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Desperate for disconnection? A two-study investigation of the Simpson's paradox in the association between digital disconnection and digital ill-being

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Abstract

A conundrum of digital disconnection research is that individuals who report digitally disconnecting *more* often report *poorer* digital well-being. This article explores whether underlying differences in trait self-control might explain this conundrum. Study 1 ($N = 1{,}315$ adults) shows support for a Simpson's paradox: Within persons, deliberate digital disconnection from the smartphone is linked to *reduced* smartphone ill-being, but between persons it links to *increased* smartphone ill-being. Negative between-person associations between trait self-control and both deliberate disconnection and smartphone ill-being suggest self-control as a confounder. Study 2 ($N = 2{,}000$ adults) explores this hypothesis further by contrasting more effortful, deliberated disconnection strategies with disengagement strategies reflecting situational goal-alignment. The findings show cognitive control associates positively with the use effortful disconnection strategies, and negatively with using less effortful disengagement strategies. Combined, the studies suggest digital disconnection takes more effort for some people than for others. This has implications for intervention design.

Lay Summary

When people voluntarily limit their digital media use, this is called digital disconnection. A puzzling finding of research is that while disconnecting is beneficial in the moment, people who disconnect more, on average do not report better (digital) well-being. This study examines if differences in self-control may explain why this is the case. We used two large studies with adults. We found that taking deliberate breaks from the phone helps to feel less stress, less conflict with goals, and less guilt in the moment. But across people, the pattern is different. Those who say they disconnect more also tend to feel worse about their phone use. The key factor seems to be self-control: People with lower self-control struggle more with phone use, and thus try harder to disconnect from their phone. While this helps in the moment, they still feel worse overall. People with higher self-control do not need to plan disconnection as much, as they can simply ignore their phone when needed. This means not all disconnection is the same. For some, it takes effort and signals a struggle. For others, it happens easily. These findings suggest that "one-size-fits-all" advice to disconnect may not work for everyone.

Digital disconnection has emerged as a novel concept; it is currently studied across a wide range of disciplines, including media psychology, media studies, human–computer interaction, tourism studies and organizational studies (Ross et al., 2024). The term is generally used to denote the non-use of digital technology. Some scholarship focuses on digital disconnection as non-use that is mandated, infrastructural, or situationally imposed (e.g., in the form of a ban or resulting from a digital divide). In the current article, however, we focus on non-use as a voluntary, self-initiated regulatory practice (e.g., Karsay & Vandenbosch, 2021) that entails setting limits to digital connectivity with the aim of curbing (perceived) negative impacts such as decreased productivity and wellbeing (Nassen et al., 2023; Syvertsen, 2020).

Digital disconnection is an umbrella term for a diverse set of practices. They can vary in intensity, length and purpose (Nassen et al., 2023; Vanden Abeele et al., 2024), and can concern either digital devices, application types or brands, device/app features, interactions, or even contents and messages (see Klingelhoefer et al. 2024 for an application of Meier and

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Reinecke's 2021 CMC taxonomy on digital disconnection). Examples of device-level disconnection practices, which are the focus of the current study, are, for example, temporarily abstaining from the use of digital devices (i.e., digitally detoxing; Enli & Syvertsen, 2021), or placing the phone out of sight while working (Vanden Abeele & Nguyen, 2023). What binds these practices, is that they are conceived as intentional, "agentic" responses (Karsay & Vandenbosch, 2021). There is thus a deliberate, volitional component to them (Nassen et al., 2023): People disconnect to improve their relationship with technology in everyday life (see Nguyen, 2021; Nguyen et al., 2024), to reclaim agency (Syvertsen, 2020), and to be more productive and present in the moment (Klingelhoefer et al., 2024; Nguyen & Hargittai, 2023).

Recent experience sampling research suggests digital disconnection is effective: People experience momentary well-being improvements when they disconnect at the within-person level (e.g., Gilbert et al., 2025). An interesting conundrum in the literature, however, is that at the *between-person*, aggregate level, people who disconnect more, do not seem to overall report better well-being: In a cross-sectional study, Schmuck (2020) found that people who reported using digital detox apps reported *greater* problematic smartphone use than those who did not. Similarly, Vanden Abeele and Nguyen (2023) found that adults who disconnected *more*, overall reported *lower* digital well-being (Vanden Abeele & Nguyen, 2023). In their experience sampling study, Gilbert et al. (2025) also observed that the disconnection-related well-being improvements at the within-person level did not replicate at the between-person level. In sum, when it comes to digital disconnection, the extant evidence suggests that we cannot simply extrapolate (causal) inferences about what happens *within* individuals to what happens *between* individuals.

The statistical artifact of within-person associations not extrapolating to the between-person level is also known as the Simpson's Paradox (Kievit et al., 2013). As Dienlin and colleagues (2025) explain, the Simpson's paradox may occur for several reasons: the observed within-person effects may be temporary; effects may change direction over time; or a third, confounding variable may be at play. Hence, the authors argue, when patterns at different levels of explanation appear absent or even reversed, it is essential to reflect on the alignment of estimate and estimand: Which outcome measures, designs, and analytical procedures are required to identify the targeted effect? Following Dienlin et al.'s rationale on media effects, one might argue that within-person changes in momentary (digital) well-being are a plausible estimate for inferring the (causal) effect of disconnection on well-being.

Nevertheless, the question remains *why* the association seems to disappear or even reverse at the aggregate, between-person level. Substantive theory offers no plausible support for why the beneficial momentary effect of disconnection would change direction over time. Hence, the possibility of theoretically plausible confounders comes to the foreground. Identifying such confounders is relevant: It reduces bias in causal inference and helps draw correct conclusions from empirical data (Dienlin et al., 2025).

In the case of digital disconnection, there is substantive theory pointing towards the confounding role of self-control. Self-control represents a form of self-regulation that steers thoughts, feelings, and behaviors towards a desired goal (Zimmerman, 1995). While self-regulation comprises a wide array of "goal-relevant activities" (Inzlicht et al., 2021, p. 321), it is in particular at work when these activities require the resolving of a (real or anticipated) conflict between two or more competing goals (Inzlicht et al., 2021, p. 321), as it concerns the ability to "override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and refrain from acting on them" (Tangney et al., 2004, p. 274), so that "a better, more optimal fit between self and world" is produced (Rothbaum et al., 1982). Self-control thus entails both elements of inhibition and initiation (Manapat et al., 2021).

