Research on smartphone social media use has increased substantially in recent years. Mostly, it has been studied in relation to subjective well-being. In the public eye, social media use has been claimed to be especially harmful to children and adolescents, whose personalities are still developing and who often have difficulty judging whether information provided in the Internet is valid (Hasebrink et al., 2019). However, empirical findings on the associations between social media use and well-being in adolescents are highly heterogeneous, ranging from negative associations (Boer et al., 2021; Valkenburg et al., 2017) to null findings (Coyne et al., 2020; Jensen et al., 2019) to positive associations (Boer et al., 2020; Frison & Eggermont, 2017). One reason for this heterogeneity might be different approaches to operationalize social media use (Griffioen et al., 2020; see also Parry et al., 2021). In the majority of existing studies, social media use was assessed subjectively, with the intention that such measures should be as close to objective measures as possible. Hence, participants were instructed to estimate either the time in hours and minutes that they usually spend on specific social media platforms (e.g., “On the days that you use Instagram, how much time do you approximately spend on Instagram via your phone?” Verbeij et al., 2021; see also Boyle et al., 2022) or the frequency of social media use (“How many times per day do you view social network sites?” Boer et al., 2021). However, recent research has questioned the accuracy of such subjective usage estimates, as they have shown rather low congruence with objective usage data (Parry et al., 2021; Verbeij et al., 2021). Thus, it has been demonstrated that participants both underestimate (Jones-Jang et al., 2020; Katapally & Chu, 2019) and overestimate (Johannes et al., 2021; Verbeij et al., 2021) their usage (see also Parry et al., 2021).

To draw valid conclusions from empirical findings, the examined constructs have to be assessed with valid and reliable measurement instruments. Therefore, researchers have emphasized the need to precisely examine how subjective and objective measures of social media use...
relate to each other and to identify factors that are related to biases in self-reported estimates of social media use (Johannes et al., 2021; Sewall & Parry, 2021; Sewall et al., 2020; Valkenburg et al., 2021). Based on previous research showing that subjective time or frequency estimates show rather low accuracy (see Parry et al., 2021; Verbeij et al., 2021) and reliability, especially in adolescents (Scharfow, 2019), we decided to move beyond this kind of subjective assessment of social media use. Rather than instructing children to estimate the exact amount of time they spent on specific social media platforms or how often they engaged in social media, we instructed them to rate the intensity of use (“How much did you use Instagram today?”) with response options on a 5-point scale ranging from not at all to very much. Hence, this study examined the congruence of such an intensity-based subjective assessment of social media use and objective usage data derived from the smartphones.

Furthermore, there are recent attempts to investigate whether the biases in subjective estimates of social media use are systematic (e.g., Boyle et al., 2022; Burnell et al., 2021; Johannes et al., 2021). Thus, Boyle and colleagues (2022) found females to report their social media use less accurately than males, and Steele and colleagues (2023) found adolescents to overestimate their usage to a greater degree than adults. Furthermore, there is evidence for heavier social media users to be less accurate in their subjective estimates than lighter users (e.g., Facebook; Burnell et al., 2021; Sewall et al., 2020). Regarding personality, previous evidence has been inconsistent. There are studies showing that all five personality traits are linked to (some) social media activities (Liu & Campbell, 2017) or that conscientiousness, neuroticism, and openness are negatively associated with time spent on social media (Prasad et al., 2018). However, research on the prediction of the congruence of subjective and objective social media use based on personality traits is still at the beginning. For instance, Burnell and colleagues (2021) found conscientiousness to be associated with higher accuracy for Facebook, but not for Instagram, Twitter, or Snapchat. However, the authors emphasize that the significance of the effect changed in sensitivity analyses and should be interpreted with caution. In another study, neither personality trait significantly predicted social media accuracy (Johannes et al., 2021). Notably, none of these studies has been conducted with children or (young) adolescents.

On a daily level, boredom has been linked to smartphone use (Dora et al., 2021) but has not shown to be a consistent significant predictor of the accuracy of subjective social media use (Johannes et al., 2021). However, research in children is missing, and the authors measured boredom as an emotional state, leaving unclear whether boredom as the reason for using social media use might be linked to the congruence of subjective and objective measures.

