Does Digital Detox Work? Exploring the Role of Digital Detox Applications for Problematic Smartphone Use and Well-Being of Young Adults Using Multigroup Analysis

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Abstract

The constant availability of social networking sites (SNSs) on smartphones has an enormous distracting potential and may lead to problematic usage behavior, especially among younger age groups. In this context, an emerging trend of using so-called digital detox applications (apps; e.g., iOS *Screen Time*) can be witnessed, which allows users to monitor and limit their smartphone use as well as to consciously disconnect for a certain period of time. However, it remains unclear whether digital detox apps can indeed reduce negative consequences of using SNSs such as problematic smartphone use (PSU) and decreased well-being. Drawing from self-regulation theory, we investigated the relationships between using SNSs, PSU, and well-being among a sample of 500 young adults between 18 and 35 years of age. We used multigroup analysis to compare digital detox app users and nonusers. Results revealed that a high proportion of young adults use digital detox apps (41.7 percent). Among those who did not use such apps, using SNSs was positively associated with PSU, which was negatively related to well-being. Among digital detox app users, we found no such relationship. Thus, digital detox apps seem to be a valuable tool to prevent harmful effects of using SNSs on well-being among young people by reducing the risk of using the smartphone compulsively.

Keywords: social networking sites, problematic smartphone use, digital detox apps, well-being, young adults

Introduction

SOCIAL NETWORKING SITES (SNSs) play an increasingly important role in people's daily life around the globe.[1–3] Due to their portability and constant connectivity, smartphones provide a platform to access SNSs anytime and anywhere.[4,5] In addition, mobile applications (apps) of SNSs such as WhatsApp or Instagram operate with push messages, which make users immediately aware of new posts. These characteristics lead to online monitor behaviors such as routinely checking constantly updated newsfeeds on SNSs.[6] This ubiquitous availability of SNSs on smartphones has an enormous distracting potential and can lead to problematic usage behavior and even addiction.[7] In particular, young adults and college students have repeatedly been found to be heavily dependent on their smartphone.[8,9]

In this context, an emerging trend of what has been labeled digital detox, app detox, disconnection, or technology pushback can be witnessed. So-called digital detox apps allow users to monitor and limit their smartphone use. A digital detox refers to a conscious disconnection from all smartphone activities for a certain period of time, which can be individually defined (e.g., 1 hour, 1 day, or even longer).[10] Digital detox apps have been found to successfully limit smartphone use during certain activities (e.g., while studying or while having dinner together).[11–14]

However, thus far, it has not been examined whether or not the use of digital detox apps can indeed reduce negative consequences of using SNSs such as problematic smartphone use (PSU) and decreases in well-being found in previous research.[15,16] To address this crucial research gap, this study draws from self-regulation theory to compare the relationships between using SNSs, PSU, and well-being among 500 young digital detox app users and nonusers. Investigating the ramifications of using SNSs in young adulthood is especially important for at least three reasons: (a) young adults are still the most active users of SNSs,[2,3] (b) they may be more prone to develop problematic smartphone usage patterns due to their higher susceptibility to immediate rewards and feedback compared to older adults,[17] and (c) young people with higher well-being have been found to be healthier, more productive, and more committed to their community—factors that are crucial for the cohesion of a society.[18]

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Use of SNSs, PSU, and Well-Being in Young Adulthood

Although using SNSs may be highly beneficial for young people in terms of maintaining relationships[19] or receiving social support,[20] it may also result in problematic habits and usage behavior. Scholars have conceptualized PSU as excessive smartphone use accompanied by symptoms that resemble core components of behavioral addictions such as withdrawal or loss of control.[21] Previous research shows that abstaining from SNSs for 1 week led to common withdrawal symptoms such as craving, relapses, social pressure to get back on SNSs,[22] or burnout symptoms.[23] The potential for SNSs to trigger problematic usage behavior may be especially high when SNSs are used through smartphones, which are more likely to be used in a habitual, automatic manner, heightening the risk of addictive behavior.[17] Indeed, the few studies that have explicitly focused on mobile phones found that using SNSs can be a powerful predictor of mobile phone addiction.[5,24]