An interesting artifact of the research evidence on self-control is that, counter to intuition, people high in trait self-control do *not* exert more state self-control. This artifact, known as the "paradox of self-control" (Inzlicht & Roberts, 2024), is explained by people high in self-control automatizing goal-directed behavior more easily, making it easier to perform such behavior habitually, and thus effortlessly—without requiring much exertion of situational self-control (de Ridder et al., 2012). Moreover, self-control also encompasses cognitive control or "executive function" processes which support the flexible allocation of attention in support of goal-directed behavior over habitual or (short-term) reward-driven behavior (Inzlicht et al., 2021, p. 322). In short, they facilitate keeping attention on the task (Buchanan et al., 2010), and lower the hedonic pull towards conventional temptations (Inzlicht & Roberts, 2024), which also removes the need to effortfully control behavior over them (Baumeister et al., 2007, 2018; Zeidner et al., 2000).

The "paradox of self-control" (Inzlicht & Roberts, 2024) may explain why we see a Simpson's paradox in the within- and between-person associations between digital disconnection and well-being outcomes. After all, there is ample evidence that low self-control associates with problematic media (over-)use (e.g., Büchi et al., 2019; Hofmann et al., 2017; Soror et al., 2015; van Velthoven et al., 2018), and that low self-control makes more susceptible to the hedonic pull and attentional demands of digital media (Lyngs et al., 2019; Schneider et al., 2021; Vanden Abeele et al., 2025), resulting in goal conflict experiences and media use self-control failure (e.g., Du et al., 2018).

In view of these findings, it has been suggested that people low in self-control might turn towards deliberate digital disconnection as a compensatory response, to fight off the hedonic pull of digital devices, and prevent goal conflict and self-control failure (Vanden Abeele et al., 2025). While this compensatory response may help with improving well-being in the moment (e.g., Gilbert et al., 2025), however, it may not magically resolve the underlying structural problem, which may also explain why, in longitudinal work, digital disconnection does not predict well-being increments over a longer period of time (Dekker et al., 2024). For individuals with high self-control, on the other hand, the need for *deliberate* digital disconnection may be lower, because they simply may not experience the same hedonic pull. Moreover, they are likely able to disengage from digital media use more naturally, with minimal effort and deliberation, through more habitualized disconnection behaviors that have become part of their situational goal-alignment routines.

To our knowledge, there is minimal research in the field that addresses the potentially confounding role of self-control in

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explaining an apparent Simpson's paradox in the association between digital disconnection and well- (or ill-)being. The aim of this article is to contribute to this knowledge gap. Study 1 ($N = 1{,}315$) explores if there is evidence for a Simpson's paradox, and if so, how trait self-control, as a potential confound, shapes it. Study 2 ($N = 2{,}000$), builds on the findings from Study 1 and examines in a cross-sectional survey study if impaired executive functioning, as a measure of cognitive control, associates differently with the use of more *deliberate*, pre-meditated digital disconnection strategies than with *low-effort* smartphone disengagement strategies that emphasize situational goal-alignment.

Study 1: The Simpson's paradox of deliberate digital disconnection

Study 1 re-analyzes existing data from a large-scale citizen science project to explore a Simpson's paradox in the association between deliberate digital disconnection and indicators of digital well-being, and how it is shaped by trait self-control. To that end, it draws from experience sampling data to model within-person associations between momentary *deliberate* disconnection and momentary experiences of smartphone goal conflict, online vigilance and guilt over smartphone use. Additionally, it draws on cross-sectional survey data to examine how person-level averages of the above variables associate with trait self-control and trait smartphone ill-being.

At the within-person level, we expect deliberate disconnection from the smartphone to associate with three state indicators of digital ill-being: online vigilance, smartphone goal conflict, and guilt over smartphone use. State *online vigilance* refers to a heightened attentiveness for the online world, resulting in behaviors such as frequently monitoring and immediately reacting to incoming digital communication (Reinecke et al., 2018). Ample literature connects online vigilance to well-being decrements. For instance, individuals with higher online vigilance experience more stress (Gilbert et al., 2022; Li, 2023), mental fatigue (Van Gaeveren et al., 2024), increased communication load and multitasking (Freytag et al., 2020; Gilbert et al., 2022). Hence, individuals may turn towards deliberate disconnection from the smartphone to reduce online vigilance.

Similarly, individuals may deliberately disconnect to reduce *goal conflict over smartphone use*. Goal conflict experiences over media use are considered indicative of poor self-control, as they point at the essence of a person's lacking ability to align behavior with ongoing goal pursuits (Reinecke et al., 2022). As such, at the within-person level, we expect that deliberate disconnection will lower conflict between smartphone use and other goal pursuits.

Finally, we look at experiences of *guilt* over smartphone use. As Reinecke and Meier's (2021) AMUSE model posits, and also suggested in empirical work on social media self-control failure (Du et al., 2018), goal conflict experiences may induce feelings of guilt over media use. We hypothesize that deliberate disconnection from the smartphone may reduce such feelings, as it prevents against (guilt-inducing) media use self-control failure. In sum, in the context of smartphone use, we expect that:

H1: At the within-person level, greater deliberate disconnection from the smartphone is linked to reduced smartphone goal conflict, online vigilance, and guilt over smartphone use.

While deliberate digital disconnection appears beneficial at the within-person level, prior research suggests this association does not extrapolate to the between-person level (e.g., Gilbert et al. 2025; Schmuck, 2020; Vanden Abeele & Nguyen, 2023). We examine if this also true in our dataset. In view of the argument that people who disconnect more may do so because they struggle more with the hedonic pull of digital media, we expect that at the between-person level, persons who turn *more* towards deliberate disconnection may, on average, experience *greater* smartphone goal conflict, online vigilance, and guilt over smartphone use. We additionally look at the association with a cross-sectional measure of smartphone ill-being (Vanden Abeele et al., forthcoming), capturing more stable self-perceptions of lacking agency over and experiencing conflicts and stress as a result of smartphone use.

In addition, we examine how trait self-control associates with the above variables. As prior research already shows, at the between-person level, low self-control is identified as a psychological trait that is concomitant with indicators of digital ill-being, such as problematic media use, media procrastination, and feeling guilt over and overwhelm by media use (Billieux, 2012; Du et al., 2018; Panek, 2013; Reinecke & Hofmann, 2016; Świątek et al., 2023; Zahrai et al., 2021). Low self-control is also considered a susceptibility factor for online vigilance (Reinecke et al., 2018). Le Roux and Parry (2022), for instance, found a medium-sized negative correlation of $-.26$ ($p < .001$) between self-control and trait online vigilance,[1] leading Parry and Coetzee (2025) to recently speculate that a decreased capacity for self-control might (at least partly) explain negative associations between experiencing a lack of agency over media use and lower well-being by being a driver of both. Following this train of thought, we expect that:

H2: At the between-person level, deliberate disconnection from the smartphone is associated with greater smartphone ill-being and greater average momentary experiences of goal conflict, online vigilance, guilt over smartphone use.
H3: At the between-person level, trait self-control correlates negatively with the above variables.

