect from digital detox intervention on examined outcomes. This is essential for deriving conclusions as to why digital detox interventions might be beneficial or harmful. Examples of possible mediators could be procrastination, withdrawal symptoms, or social support. Corresponding with this, the timeout duration should be investigated systematically, as this factor might allow for a distinction between beneficial and harmful digital detox interventions as well. In line with this, it is also needed to check whether participants implement digital detox interventions as instructed and how long each timeout is. In our review, only three studies (Dunican et al., 2017; Eide et al., 2018; Wilcockson et al., 2019) placed the electronic devices, e.g., in a locked cabinet to ensure full adherence to the digital detox intervention. The other studies did not measure the duration of the timeout even though six studies used a device-based measurement. However, these studies focused on the duration of the smartphone or SNS/IM usage which can be only regarded as a proxy of the timeout itself.

Next to the rather methodological aspects for future research, one important conceptual issue regarding the definition of *digital detox* should be taken into account. From our perspective, the current definition needs to be extended in terms of the hierarchical computer-mediated communication taxonomy (Meier & Reinecke, 2020). Digital detox should not only refer to a time period during which a person refrains from using electronic devices, but also to time periods during which a person does not engage in certain types of applications, branded media, special features, interactions, and/or messages. This is also in line with the definitions used in the studies included in this review. Across the 21 studies different terms are used like "removal of electronical devices" (Dunican et al., 2017), "smartphone/Facebook restrictions" (e.g., Eide et al., 2018), "vacation from Facebook" (Hanley et al, 2019), or "abstinence from Facebook/social media" (e.g., Hall et al., 2019). In line with the definition of Anrijs et al. (2018) we further recommend to add the terms "voluntary/intentional abstinence" to the definition of digital detox (see the introduction section for reasons). However, it needs to be mentioned that most of the studies included in this review did not present a definition of digital detox. Therefore, a stronger conceptual and theoretical embedding of digital detox (interventions) is necessary. Corresponding with this, another aspect of future research could be the focus on digital detox interventions that emphasize a healthy way of using the smartphone, instead of discouraging the use of smartphones (cf. Buctot et al., 2018; Keller et al., 2021), as this might be more realistic in everyday life, because the smartphone is and will remain people's daily companion.

### *The systematic review's strengths and limitations*

This review provides information for research and practitioners about digital detox interventions' efficacy. Furthermore, we discussed implications for the definition of *digital detox* and provided a conceptual framework for future research. Aside from these strengths, limitations in this review also need to be mentioned. The first is the wide variety of terms used in studies that investigate a timeout from smartphone/SNS/IM use. Studies used alternative terms, and it could be the case that some studies might have been missed because we have not included the term in our literature search. This might be the

case for specific social media platforms (e.g., TikTok) or terms that describe a timeout from smartphone or social media use (e.g., a year without such media). However, it is not feasible to account for all possible synonymous terms in the literature search. Another limitation is the focus on smartphone use in general and SNS/IM use. As the smartphone could be used for other activities – e.g., gambling, or dating – our findings might result in an incomplete picture of digital detox interventions. However, considering that SNS/IM use is the most widespread use for the smartphone, our review covers a wide range of behavior. Furthermore, study selection may have been skewed, as only studies published in English were included. Therefore, the results can be transferred only to the Western world, with no more than two studies from other countries (South Korea and United Arab Emirates).

## Conclusion

This review provides a novel insight into the associations between digital detox interventions and different outcomes. It can be concluded that across the included studies, digital detox interventions exert some promising effects on usage itself and on depression symptoms. However, the inconsistent findings regarding other outcomes across all presented studies prevent making a recommendation as to whether to promote or discard digital detox interventions, as positive and counterproductive consequences need to be examined more clearly. Thus, it is recommended that more investment in empirical high-quality research be implemented to understand under which circumstances digital detox is helpful and for whom. Thus, potential moderating and mediating variables need to be examined in the future – including for the duration of the digital detox period, the level of smartphone addiction, or the level of technology-related stress – before the utility of digital detox interventions can be determined adequately.

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### Contribution

TR designed the study. All authors contributed to the systematic search and data extraction, as well as the interpretation of the data. Furthermore, all authors helped draft, write, and revise the paper, as well as approve the manuscript.