Scholars have theorized different potential underlying mechanisms between the use of SNSs and problematic usage behavior. Some have postulated that positive experiences emerging from the intense use of SNSs may contribute to the development of an emotional bond to SNSs, which may result in the compulsive need of staying permanently online or not feeling at ease when being disconnected from one's SNSs.[20,25] Others have argued that insufficient self-control may be a potential risk factor for developing problematic media usage.[26]

The social cognitive theory of self-regulation[27] provides a possible explanation for this relationship. The theory postulates that human behavior is motivated and regulated by self-regulative mechanisms, which include monitoring one's behavior, judgment of one's behavior, and affective self-reaction such as positive affect when a goal is achieved. Excessively using SNSs is often described as ''going down a rabbit hole,'' which refers to a ''reduced awareness of the passage of time while immersed in online activity.''[28] Therefore, when using SNSs, individuals might engage in less self-monitoring behavior, which makes problematic media usage behavior more likely.

Young people may be particularly prone to develop problematic media usage behavior, as self-regulative mechanisms have been found to be weaker among young adults compared to middle-aged or older adults.[17] With increasing age, individuals rely more on reflective and less on reflexive mechanisms.[29] Thus, due to the high susceptibility to react on immediate rewards and feedback in young adulthood,[17] it is important to investigate problematic media usage behavior such as PSU in this period, which is usually defined as the age range between 18 and 35.[30]

Irrespective of whether or not these symptoms would indeed be clinically diagnosed, the feeling of perceived addiction, that is, withdrawal or sudden cravings, can decrease overall well-being among young adults. Meta-analyses repeatedly revealed a negative association between the use of SNSs and well-being.[15,31] This relationship has been found for both self-reported[28] and tracking data.[32] While scholars have identified different underlying mechanisms of these effects such as loneliness,[33] reduced self-esteem,[34] or decreased academic performance,[9] the role of PSU as a mediator between using SNSs and well-being has received only scarce research attention, especially in young adulthood. Based on self-regulation theory,[27] which predicts less positive effect in response to judging one's behavior as problematic, we assume that using SNSs induces symptoms of PSU, which in turn lowers perceived overall well-being. Accordingly, H1 states as follows:

H1: Mobile use of SNSs decreases young adults' well-being due to an increase in PSU.

Using digital detox apps might prevent the negative consequences of using SNSs, as these apps allow individuals to monitor or restrict their smartphone use and to implement behavior change interventions. Self-monitoring or tracking apps capture detailed information on type and time of smartphone use and can be tailored to restrict smartphone use for a certain time (e.g., in the late evening hours) or during certain activities (e.g., while studying).[10] These apps are nowadays often already preinstalled on smartphone devices or can be downloaded with only one click. Many of these apps either work with positive incentives (e.g., donating to the environment) when the self-set goals have been met or with negative incentives (e.g., paying a penalty) if the planned disconnection period is interrupted.

Studies investigating digital detox app use are still scarce. In other areas, scholars have found that using self-monitoring smartphone apps successfully reduces addictive symptoms such as smoking[35] and helps with sticking to a diet[36] or to healthy behavior in general.[37] However, research has not yet investigated the moderating influence of digital detox app use in the context of using SNSs, PSU, and well-being.

Based on the propositions of self-regulation theory,[27] it can be assumed that smartphone users who engage in self-monitoring behavior—that is, use digital detox apps—are less likely to lose control over their smartphone use, resulting in less PSU and higher well-being when they achieve their self-set goals. Indeed, there is first empirical evidence suggesting that digital detox apps can successfully limit individuals' overall smartphone use and decrease their perceived distracting potential,[13] and support users to reach their self-defined goals.[38] In addition, first studies suggest that mindfulness-based interventions help reduce overall smartphone use as well as symptoms associated with compulsive smartphone use.[39] Based on these findings, H2 postulates the following:

H2: The negative relationship between mobile use of SNSs and well-being through PSU is weaker for those young adults who use digital detox apps compared to those young adults who do not use such apps.

Methods

Procedure and sample

The data of this study are based on an online survey of 500 young adults ($M_{age} = 22.37$, standard deviation [SD] = 3.47; 57.8 percent women, 42.2 percent men) conducted in May/June 2019 and used for this study only. We recruited participants through the university network using e-mail, groups on SNSs, and flyers. We included participants in this study if they possessed a smartphone, were based in Austria, and were

between 18 and 35 years of age. Some 4.4 percent had no university qualification, 71.6 percent had a high school degree, and 24 percent had a college or university degree.