Finally, we additionally explore cross-level interaction effects, to examine whether trait self-control weakens or strengthens the within-person associations between deliberately disconnection and online vigilance, goal conflict, and guilt:

RQ1: Does self-control moderate the association between deliberately disconnection and online vigilance, smartphone goal conflict, and guilt over smartphone use?

Method Study 1

For the current study, we use both intake survey data as well as experience sampling measurements (ESM, $n = 67{,}762$ datapoints)

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that were collected as part of a large-scale citizen science project in which 1,315 adult individuals participated. The study thus re-analyzes existing data. The study was approved by Ghent University's ethical review board (2022-11). Because of word count restrictions, some information can be found in the Supplementary Materials or on this study's OSF page (see data availability statement).

Sample and procedure

We collaborated with a newspaper to recruit participants. The newspaper advertised the study over a two-week period. In total, 1,315 individuals took the intake questionnaire and completed more than eight ESM measurements (our prespecified threshold for inclusion in data analysis). Both intake and ESM questionnaires were administered using the m-Path app. After completing the intake questionnaire, during 2 weeks, participants received invitations to complete six daily ESM questionnaires, each sent within a 90-min timeslot (start time: 07.30 a.m., end time: 10.45 p.m.). A reminder invitation was sent after 30 min and questionnaires remained available for 45 min. On average, we counted 2 hr and 44 min (SD = 12 min) between ESM measurements. Details can be found on the project's OSF page (see Data Availability statement).

Participants were incentivized by providing them with a personalized report after completion of the study. The recruitment and incentivization strategy resulted in a sample that was non-representative for the population. Participants' age ranged from 18 to 82 years (M_{age} = 38.9). A majority of participants (62%) identified as female, 37% identified as male. Most participants were employed (77%) and highly educated (93%).

Time-variant measures

Deliberate disconnection from the smartphone, goal conflict, feelings of guilt over smartphone use and online vigilance were time-varying measures, collected in the experience sampling study. For these items, responses ranged from 1 (not at all) to 7 (all the time). In the morning questionnaire, the stem of these items was "*Since getting up this morning, …*" In the other five daily questionnaires, we used the stem "*Since the previous questionnaire, …*" In the current study, the beep-level (situational) measures are used to test H1 (within-person associations). The person-level averages of these situational measures are used to test H2 (between-person associations). See Appendix A (Supplementary Materials) for the full list of measures.

Deliberate disconnection from the smartphone

We measured momentary deliberate disconnection from the smartphone with the item "*Since […], I deliberately limited my smartphone use.*" Note that the Dutch term for "deliberate" ("bewust") can be translated as both "deliberate" and "consciously." On average, deliberate disconnection scores were low (M = 2.58, SD = 1.23). An intercept-only model revealed that 50.2% and 49.8% of the variance for this item was at the within- and between-person level, respectively.

Smartphone goal conflict

Momentary experiences of perceived conflict between smartphone use and personal goals were assessed using the item: "*Since […] my smartphone use hampered me in making progress towards my ongoing goals (e.g., working, studying, exercise, etc.).*" On average, goal conflict experiences were uncommon (M = 1.95, SD = 0.85). An intercept-only model revealed that 58.6% of the variance for this item was at the within-person level and 41.4% was at the between-person level.

Guilt over smartphone use

Feelings of guilt over smartphone use were assessed using the item "*Since […] I felt bad about my smartphone use*." Again, on average experiences of guilt over smartphone use were uncommon (M = 2.00, SD = 0.91). An intercept-only model revealed that 53.8% of the variance for this item was at the within-person level and 46.2% was at the between-person level.

Online vigilance

We assessed state online vigilance using three items that were adapted from Reinecke et al. (2018), reflecting monitoring ("*Since […] I continuously monitored my emails and messages.*"), reactibility ("*Since […] I gave incoming messages and emails my immediate attention*."), and salience ("*Since […] my thoughts were continuously with my emails, messages and social media*."). Responses ranged from 1 (not at all) to 7 (all the time). The participant-mean centered Cronbach's Alpha was 0.71, and the between-person Cronbach's Alpha was .95. On average, online vigilance experiences were somewhat uncommon (M = 2.76, SD = 0.93). An intercept-only model revealed that 58.2% and 41.8% of the variance for online vigilance was at the within- and between-person level, respectively.

Time-invariant measures

Self-control and smartphone ill-being were assessed at the trait level, i.e., as time-invariant measures. These measures were collected during the intake questionnaire.

Trait-level self-control

We assessed trait self-control using the 13-item Brief Self-Control scale developed by Manapat et al. (2021). A sample item of this scale is "*I am good at resisting temptations*." The higher order trait self-control variable was calculated after reversing negatively worded items (e.g., "*I am lazy*") by taking the mean across all 13 items. Cronbach Alpha analysis supported the scale's unidimensional factor structure (α = .81). Response options ranged from 1 to 5 (*strongly disagree/agree*). On average, participants scored neutral in self-control (M = 2.99, SD = 0.54).

Trait-level smartphone ill-being

We assessed trait-level smartphone ill-being with the six item "drawbacks" subscale from Vanden Abeele et al.'s (forthcoming) digital well-being scale. As detailed in the original scale development, this measure uses a hierarchical structure wherein digital well-being comprises four facets (hedonic, eudaimonic, loss of control, and functional impairment) nested within two second-order factors (benefits and drawbacks). The present

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study focuses exclusively on the "drawbacks" items, of which examples are *"My smartphone is a waste of time,"* and *"My smartphone is a source of stress."* We anticipated no significant differences in effects across its constituent facets (impairment and loss of control). A CFA (see Appendix B in the Supplementary Materials) showed acceptable model fit, $\chi^2(8) = 136.4$, *CFI* = .96, *TLI* = .93, *RMSEA* = .11 [90% CI .10, .13], *SRMR* = .04, and highly correlated subscales ($r = .83$), supporting pooling them in one scale, which also showed high internal consistency ($\alpha = .85$). Responses ranged from 1 (*almost never*) to 5 (*almost always*). On average, participants indicated to experience smartphone ill-being occasionally to regularly ($M = 2.46$, $SD = 0.78$).