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## Supplemental material

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## References

Addo, A. (2013). The adoption of mobile phone: How has it changed us socially? *Issues in Business Management and Economics*, *1*(3), 47–60.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Association.

Amez, S., & Baert, S. (2020). Smartphone use and academic performance: A literature review. *International Journal of Educational Research*, *103*, 101618. https://doi.org/10.1016/j.ijer.2020.101618

Anrijs, S., Bombeke, K., Durnez, W., Van Damme, K., Vanhaelewyn, B., Conradie, P., . . . De Marez, L. (2018). MobileDNA: Relating physiological stress measurements to smartphone usage to assess the effect of a digital detox. In C. Stephanidis (Ed.), *HCI International 2018 – Posters' Extended Abstracts*. Las Vegas, NV, USA.

Brown, L., & Kuss, D. J. (2020). Fear of missing out, mental wellbeing, and social connectedness: A seven-day social media abstinence trial. *International Journal of Environmental Research and Public Health*, *17*(12), 4566. https://doi.org/10.3390/ijerph17124566

Buctot, D. B., Kim, N., & Park, K. E. (2018). Development and evaluation of smartphone detox program for university students. *International Journal of Contents, 14*. https://doi.org/10.5392/IJoC.2018.14.4.001

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research*, *28*(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4

Chun, J. (2018). Conceptualizing effective interventions for smartphone addiction among Korean female adolescents. *Children and Youth Services Review*, *84*, 35–39. https://doi.org/10.1016/j.childyouth.2017.11.013

Clayton, R. B., Leshner, G., & Almond, A. (2015). The extended iSelf: The impact of iPhone separation on cognition, emotion, and physiology. *Journal of Computer-Mediated Communication*, *20*, 119–135. https://doi.org/10.1111/jcc4.12109

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, *20*, 37–46. https://doi.org/10.1177/001316446002000104

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*(4), 385–296. https://doi.org/10.2307/2136404

Collier, R. (2009). Virtual detox: Inpatient therapy for Internet addicts. *Canadian Medical Association Journal*, *181*, E193-E194. https://doi.org/doi:10.1503/cmaj.109-3051

Costa, S., & Kuss, D. J. (2019). Current diagnostic procedures and interventions for gaming disorders: A systematic review. *Frontiers in Psychology*, *10*, 578. https://doi.org/10.3389/fpsyg.2019.00578

Demirci, K., Akgonul, M., & Akpinar, A. (2015). Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. *Journal of Behavioral Addictions*, *4*, 85–92. https://doi.org/doi:10.1556/2006.4.2015.010

Dickinson, J. E., Hibbert, J. F., & Filimonau, V. (2016). Mobile technology and the tourist experience: (Dis)connection at the campsite. *Tourism Management*, *57*, 193–201.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Dienlin, T., & Johannes, N. (2020). Digital technology use and adolescent well-being. *Dialogues in Clinical Neuroscience*, *22*, 135–142. https://doi.org/doi:10.31887/DCNS.2020.22.2/tdienlin

Duke, É., & Montag, C. (2017). Smartphone addiction, daily interruptions and self-reported productivity. *Addictive Behaviors Reports*, *6*, 90–95. https://doi.org/10.1016/j.abrep.2017.07.002

Dunican, I. C., Martin, D. T., Halson, S. L., Reale, R. J., Dawson, B. T., Caldwell, J. A., . . . Jones, M., & Eastwood, P. R. (2017). The effects of the removal of electronic devices for 48 hours on sleep in elite judo athletes. *The Journal of Strength & Conditioning Research*, *31*(10), 2832–2839. https://doi.org/doi:10.1519/JSC.0000000000001697.

Eide, T. A., Aarestad, S. H., Andreassen, C. S., Bilder, R. M., & Pallesen, S. (2018). Smartphone restriction and its effect on subjective withdrawal related scores. *Frontiers in Psychology*, *9*. https://doi.org/doi:10.3389/fpsyg.2018.01444

Endicott, J., Nee, J., Harrison, W., & Blumenthal, R. (1993). Quality of life enjoyment and satisfaction questionnaire: A new measure. *Psychopharmacology Bulletin*, *29*(2), 321.