We obtained informed consent from all participants through an opt-in question in the online questionnaire. More specifically, all participants consented to (a) the strictly scientific purpose of the research, (b) their right to refuse to participate, (c) their right to stop their participation at any point of the study, and (d) the strict confidentiality of their responses. The study complied with the university's ethical guidelines. We raffled ten 15-Euro vouchers among all participants as compensation for their participation.

To determine the adequate sample size, we conducted an a-priori power analysis ($f^2 = 0.02$, $\alpha = 0.05$, $1 - \beta = 0.80$–0.90), which revealed a sample size ranging from 395 to 528 to detect a small effect, which has been identified in similar previous research.[40,41] Thus, based on the sample size, the study was highly likely to obtain valid results.

Measures

Mobile use of SNSs. We measured mobile use of SNSs by asking participants to indicate the average minutes they daily used the following platforms on a slide switch from 0 to 360 minutes: Facebook ($M = 34.39$, $SD = 50.24$), Instagram ($M = 55.11$, $SD = 66.19$), Snapchat ($M = 24.73$, $SD = 50.54$), YouTube ($M = 39.18$, $SD = 56.36$), and WhatsApp ($M = 70.81$, $SD = 76.28$). To assess mobile use of SNSs in total, we computed a formative index of the five items ($M = 45.42$, $SD = 43.36$).

Problematic smartphone use. We assessed PSU with four items[42] (e.g., ''I get restless when my phone is out of range,'' $M = 3.03$, $SD = 0.85$, and Cronbach's $\alpha = 0.69$).

Well-being. Following previous studies,[43–46] we assessed well-being using four items of the Satisfaction with Life Scale[47] (e.g., ''If I could live my life over, I would change almost nothing,'' $M = 3.49$, $SD = 0.87$, and Cronbach's $\alpha = 0.80$).

Digital detox app use. Furthermore, we asked participants if they had ever used a so-called digital detox app on their phone before. Upon providing participants with a definition and examples of digital detox apps, they were asked to indicate which of the following apps they had used in the past: iOS Screen Time, Android Digital Well-Being (also, ActionDash and Digital Balance), Moment, Forest, Quality Time, Detox, Space, OffTime, RealizeD, or any other similar app, which they could indicate. Individuals who indicated not using any app were scored as 0; those who indicated using one or more apps were scored as 1. The question was placed in the last part of the questionnaire.

Covariates. We measured important covariates such as gender, age, education, living situation, and self-discipline. We assessed self-discipline with four items[42] (e.g., ''In general, I am very neat,'' $M = 3.57$, $SD = 0.71$, and Cronbach's $\alpha = 0.69$), as this personality trait might be an important predictor of digital detox app use. We measured perceived social pressure to use the smartphone, which has been found to be an important predictor of PSU, with two items (e.g., ''In my

circle of friends it is normal to answer messages immediately,'' $M = 2.93$, $SD = 0.95$, and $r = 0.44^{***}$).[22] Finally, to ensure that the findings were independent from overall smartphone use, we gauged intensity of general smartphone use with four items by asking participants to indicate the average minutes they use their smartphone per day, for example, ''to make calls'' (formative index: $M = 39.23$ and $SD = 28.86$).

Independent t tests revealed that digital detox app users and nonusers did not differ with regard to educational degree ($\chi^2 = 5.47$, $df = 5$, and $p = 0.361$), living situation ($\chi^2 = 0.95$, $df = 1$, and $p = 0.330$), intensity of general smartphone use ($t = -0.63$, $df = 444$, and $p = 0.532$), perceived social pressure ($t = -0.27$, $df = 498$, and $p = 0.785$), and self-discipline ($t = -0.58$, $df = 498$, and $p = 0.562$). However, females were significantly more likely to use digital detox apps ($\chi^2 = 6.41$, $df = 1$, and $p = 0.011$) as were older individuals ($t = 3.52$, $df = 478$, $p < 0.001$). To ensure that the results were not contingent on these individual characteristics, we controlled gender, age, education, intensity of general mobile phone use, perceived social pressure, and self-discipline in all analyses.