Analysis

Data were organized, cleaned, and analyzed with R and AMOS. AMOS was used for the CFA of the scales. The packages tidyverse (Wickham et al., 2019) and esmpack (Viechtbauer & Constantin, 2023) were used to clean and restructure the data; psych (Revelle, 2025), lme4 (Bates et al., 2015), lmerTest (Kuznetsova et al., 2017), and rmcorr (Bakdash & Marusich, 2024) were used to analyze the data; and ggplot2 (Wickham, 2016) was used to visualize the results.

To visualize associations between focal variables, zero-order correlation coefficients were computed and displayed as lower-triangular heatmaps. For the aggregated participant-level analyses, Spearman's rank-order correlations were calculated between all focal variables. For the within-participant analysis, Pearson correlation coefficients were calculated between all focal variables after accounting for the data's hierarchical structure (i.e., observations at level 1, participants at level 2), which is critical to prevent standard error underestimation (Hox et al., 2017); specifically, each variable was participant-mean centered prior to computing the correlations.

To explore whether trait self-control interacts with the relationship between deliberate digital disconnection and guilt, goal conflict, and online vigilance, multilevel models were constructed where the latter outcomes were modelled as dependent variables, while disconnection, trait self-control, and an interaction term between these two variables were input as independent variables. To investigate pure within-person effects, the digital disconnection variable was participant-mean centered (Enders & Tofighi, 2007). Trait self-control was grand-mean centered prior to analyses, to improve the interpretation of the intercept (Enders & Tofighi, 2007). Finally, both the intercept, and the slope representing the impact of deliberate disconnection on each dependent variable, were modelled to vary across participants. Two-tailed tests were used for all analyses, with alpha set to .05.

Results Study 1

We first examined within-person associations between experiences of goal conflict, online vigilance, and guilt over smartphone use and deliberate disconnection (H1). Overall, the results support our hypothesis (see Figure 1): Smartphone goal conflict, online vigilance and guilt over smartphone use were all moderately to strongly positively correlated with each other, showing that these digital ill-being experiences occur together ($r > .30$, $p < .001$). Furthermore, deliberate disconnection from the smartphone, was–albeit rather weakly–negatively associated with each of these measures, suggesting that people experience less online vigilance ($r = -.08$, $p < .001$), smartphone goal conflict ($r = -.03$, $p < .001$) and guilt ($r = -.06$, $p < .001$) over their smartphone use at times where they have deliberately disconnected.

Next, we examined between-person associations, expecting deliberate disconnection from the smartphone to relate

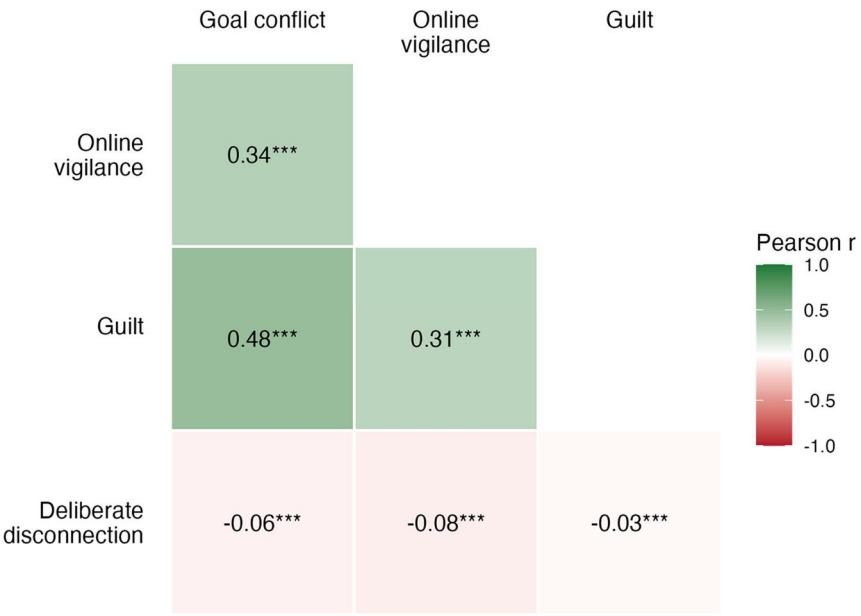


Figure 1 Within-person Pearson correlations between deliberate disconnection from the smartphone, goal conflict, online vigilance, and guilt over smartphone use.

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positively to goal conflict, online vigilance, guilt over smartphone use and smartphone ill-being (H2), and with this set of variables associating *negatively* with trait self-control (H3). Given that several variables were highly skewed, we computed both Pearson and Spearman Rho correlation coefficients. The results supported both hypotheses (see Figure 2): Individuals in our sample who on average reported to deliberately limit their smartphone use more also reported experiencing greater smartphone ill-being, online vigilance, goal conflict over smartphone use, and feelings of guilt over their smartphone use. Trait self-control, on the other hand, showed a statistically significant weak-to-moderate negative correlation with all variables in the model (*Spearman Rho* $> -.09$, $p < .001$).

Finally, we explored the possibility of trait self-control as a moderator of the within-person relationship between deliberate disconnection, smartphone goal conflict, online vigilance, and guilt (RQ1). Analyses confirmed a significant negative direct cross-level effect of trait self-control on smartphone goal conflict ($b = -0.53$), online vigilance ($b = -0.33$) and guilt ($b = -0.55$). Additionally, the analysis revealed significant positive interaction effects for goal conflict and guilt, but not for online vigilance. Specifically, for people low in trait self-control, deliberate disconnection appeared to mitigate more strongly against smartphone goal conflict ($b = 0.05$, $p < .001$) than for people high in self-control. For guilt, however, the interaction suggested that deliberate disconnection was mostly associated with greater guilt for people high in self-control ($b = 0.03$, $p = .01$). For online vigilance, no interaction effect was found, suggesting that trait self-control neither weakens nor strengthens the effect of deliberate disconnection ($b = 0.02$, $p = .238$). A visual representation of these interactions can found in Figure 3. The full results tables can be consulted in Appendix C (Supplementary Materials).

Discussion Study 1

Study 1 examined whether we could find evidence for a Simpson's paradox in the association between deliberate digital disconnection and indicators of smartphone ill-being, and if yes, to explore if it might be at least partially explained through the role of trait self-control. Our findings are overall supportive: at the within-person level, the pattern suggests deliberate disconnection has beneficial outcomes (H1), whereas at the between-person level, the pattern suggests it associates with more problematic outcomes (e.g., increased goal conflict and guilt; H2). We also found evidence suggesting self-control as a potential confounder: At the between-person level, this trait was negatively associated with both deliberate disconnection and the person-averages of measured digital ill-being indicators. Moreover, cross-level interaction analyses suggested that among people with lower trait self-control, deliberate disconnection reduced smartphone goal conflict more strongly. This may stem from these individuals "needing" to deliberately disconnect more.