Felix, L., & Dean, B. (2012). *Our story, 2 decades in the making*. https://www.digitaldetox.com/our-story

Fioravanti, G., Prostamo, A., & Casale, S. (2019). Taking a short break from Instagram: The effects on subjective well-being. *Cyberpsychology, Behavior, and Social Networking*. https://doi.org/10.1089/cyber.2019.0400

Hall, J. A., Xing, C., Ross, E. M., & Johnson, R. M. (2019). Experimentally manipulating social media abstinence: results of a four-week diary study. *Media Psychology*. https://doi.org/10.1080/15213269.2019.1688171

Hanley, S. M., Watt, S. E., Coventry, W., & Jankowski, J. (2019). Taking a break: The effect of taking a vacation from Facebook and Instagram on subjective well-being. *Plos One*, *14*(6), e0217743.

Hardcastle, S. J., Hancox, J., Hattar, A., Maxwell-Smith, C., Thøgersen-Ntoumani, C., & Hagger, M. S. (2015) Motivating the unmotivated: How can health behavior be changed in those unwilling to change? *Frontiers in Psychology*, *6*, 835. https://doi.org/doi:10.3389/fpsyg.2015.00835

Hinsch, C., & Sheldon, K. M. (2013). The impact of frequent social internet consumption: Increased procrastination and lower life satisfaction. *Journal of Consumer Behaviour*, *12*, 496–505. https://doi.org/doi:10.1002/cb.1453

Hunt, M. G., Marx, R., Lipson, C., & Young, J. (2018). No more FOMO: Limiting social media decreases loneliness and depression. *Journal of Social and Clinical Psychology*, *37*, 751–768. https://doi.org/doi:10.1521/jscp.2018.37.10.751

İNal, E. E., Demİrcİ, K., ÇetİntürK, A., Akgönül, M., & Savaş, S. (2015). Effects of smartphone overuse on hand function, pinch strength, and the median nerve. *Muscle & Nerve*, *52*(2), 183–188. https://dx.doi.org/10.1002/mus.24695

Jorge, A. (2019). Social media, interrupted: Users recounting temporary disconnection on Instagram. *Social Media + Society*. https://doi.org/10.1177/2056305119881691

Keller, J., Roitzheim, C., Radtke, T., Schenkel, K., & Schwarzer, R. (2021). Effects of an app-based intervention on problematic smartphone use: Randomized controlled trial. *JMIR Preprints*. https://preprints.jmir.org/preprint/26397

King, D. L., Delfabro, P. H., Yim Dho, Y., Wu, A. M. S., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2018). Policy and prevention approaches for disordered and hazardous gaming and internet use: An international perspective. *Preventive Science*, *19*, 233–249. https://doi.org/10.1007/s11121-017-0813-1

Kmet, L. M., Lee, R. C., & Cook, L.S. (2004). *Standard quality assessment criteria for evaluating primary research papers from a variety of fields*. Alberta Heritage Foundation for Medical Research (AHFMR). http://www.ihe.ca/advanced-search/standard-quality-assessment-criteria-for-evaluating-primary-research-papers-from-a-variety-of-fields

Ko, M., Yang, S., Lee, J., Heizmann, C., Jeong, J., Lee, U., Shin, D., Yatani, K., Song, J., & Chung, K. (2015, March 14-18). *NUGU: A group-based intervention app for improving self-regulation of limiting smartphone use* [Conference presentation]. 18th ACM Conference, Vancouver, BC, Canada. https://doi.org/10.1145/2675133.2675244

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine*, *15*(2), 155-163. https://doi.org/10.1016/j.Jcm.2016.02.012

Kuntsman, A., & Miyake, E. (2016). *Paradoxes of digital dis/engagement: A follow up study (businesses and services)*. Working Papers of the Communities & Culture Network, ISSN 2052–7268

Lepp, A., Barkley, J. E., & Karpinski, A. C. (2014). The relationship between cell phone use, academic performance, anxiety, and satisfaction with life in college students. *Computers in Human Behavior*, *31*, 343–350. https://doi.org/doi:10.1016/j.chb.2013.10.049

Lepp, A., Barkley, J. E., Sanders, G. J., Rebold, M., & Gates, P. (2013). The relationship between cell phone use, physical and sedentary activity, and cardiorespiratory fitness in a sample of U.S. college students. *The International Journal of Behavioral Nutrition and Physical Activity*, *10*, 79. https://doi.org/doi:10.1186/1479-5868-10-79

Liao, W. (2019). *Put your smartphone down: Preliminary evidence that reducing smartphone use improves psychological well-being in people with poor mental health* [Unpublished master thesis]. University of Otago.