Data analysis

We conducted a structural equation model (SEM) in *lavaan*[48] and used multigroup analysis to detect differences between digital detox app users and nonusers. We entered digital detox app use (dichotomous), mobile use of SNSs (formative index), and the covariates as manifest variables; and PSU and well-being as latent variables. Before entering the interaction term of using SNSs and digital detox apps, use of SNSs was mean centered. To infer indirect effects, we used bias-corrected confidence intervals (CIs) with 1,000 bootstrapping samples.

Results

Descriptive results

The descriptive results revealed that 41.6 percent of the participants used digital detox apps on their phones. Among those, 31.2 percent used *ioS Screen Time*, 4.4 percent *Forest*, 2.4 percent *Android Digital Well-Being*, 1.2 percent *Moment*, 1.0 percent *Detox*, 0.8 percent *Quality*, 0.6 percent *Space*, 0.6 percent *Offtime*, and 4.6 percent other digital detox apps.

Structural equation model

Next, we conducted a SEM using Full Information Maximum Likelihood (FIML) Estimation, which revealed an acceptable model fit ($\chi^2 = 138.79$, $df = 67$, comparative fit index [CFI] = 0.94, Tucker-Lewis index [TLI] = 0.92, root-mean-squared error of approximation [RMSEA] = 0.05, and 90 percent CIs = 0.04–0.06). Table 1 shows all results. H1 postulated that mobile use of SNSs would exert a negative indirect effect on well-being through PSU. Confirming H1, findings revealed a significant positive relationship between mobile use of SNSs and PSU ($b = 0.00$, standard error [SE] = 0.00, $\beta = 0.19$, and $p = 0.019$), and a significant negative relationship between PSU and well-being ($b = -0.24$, $SE = 0.09$, $\beta = -0.20$, and $p = 0.006$).

H2 assumed that the relationships between the mobile use of SNSs, PSU, and well-being would be weaker for digital

TABLE 1. RESULTS OF THE HYPOTHESIZED STRUCTURAL EQUATION MODEL
BASED ON MAXIMUM LIKELIHOOD ESTIMATION

| | Problematic smartphone use | | | | | | Well-being | | | | | |
| | Model 1 | | | Model 2 | | | Model 1 | | | Model 2 | | |
Predictor	b	SE	β	b	SE	β	b	SE	β	b	SE	β
Gender[a]	0.15	0.08	0.10	0.12	0.08	0.08	−0.10	0.09	−0.06	−0.12	0.09	−0.07
Age	−0.01	0.01	−0.03	0.00	0.01	0.00	−0.03	0.02	−0.13*	−0.03	0.02	−0.11
Education[b]	0.28	0.12	0.15*	0.27	0.12	0.15*	−0.05	0.12	0.02	−0.05	0.12	−0.02
Living situation[c]	0.03	0.10	0.02	−0.01	0.09	−0.00	−0.11	0.11	0.05	−0.13	0.11	−0.06
Self-discipline	−0.17	0.06	−0.17**	−0.18	0.05	−0.18**	0.26	0.07	0.21***	0.25	0.07	0.21***
Perceived social pressure	0.30	0.05	0.39***	0.29	0.05	0.38***	0.03	0.05	0.03	0.04	0.06	0.04
General smartphone use	−0.00	0.00	−0.10	−0.00	0.00	−0.07	−0.00	0.00	−0.03	−0.00	0.00	−0.02
Use of SNSs	0.00	0.00	0.19*	0.01	0.00	0.30**	−0.00	0.00	−0.03	−0.00	0.00	−0.01
Problematic smartphone use							−0.24	0.09	−0.20**	−0.28	0.09	−0.23**
Digital detox app use				0.20	0.07	0.14**				0.21	0.09	0.12*
Use of SNSs × digital detox app use				−0.00	0.00	−0.18*				−0.00	0.00	−0.05
Adjusted R^2		0.22			0.25			0.12			0.14	