Interestingly, a different cross-level interaction effect on guilt was found. Here, once the direct effect of trait self-control was controlled for, deliberate disconnection seemed to strengthen guilt over smartphone use among people high in self-control. Other than this effect resulting from spurious associations, a tentative explanation might be a differential self-appraisal effect (see also Wolfers, 2024): Perhaps individuals low in self-control, for example because of their greater tendency to procrastinate and therefore run into trouble when having to finish important tasks (see also Schnauber-Stockmann et al., 2018), are so dependent on "effortful disconnection" that their momentary sense of guilt over smartphone use is not much attenuated by it.

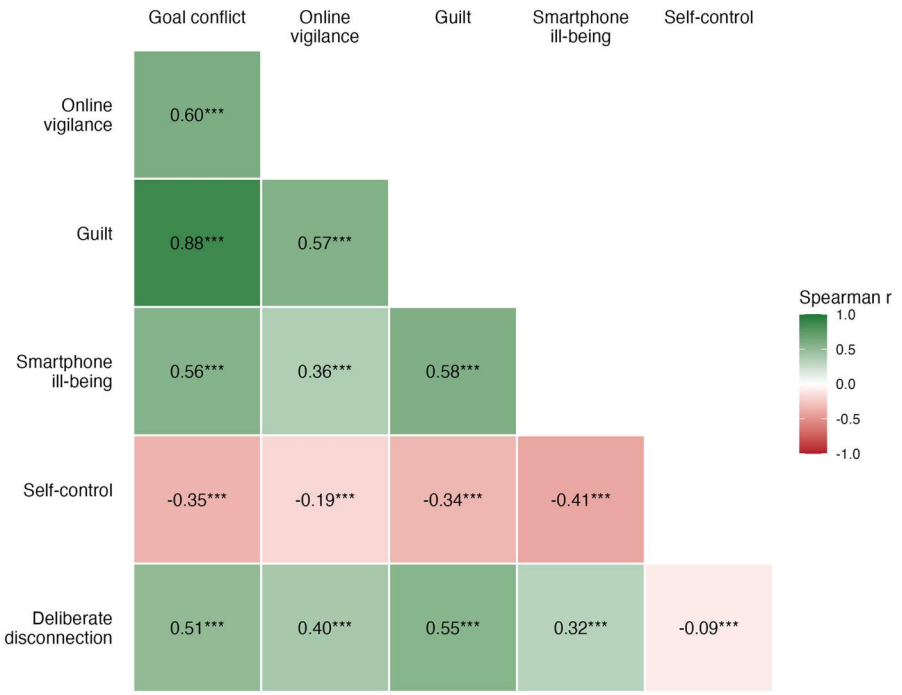


Figure 2 Between-person Spearman's Rho correlations between deliberate disconnection from the smartphone, goal conflict, online vigilance, guilt over smartphone use, smartphone ill-being, and trait self-control.

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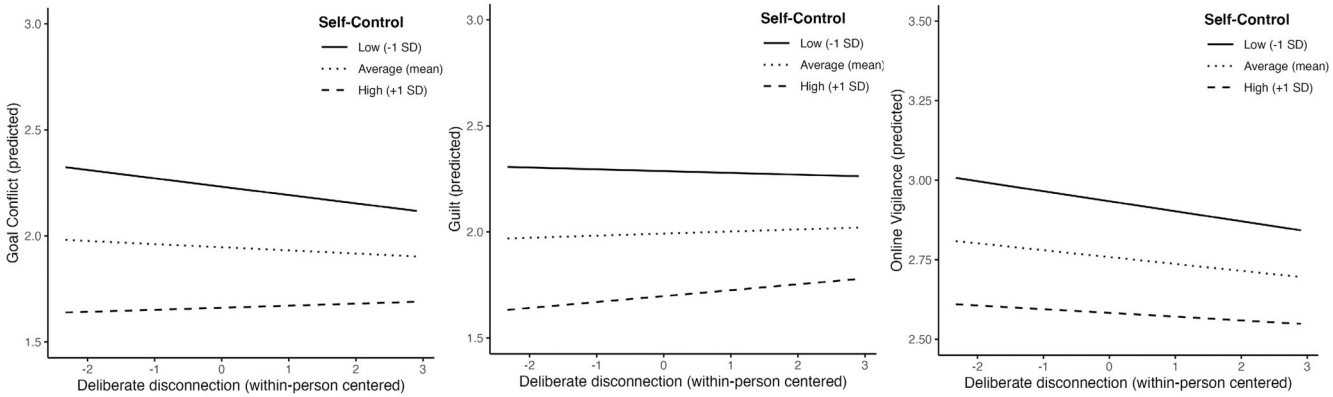


Figure 3 Cross-level interactions between deliberate disconnection and self-control on goal conflict (left), guilt over smartphone use (middle), and online vigilance (right).

Earlier work on the self-control failure–guilt nexus (e.g., Du et al., 2018) to some extent corroborates this interpretation. For individuals high in self-control, on the other hand, needing to *deliberately* disconnect may be out of character, thus challenging their self-efficacy beliefs in relation to their agency over media use.

Although the findings of Study 1 overall support the hypothesis that trait self-control shapes the association between deliberate disconnection and digital well-being, a limitation of the current study is its exploratory nature. This, in combination with effect parameters that sometimes do not meet the typical smallest-effect-size-of-interest (SESOI) threshold of 0.05, indicate that results need to be interpreted with caution, and that further research is warranted to support the central argument.

To this end, we already designed a follow-up study ourselves. A crux of Study 1 is that it focuses only on *deliberate* digital disconnection as a concrete form of effortful self-control; it does not contrast this form of disconnection, however, with effortless "disengagement" from technology (i.e., "just doing it"), which we presume to be more prominent among people high in self-control as a result of their capacity to more naturally allocate attention and align behavior with ongoing goal pursuits. This is what Study 2 explores within the context of a larger cross-sectional omnibus survey study to which we were able to contribute a set of measures.