Markowetz, A. (2015). *Digitaler Burnout. Warum unsere permanente Smartphone Nutzung gefährlich ist* [Digital burnout: Why our permanent smartphone use is dangerous]. München: Droemer HC.

Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality and Social Psychology*, *55*, 102–111.

McDaniel, B. T., & Radesky, J. S. (2018). Technoference: Parent distraction with technology and associations with child behavior problems. *Child Development*, *89*(1), 100–109. https://doi.org/10.1111/cdev.12822

Meier, A., & Reinecke, L. (2020). Computer-mediated communication, social media, and mental health: A conceptual and empirical meta-review. *Communication Research*. https://doi.org/10.1177/0093650220958224

Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J., & Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically-clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, *46*, 81–95. https://doi.org/10.1007/s12160-013-9486-6

Miller, S.A. (2001). *PICO worksheet and search strategy*. US National Center for Dental Hygiene Research.

Miller, W. R., & Rollnick, S. (2013). *Motivational interviewing: Preparing people for change* (3rd ed.). Guilford Press.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G., & The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med*, *6*(7): e1000097. https://doi.org/doi:10.1371/journal.pmed1000097

National Day of Unplugging (n.d.). *National Day of Unplugging*. https://www.nationaldayofunplugging.com/

Nuñez, T. R., Radtke, T., & Eimler, S. (2020). Third-person perspective on phubbing: observing smartphone-induced social exclusion generates negative affect, stress, and derogatory attitudes. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, *14*(3). https://doi.org/10.5817/CP2020-3-3

Omar, M. K., Dahalan, N. A., & Yusoff, Y. H. M. (2016). Social media usage, perceived team-efficacy and knowledge sharing behaviour among employees of an oil and gas organisation in Malaysia. *Procedia Economics and Finance*, *37*, 309–316. https://doi.org/10.1016/S2212-5671(16)30130-7

Orben, A., & Przybylski, A. K. (2019a). Screens, teens, and psychological well-being: Evidence from three time-use-diary studies. *Psychological Science*, *30*, 682–696. https://doi.org/10.1177/0956797619830329

Orben, A., & Przybylski, A. K. (2019b). The association between adolescent well-being and digital technology use. *Nature Human Behaviour*, *3*, 173–182. https://doi.org/10.1038/s41562-018-0506-1

Oxford Dictionaries. (2019, January 30). Definition of *digital detox* in English. http://www.oxforddictionaries.com/definition/english/digital-detox

Price, C. (2018). *How to break up with your phone*. Ten Speed Press.

Przybylski, A. K., Murayama, K., De Haan, C. R., & Gladwell, V. (2013). Motivational, emotional, and behavioral correlates of fear of missing out. *Computers in Human Behavior*, *29*(4), 1841–1848. https://doi.org/10.1016/j.chb.2013.02.014

Schmidt, C., Muench, R., Schneider, F., Breitenbach, S., & Carolus, A. (2018). Generation "always on" turned off: Effects of smartphone separation on anxiety mediated by the fear of missing out. In C. Stephanidis (Ed.), *HCI International 2018 – Posters' Extended Abstracts* (pp. 436–443). Las Vegas, NV, USA.

Sheldon, K. M., Abad, N., & Hinsch, C. (2011). A two-process view of Facebook use and relatedness need-satisfaction: Disconnection drives use, and connection rewards it. *Journal of Personality and Social Psychology*, *100*, 766–775. https://doi.org/10.1037/a0022407.

Shlain, T. (2019). *24/6: The power of unplugging one day a week*. Gallery Books.

Singh, M. (2019). Compulsive digital gaming: An emerging mental health disorder in children. *The Indian Journal of Pediatrics*, *86*, 171–173. https://doi.org/10.1007/s12098-018-2785-y

Skierkowski, D., & Wood, R. M. (2012). To text or not to text? The importance of text messaging among college-aged youth. *Computers in Human Behavior*, *28*, 74–756. https://doi.org/10.1016/j.chb.2011.11.023

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory*. Consulting Psychologists Press.