Note: $N = 500$, Fit Model 1: $\chi^2 = 138.79$, $df = 67$, CFI = 0.94, TLI = 0.92, and RMSEA = 0.05 (0.04–0.06), Fit Model 2: $\chi^2 = 157.44$, $df = 79$, CFI = 0.94, TLI = 0.91, and RMSEA = 0.05 (0.03–0.06). Model 2: Using SNSs was mean centered before computing the interaction term of using SNSs and digital detox app use.
[a]Male is the reference category.
[b]No university degree is the reference category.
[c]Living alone versus living with other people (living with other people is the reference category).
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.
app, Application; CFI, comparative fit index; RMSEA, root-mean-squared error of approximation; SE, standard error; SNSs, social networking sites; TLI, Tucker-Lewis index.

detox app users compared to nonusers. Thus, in Model 2, the interaction term between mobile use of SNSs and digital detox apps was added. In line with H2, results showed a significant negative interaction effect of mobile use of SNSs and digital detox apps on PSU ($b = −0.00$, $SE = 0.00$, $\beta = −0.18$, and $p = 0.038$). The direction of the effect indicates that there is a stronger relationship of mobile use of SNSs and PSU for those who do not use digital detox apps, which confirms H2. There were also significant direct relationships of digital detox app use to PSU ($b = 0.20$, $SE = 0.07$, $\beta = 0.14$, and $p = 0.006$) and well-being ($b = 0.21$, $SE = 0.09$, $\beta = 0.12$, and $p = 0.015$). To further inspect the differences between digital detox app users and nonusers, a multigroup analysis was conducted.

Multigroup analysis

The multigroup analysis (see Fig. 1, Model Fit: $\chi^2 = 19.64$, $df = 134$, CFI = 0.93, TLI = 0.90, RMSEA = 0.05, and 90 percent CI = 0.04–0.06) showed that mobile use of SNSs had a significant positive relationship with PSU among digital detox app nonusers ($b = 0.01$, $SE = 0.00$, $\beta = 0.30$, and $p = 0.001$), but not among digital detox app users ($b = −0.00$, $SE = 0.00$, $\beta = −0.00$, and $p = 0.977$). Furthermore, PSU was significantly negatively related to well-being for digital detox app nonusers ($b = −0.40$, $SE = 0.14$, $\beta = −0.32$, and $p = 0.004$), but not for digital detox app users ($b = −0.07$, $SE = 0.11$, $\beta = −0.07$, and $p = 0.544$). In addition, mobile use of SNSs had a significant indirect negative effect on well-
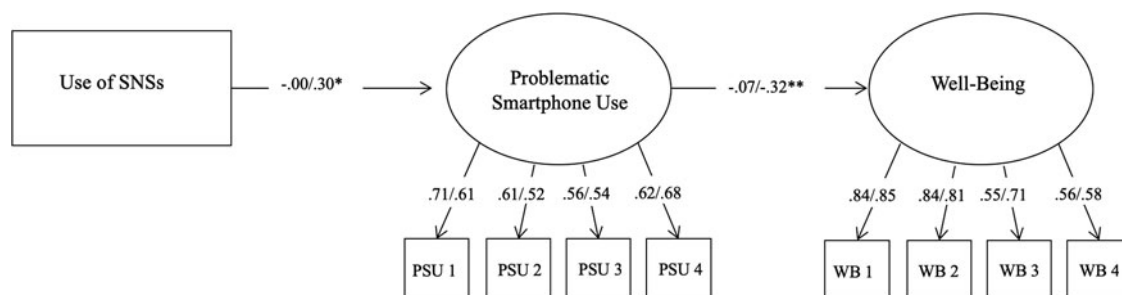

FIG. 1. Multigroup structural equation model examining the relationships between the use of SNSs, problematic smartphone use, and well-being (*left*: digital detox app users; *right*: digital detox app nonusers); model fit: $\chi^2 = 219.64$, $df = 134$, CFI = 0.93, TLI = 0.90, RMSEA = 0.05, and 90 percent CI = 0.04–0.06. Values reflect standardized coefficients. *Rectangles* reflect manifest, *ovals* latent variables. For clarity, error terms, covariances, and control variables are not shown. *$p < 0.05$; **$p < 0.01$. app, application; CFI, comparative fit index; CI, confidence interval; RMSEA, root-mean-squared error of approximation; SNSs, social networking sites; TLI, Tucker-Lewis index.

being through PSU for digital detox app nonusers ($b = -0.00$, $SE = 0.00$, and 90 percent CIs $= -0.01$ to -0.00), which was not significant for digital detox app users ($b = 0.00$, $SE = 0.00$, and 90 percent CIs $= -0.001$ to 0.001). Overall, the results found in this study were not contingent upon the inclusion or exclusion of the covariates. Tests for measurement invariance revealed an acceptable model fit (CFI >0.92; RMSEA <0.06) for a model which constrained the factor structure (configural invariance) and factor loadings (metric invariance) as equal in both groups.