Study 2: Deliberate digital disconnection versus smartphone disengagement

Study 2 is a cross-sectional study aiming to further explore the relationship between self-control and digital disconnection. It builds on a recent study by Brevers and Turel (2019) which shows that not all strategies for controlling one's social media use are the same. Based on interviews with social media users, the authors rank six families of social media self-control strategies according to the extent to which they require pro-active, premeditated deliberation or rather reflected situational goal-alignment. Strategies at the high end of deliberation are those that aim to restrict social media use through modifications to the physical environment (e.g., putting the phone in a different room, placing it in a drawer) or to device features (e.g., putting the phone in airplane mode). Strategies on the other end of the spectrum are those that involve the more straightforward activation of self-control processes to allocate attention and align behavior with ongoing goal pursuits, for instance "simply ignoring the phone completely," just "keeping working," or "finishing an important task before checking the phone."

Brevers and Turel implicitly show support for self-control shaping disconnection in finding that, although participants high in self-control found it *easier* to perform self-control strategies, they did *not* perform them more often. For their further analyses, however, they use a summative scale of the strategies, leaving the question unanswered whether differences in self-control associate differently with strategies requiring more versus less conscious deliberation. It is theoretically plausible, however, that individuals high in self-control rely less on deliberate disconnection as they can disengage from digital media use fairly effortlessly, using their heightened capacity for cognitive and behavioral control to allocate their attention and align their behavior with their situational goal-pursuits. This is also corroborated by a study from Baumgartner and Kühne (2024) on media disengagement. In the discussion of this study, the authors argue that for individuals high in self-control, goal conflict experiences are likely a stronger predicter of media discontinuation (p. 16), as they are more able to "just quit" in response to them. It is this question that we address in the current study.

We focus on cognitive control, also known as executive functioning, rather than the broader construct of self-control. Executive functioning taps specifically into cognitive control processes that allow "the flexible allocation of attention in the service of goal-directed behavior in the face of more habitual or immediately compelling behaviors" (Inzlicht et al., 2021, p. 323). While measures of general self-control such as the Brief Self-Control Scale of Manapat et al. (2021) used in Study 1 rely more heavily on self-evaluations of initiatory self-control capacity (with items such as "I am lazy"), executive functioning measures focus explicitly on the capacity to keep attention on the task. In our view, this attentional aspect of cognitive control is highly relevant in the context of disconnection, as a key motivation for disconnection is to reduce the "distracting" potential of digital media (Klingelhoefer et al., 2024). People with a greater capacity

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for attentional control may require less pre-emptively planned, deliberate digital disconnection to protect against distractors, as they might more easily ignore or override them when their situational goal-pursuits demand it.

Impairments in executive functioning are central to deficits in self-control (Hofmann, Baumeister, Förster et al., 2012; Hofmann, Schmeichel & Baddeley, 2012), and are key diagnostic criteria for developmental and learning disabilities such as autism spectrum disorder and attention deficit hyperactivity disorder (American Psychiatric Association, 2013). If deliberate disconnection strategies are more commonly used by individuals whose executive functioning is impaired (H1a), whereas straightforward strategies to disengage from digital media use as a form of situational goal-alignment are more common among individuals with high executive functioning (H1b), this has real-world repercussions.

Method Study 2

Sample and procedure

Study 2 draws data from a cross-sectional survey of technology use and well-being administered in October 2024 by an external professional research agency to a quota-based sample of Czech adults (age 18–59, $N = 2000$, $M_{age} = 42.12$, $SD = 10.21$, 43.2% women). Items were cognitively tested with the target group. Sampling quota were used to ensure equal representation of gender, age, education, net income, region of residence (based on NUTS3; European Commission & Eurostat, 2020), and municipality size.

The data collection was approved by Masaryk University's Ethical Committee (EKV-2024-102). Participants had the option to respond "I don't want to answer" to every question and stop any time. Participants were members of the agency panel and received a standard monetary compensation for participation.

Measures

Digital ill-being

Digital ill-being was derived from the Digital well-being measure by Vanden Abeele et al. (forthcoming). Participants were asked how much they agree with six items reflecting drawback experiences of digital technology use (e.g., "*Technology use is a waste of time*," "*Technology use hampers my performance*"). Participants responded on a scale ranging from (1) to (7) (*totally disagree/agree*). Confirmatory factor analysis supported a one-dimensional "drawbacks" scale ($\chi^2(9) = 156.74$, *CFI* = .96, *TLI* = .93, *RMSEA* = .09 [90% CI .08, .10]). The scale showed adequate internal consistency ($\alpha = .81$). On average, people reported slight disagreement to experiencing drawbacks ($M = 3.25$, $SD = 1.12$). See Appendix A for the full list of measures and Appendix B (Supplementary Materials) for the full CFA results.

Deliberate digital disconnection and smartphone disengagement

The measures for assessing deliberate digital disconnection and smartphone disengagement were developed for the project, using examples of social media self-control strategies provided in Brevers and Turel's (2019) taxonomy. We created a scale comprising six items, each assessing how often the participant performs a particular strategy to limit their digital media use (1 = *never* to 6 = *always*). Three items were intended to assess deliberate disconnection (e.g, "*limit access to the phone or applications*"). To emphasize deliberation, we used the stem "*BEFORE starting an activity, how often do you proactively …* " The other three items aimed to capture smartphone disengagement as a form of straightforward situational goal-alignment (e.g., "*simply ignore your phone*," "*just turn your phone off*"). These items used the stem "*DURING an activity, how often do you …* " to emphasize in situ alignment with goal pursuits.

A confirmatory factor analysis supported a correlated two-factor structure after excluding one problematic item whose behavioral content was temporally ambiguous—"*BEFORE starting an activity, how often do you proactively place your phone screen down or place your phone away?*" The item correlated more strongly with the smartphone disengagement items ($r = .26$–$.45$) than with the remaining two deliberate disconnection items ($r = .14$, and $r = .17$). The retained two-factor model fit the data well, $\chi^2(4) = 27.8$, *CFI* = .99, *TLI* = .96, *RMSEA* = .05 [90% CI .03, .07], *SRMR* = .03, with standardized loadings ranging from .54 to .78. The two latent factors were only weakly correlated, $r = .15$, $p < .001$, supporting their empirical distinctiveness. See Appendix D (Supplementary Materials) for the table with item wordings and factor loadings. The Cronbach's α for the resulting two-item deliberate-disconnection subscale was .63, and .66 for the three-item disengagement subscale. On average, participants reported deliberately disconnecting rather seldom ($M = 1.71$, $SD = 0.99$) and straightforwardly disengaging from using their smartphone fairly regularly ($M = 3.70$, $SD = 0.98$).