Statista (2020, 14 August). *Social Networks mit den meisten Nutzern weltweit 2020*. https://de.statista.com/statistik/daten/studie/181086/umfrage/die-weltweit-groessten-social-networks-nach-anzahl-der-user/

Stieger, S., & Lewetz, D. (2018). A week without using social media: Results from an ecological momentary intervention study using smartphones. *Cyberpsychology, Behavior, and Social Networking*, *21*(10). https://doi.org/10.1089/cyber.2018.0070

Syvertsen, T. (2017). "Caught in the net": Online and social media disappointment and detox. *Media Resistance*, 77–97. https://doi.org/10.1007/978-3-319-46499-2_5

Syvertsen, T., & Enli, G. (2019). Digital detox: Media resistance and the promise of authenticity. *Convergence*. https://doi.org/10.1177/1354856519847325

Tennant, R., Hiller, L., Fishwick, R., Platt, S., Joseph, S., Weich, S., Parkinson, J., Secker, J., & Stewart-Brown, S. (2007). The Warwick-Edinburgh Mental Well-being Scale (WEMWBS): Development and UK validation. *Health and Quality of Life Outcomes*, *5*(1), 63. https://doi.org/10.1186/1477-7525-5-63

Thomée, S. (2018). Mobile phone use and mental health: A review of the research that takes a psychological perspective on exposure. *International Journal of Environmental Research and Public Health*, *15*, 2692. https://doi.org/doi:10.3390/ijerph15122692

Tromholt, M. (2016). The Facebook experiment: Quitting Facebook leads to higher levels of well-being. *Cyberpsychology, Behavior, and Social Networking*, *19*(11). https://doi.org/10.1089/cyber.2016.0259

Turel, O., & Cavagnaro, D. (2019). Effect of abstinence from social media on time perception: Differences between low- and at-risk for social media "addiction" groups. *Psychiatric Quarterly, 90*. https://doi.org/10.1007/s11126-018-9614-3

Turel, O., Cavagnaro, D. R., & Meshi, D. (2018). Short abstinence from online social networking sites reduces perceived stress, especially in excessive users. *Psychiatry Research*, *270*, 947–953. https://doi.org/doi:10.1016/j.psychres.2018.11.017

Turgeman, L., Hefner, I., Bazon, M., Yehoshua, O., & Weinstein, A. (2020). Studies on the relationship between social anxiety and excessive smartphone use and on the effects of abstinence and sensation seeking on excessive smartphone use. *International Journal of Environmental Research and Public Health*, *17*, 1262. https://doi.org/10.3390/ijerph17041262

Vally, Z., & D'Souza, C. D. (2019). Abstinence from social media use, subjective well-being, stress, and loneliness. *Psychiatric Care*. https://doi.org/10.1111/ppc.12431

Vanman, E., Baker, R., & Tobin, S. (2018). The burden of online friends: The effects of giving up Facebook on stress and well-being. *The Journal of Social Psychology*, *158*, 496–508. https://doi.org/10.1080/00224545.2018.1453467

Vitinius, F., Tieden, S., Hellmich, M., Pfaff, H., Albus, C., & Ommen, O. (2018). Perceived psychotherapist's empathy and therapy motivation as determinants of long-term therapy success – results of a cohort study of short term psychodynamic inpatient psychotherapy. *Frontiers in Psychiatry*, *9*. https://doi.org/10.3389/fpsyt.2018.00660

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063-1070. https://doi.org/10.1037/0022-3514.54.6.1063

Wilcockson, T. D. W., Osborne, A. M., & Ellis, D. A. (2019). Digital detox: The effect of smartphone abstinence on mood, anxiety, and craving. *Addictive Behaviors*, *99*, 106265. https://doi.org/doi:10.1016/j.addbeh.2019.06.002

World Health Organization. (2018). *International classification of diseases for mortality and morbidity statistics* (11th Revision). https://icd.who.int/browse11/l-m/en

Yau, Y. H., Gottlieb, C. D., Krasna, L. C., & Potenza, M. N. (2014). Food addiction: Evidence, evaluation, and treatment. In K. Rosenberg, & L. Feder (Eds.). *Behavioral addictions: Criteria, evidence and treatment* (pp. 143–184). Elsevier.

Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavicq*, *67*(6), 361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x

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