Discussion

This study set out to investigate, for the first time, whether using digital detox apps can buffer negative consequences of the mobile use of SNSs among young adults. In line with other studies,[5,24] the findings revealed that individuals who frequently use SNSs reported higher PSU, which is worrisome, given that using SNSs is almost ubiquitous among young people nowadays.[2,3] However, the results suggest that using digital detox apps can be a valuable means to prevent harmful relationships between using SNSs, PSU, and well-being. Multigroup analysis revealed that those young adults who used digital detox apps indicated lower levels of perceived PSU and higher levels of well-being in response to the use of SNSs. These effects were independent from sociodemographic variables, smartphone usage habits, perceived social pressure, or self-discipline. Overall, the findings are in line with Bandura's self-regulation theory,[27] in that, self-monitoring behavior with regard to one's use of SNSs presumably results in perceptions of one's smartphone use as more reflective or goal oriented, which ultimately results in a positive affective self-reaction, which is visible in one's self-reported well-being.

The direct positive relationship between digital detox app use and higher perceived PSU found in this study further suggests that digital detox app users are highly aware of their PSU, which is presumably the reason why they are inclined to use these apps. Indeed, using these apps seems to be successful, as significant relationships between the use of SNSs, PSU, and well-being are absent for digital detox app users. In this context, the overall high number of young adults who used digital detox apps points toward a responsible and reflective use among young adults overall, which can be considered positive.

This study has some notable limitations. First, this research is cross-sectional, which prevents inferences about the timely order and causal nature of the relationships found. Yet, this study is the first to investigate the moderating influence of digital detox app use on the use of SNSs and related negative outcomes, and should therefore serve as a springboard for future panel studies and experiments.

In addition, the sample was limited to young adults between 18 and 35 years of age, who were rather highly educated, which could explain the high prevalence of digital detox app users in the sample. Upcoming studies should aim at investigating different age and educational groups. In particular, adolescents should be in the focus of future research, as their ability to resist immediate reward and feedback is weaker compared with adults.[17] As a result, their tendency to self-monitor their use of smartphones and SNSs may also be lower.

Furthermore, other important influence factors for PSU found in previous studies such as narcissism,[25,49] anxiety,[50] insomnia,[50] or self-regulation[17,51] were not in the focus of this study, neither were the potential underlying mechanisms between the use of SNSs and PSU such as perceived online social support.[20] Therefore, future research should investigate if and how these factors are related to digital detox app use.

In addition, it is important to stress that smartphones are not solely used for SNSs, but for various different purposes such as news consumption, gaming, or shopping.[52] However, against that background, the findings are all the more important, as they show that intense use of SNSs was related to and potentially caused PSU irrespective of the intensity of general smartphone use.

Relatedly, although the use of SNSs is not limited to smartphones, this study focused on smartphones, because (a) they allow constant access to SNSs[4] and (b) the majority of digital detox apps are designed for smartphones. Yet, future research should consider digital detox practices other than using mobile apps in the context of other technical devices such as tablets, laptops, and even wearables like smartwatches.

Finally, following similar studies,[18,43–46] well-being was measured with the Satisfaction with Life Scale.[47] However, although life satisfaction is an important indicator of well-being and is strongly correlated with other measures of subjective well-being,[47] it does not tap into negative dimensions of well-being such as negative mood or depression. Whether the use of digital detox apps affects those negative facets of well-being differently should be the subject of future research.

Despite these limitations, the results of this study show for the first time that self-monitoring behavior using digital detox apps may prevent young adults to develop problematic or compulsive smartphone usage patterns due to using SNSs. Against the background of studies showing that having symptoms of PSU may not only decrease well-being but can also decrease the enjoyment of face-to-face interactions and disrupt schoolwork and other activities, these findings are encouraging.[53]

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