Online vigilance was derived from Reinecke et al. (2018). The scale consisted of nine items covering the salience, monitoring, and reactibility dimensions. Statements included, for example "*I have a hard time disengaging mentally from online content.*" and "*I constantly monitor what is happening online.*" Participants responded on a scale ranging from (1) *totally disagree* to (5) *totally agree*. From each dimension we selected the three highest loading items from Reinecke et al.'s study (2018). The scale showed high internal consistency ($\alpha = .92$). On average, people reported slight disagreement to experiencing online vigilance ($M = 2.41$, $SD = 0.89$).

Impaired executive functioning was measured by the Short Self-report Measure of Problems with Executive Function by Buchanan et al. (2010). Participants were asked to rate how often they have problems in the following areas on a scale from (1) never to (6) always. The measure consisted of six items (e.g., "D*o you have difficulty carrying out more than one task at a time?*"; "D*o you have difficulty seeing through something that you have started?*"). The scale showed high internal consistency ($\alpha = .85$). On average, people reported occasional impairment in their executive functioning ($M = 2.71$, $SD = 0.81$).

Results

Given that variables were ordinal, and showed skewness in their distributions, we computed both Pearson and Spearman Rank Order correlations. The findings of the analysis supported

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both our hypotheses: We observed that persons who reported deliberately disconnecting more often also reported greater impaired executive functioning (*Spearman Rho* = .18, $p < .001$), as well as greater trait online vigilance (*Spearman Rho* = .28, $p < .001$) and digital ill-being (*Spearman Rho* = .18, $p < .001$).

Vice versa, individuals who reported to situationally disengage from technology more often reported decreased impaired executive functioning (*Spearman's Rho* $> -.08$, $p < .01$), and showed lower scores for trait online vigilance (*Spearman Rho* $> -.26$, $p < .001$) and digital ill-being (*Spearman Rho* $> -.10$, $p < .001$; see also Figure 4).

Discussion Study 2

Study 2 further corroborates Study 1's findings by showing that individuals who report greater impairment in their executive functioning (and who report lower digital well-being and higher online vigilance) use deliberate disconnection strategies *more* often (H1a) while using strategies involving straightforward disengagement from technology as a form of situational goal-alignment *less* often (H1b). These findings suggest that the situational strategies that people use to limit technology use may be understood as part of a broader constellation of concomitant experiences and characteristics. Given that these seem to appear as manifestations of an individual's underlying capacity for executive functioning, we might conceive of them as differential digital phenotypical expressions (cf. Jain et al., 2015) of this capacity. Naturally, more evidence is needed to explore this tentative interpretation, especially in view of the small effect sizes found. Nonetheless, our observation raises broader questions about our digitally connected society, and how its constant connectivity may be more challenging to some individuals than to others.

General discussion

The overarching aim of this article was to gain a better understanding of whether self-control acts as a potential confounder that may, at least partially, explain why research observes a Simpson's paradox in the association between deliberate smartphone disconnection and (digital) well-being. Overall, our findings support this idea.

Synthesizing our findings, in Study 1, we found that deliberate disconnection was associated with *reduced* guilt, goal conflict, and online vigilance at the within-person level, but that this pattern reversed at the aggregate, between-person level. This paradoxical pattern has been observed in previous work on digital disconnection (Klingelhoefer et al., 2024; Schmuck, 2020; Vanden Abeele & Nguyen, 2023). Study 1 also identified trait self-control as a potentially confounding factor shaping this paradox: High trait self-control correlated negatively at the between-person level with both deliberate disconnection and the indicators of digital ill-being. Self-control also moderated the association between deliberate disconnection and goal conflict and guilt, albeit in a reversed manner: While deliberate disconnection seemed to help individuals low in self-control more to reduce goal conflict, it seemed to make high self-control individuals' guilt over smartphone use more pronounced.

Further support came from Study 2. Using impaired executive functioning as a proxy for cognitive control, we again found a negative between-person relationship with deliberate digital disconnection. Additionally, individuals with better executive functioning tended to more often disengage from smartphone use through straightforward situational goal-alignment strategies, such as "simply ignoring incoming calls and messages." This disengagement likely reflects not only better resistance to temptations (Baumeister, 2003) but also reduced temptation to begin with (see also Inzlicht & Roberts, 2024; Werner & Milyavskaya, 2019).

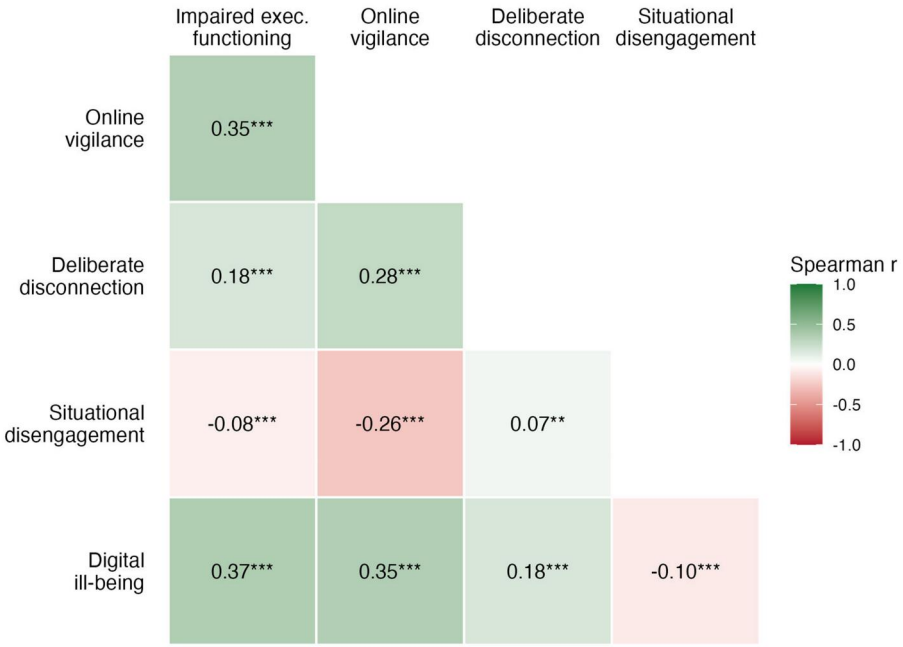


Figure 4 Between-Person Spearman rho correlations between deliberate disconnection from digital technology, situational disengagement from digital technology, trait online vigilance, digital ill-being, and impaired executive functioning.

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The findings have theoretical, methodological, and practical implications. Theoretically, they prompt a reconsideration of digital disconnection's conceptualization and operationalization. The common conceptualization of digital disconnection as an intentional, agentic strategy to regulate media use (Karsay & Vandenbosch, 2021) might inadvertently lead people to consider the use of *deliberate* disconnection strategies as a manifestation of high self-control, whereas our study suggests the reverse: while disconnection behavior *can* occur naturally and effortlessly, as a byproduct of more general situational goal-alignment processes and earlier developed disconnection "habits," for some individuals disconnection might require effort and deliberation. The theoretical difference between "digital disconnection" and "digital disengagement," as well as the conceptual question regarding the "grey zone" where these two concepts might come to overlap or come together in the form of "disconnection habits," warrants further theoretical consideration.

Additionally, we may question how "voluntary" disconnecting is for individuals low in self-control when the hedonic pull of digital media is so great for them that deliberate disconnection is their only resolve to withstand it. It remains unknown how successful these people are in upholding their deliberate disconnection, and what the downstream implications of their failure to keep it up may be, for instance in terms of self-conscious emotions (e.g., guilt) and self-efficacy beliefs. From an intervention perspective, however, conceiving of deliberate disconnection as a compensatory behavioral strategy originating out of a self-control deficit opens doors for digital phenotyping investigations, where these deficits might be detected, and tackled with potentially just-in-time-adaptive interventions. Such a possibility could allow for a more in-depth understanding of disconnection and how it can be facilitated, but it does not come without risks, as it could also open doors for targeting and exploiting of an already vulnerable group.

Methodologically, our study also highlights the importance of operationalizing items measuring digital disconnection carefully, with particular consideration for how some disconnection strategies require greater deliberation and effort than others, and how subtle differences in item wordings might thus inadvertently make these items capture aspects of underlying self-control.

Additionally, researchers need to carefully consider the separation of between- and within-person media effects in the design of their studies and the interpretation of results: Aggregated patterns across individuals do not necessarily reflect the processes that unfold within individuals over time and may even point in the opposite direction. This distinction has direct implications for how digital disconnection policies and interventions should be designed and implemented. First of all, relying on the wrong level of evidence risks promoting ineffective or even counter-productive recommendations that are ultimately misaligned with the intended goals of change. Second, approaches ideally take account of how considerate they are of underlying differences in self-control. One-size-fits-all interventions that center around straightforward self-control, for instance recommendations to "put your phone away" or "only check your email twice a day" are likely ill-suited to people low in self-control, as they are least equipped to enact such behavior (and may only develop greater guilt in response to recurrent failure).

Prior research on self-control has established that more successful interventions, then, are those that offer individuals attainable strategies for situational self-control, or that accommodate the situation for them. These strategies ideally "nip a tempting impulse in the bud" (Duckworth et al., 2016, p. 1). One way to do so is to encourage people to shape their digital environment so that temptations are simply removed. This could, for instance, mean incentivizing people who struggle to de-install "tempting" apps (e.g., social media, news, gaming) from their smartphone and mandating or infrastructurally enforcing (involuntary) disconnection where such accommodating measures are justifiable (e.g., in the classroom or while driving). Important to note is that, given that people low in self-control usually also struggle in other areas of life where there is a hedonic pull of a temptation (e.g., food consumption), more general interventions towards enhancing skills for situational self-control may spill over to the context of digital connectivity.

These solutions, however, still put the focus on the individual, and largely target the symptom rather than the cause: the hedonic pull of digital media environments. Indeed, the need for situational self-control strategies will reduce if responsibility shifts from the individual to the collective level. Institutions, technology designers, and society at large can accommodate disconnection so that it becomes a viable option for those who need it through regulation and intervention design. Even more helpful, however, would be to lower the need for deliberate disconnection to begin with, for instance by regulating addictive and manipulative design practices, and re-designing the Digital Society so that it is no longer "digital first" (Vanden Abeele et al., 2025).

Limitations

This study is not without limitations. A primary limitation concerns the small effect sizes, especially in Study 1. While typical for ESM studies, they raise questions about the study's validity and practical significance: Although the observed mechanism seems present, it requires replication, and its real-world impact may ultimately be modest.

Second, the deliberate disconnection measures in Study 1 and Study 2 were not pre-tested, and one may question to what extent they truly tap into the "deliberateness" of the behavior. Of particular note, in this regard, is that the measure in Study 2 required adjustment. One of the three intended scale items did not perform as expected during validation and was therefore omitted, leading to a two-item measure. While this measure allowed us to test our hypothesis and showed appropriate psychometric properties, it narrowed the construct's operationalization. The omitted item correlated negatively with impaired executive functioning, suggesting it may reflect a more habitual, low-effort strategy used by individuals high in cognitive self-control; however, further research is needed to substantiate this interpretation.

Third, the use of different measures across the two studies is a methodological limitation: Key constructs were not operationalized in the exact same manner, which prevents a direct comparison. However, this limitation may also be interpreted as a

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conceptual strength as our core hypothesis, the negative association between deliberate disconnection and self-control, was supported in both studies despite differences in operationalizations. This suggests the effect is robust and not merely an artifact of a single measure. Nonetheless, future research should aim to replicate this work using a single, consistent set of validated measures to confirm relationships.

Finally, the self-control paradox likely represents only one of several mechanisms underlying the Simpson's paradox in digital disconnection. Investigating additional mechanisms is beyond the scope of this article, but future research could explore alternative explanations (cf. Dienlin et al., 2025), such as time lag effects (see also Klingelhoefer et al., 2026) or an effect reversal. For instance, perhaps momentary disconnection benefits well-being, but when repeated creates pressure to "catch up." Combining experience sampling with longitudinal research may be particularly useful for examining such alternatives.

Conclusion

This article demonstrates the existence of a Simpson's paradox in the association between deliberate disconnection and digital ill-being, and shows support for the hypothesis that self-control is a potential confounder driving this paradox: Because people with lower self-control struggle more with simply disengaging from digital media, they are incentivized to shift towards more deliberate strategies that "de-fang" their hedonic pull.

Notes

1. Interestingly, this association was suppressed when controlling for general mental ill-being measures, which may result from these variables overlapping, as suggested in the current study.

Supplementary material

Supplementary material is available at *Journal of Computer-Mediated Communication* online.

Data availability

The data, analysis scripts and supplementary materials are available on the project's OSF page: https://osf.io/8r7pd/overview? view_only=aecaaf3583294d3b8292ca49cac04b12.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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Open science framework badges

Open Materials

The components of the research methodology needed to reproduce the reported procedure and analysis are publicly available for this article.

Open Data

Digitally shareable data necessary to reproduce the reported results are publicly available for this article.

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