Therefore, we investigated whether biases in subjective estimates might be systematic in children by testing whether person-level variables (e.g., personality) or daily states (e.g., boredom) predicted higher or lower congruence of subjective and objective social media reports.

The Present Study

The present study aims at extending previous work on the congruence of subjective and objective social media use in five ways. First, it targeted children, an age group that has been shown to regularly use social media platforms (Hasebrink et al., 2019; Krebs & Rynkowski, 2019) but has received little attention in past research. Second, we included newer social media platforms, that is, TikTok and YouTube (besides Instagram), which are used more and more but have been examined very little to date (DataReportal, 2022). Third, we used a different subjective measure of social media use, referring to an estimate of the subjective intensity of use instead of an estimate of the amount of time (minutes/hours) spent on social media and then examined the congruence of this new subjective measure and objective reports. We built on previous research showing that accuracy is higher when asking about specific content of use (i.e., social networking sites as compared to general Internet use; Scharkow, 2016) and that accuracy varies across different social media platforms (e.g., Verbeij et al., 2021) and analyzed the congruence between subjective and objective use separately for Instagram, TikTok, and YouTube. Fourth, we repeatedly assessed subjective and objective social media use on a daily basis in children’s everyday lives and natural contexts. This ambulatory assessment approach with close-in-time questions (e.g., referring to the current day) increases the ecological validity of findings (Ehner-Priemer et al., 2009) and reduces the confounding influence of systematic biases in retrospective self-reports (e.g., recall biases; Bolger & Laurenceau, 2013). A data structure with multiple assessments per individual further allows investigating associations at the within-person level. This is crucial, as previous research is mainly based on differences between individuals and, hence, does not allow for inferences about associations within individuals (Molenaar, 2004). However, for interventions to be effective, the targeted constructs need to be associated within individuals, highlighting the need for studies examining associations at the individual level (Valkenburg et al., 2021). And fifth, we investigated whether the discrepancy between subjective and objective reports was systematic. Building on previous
research, we examined participants’ gender (Boyle et al., 2022; Burnell et al., 2021), age (Burnell et al., 2021; Steele et al., 2023), the Big Five personality traits (Burnell et al., 2021; Liu & Campbell, 2017; Prasad et al., 2018), and general amount of use of respective social media platforms (Burnell et al., 2021; Sewall et al., 2020) as potential person-level variables as well as daily boredom (Dora et al., 2021; Johannes et al., 2021) as a potential state that might predict higher or lower congruence of subjective and objective social media use. Furthermore, in an exploratory manner, we investigated whether daily active or passive social media use were associated with higher or lower congruence.

We examined the following research questions (RQ 1–3):

RQ 1: How congruent are children’s reports of subjective and objective use of different social media platforms?

RQ 2: Are interindividual differences associated with the congruence of subjective and objective use of different social media platforms?

RQ 3: Are daily characteristics of use associated with the congruence of subjective and objective use of different social media platforms?

Method

Study protocol, codebook, data, and analysis code necessary to reproduce the main results reported here are available in the Open Science Framework (OSF) at https://osf.io/qwtrv/ (Irmer & Schmiedek, 2023a).

Participants

Two-hundred 10- to 14-year-olds (103 female; \(M_{\text{age}} = 11.71, SD_{\text{age}} = 1.02\)) and one of their parents (163 mothers) participated in this study. The majority of children reported German as their native language \((n = 160, 80.0\%)\) and attended the academic tier of secondary school \((\text{Gymnasium}; n = 151, 75.5\%)\). At the time the study was conducted, 84.5% (32.5%) of fathers (mothers) reported being full-time employed, 10.0% (56.0%) part-time employed, and 4% (10.0%) unemployed.

Procedure

Data were collected as part of the zEbra study between April and June 2021 in Germany. The zEbra study was a 14-day diary study embedded within a baseline assessment (for parents and children) and a post assessment (for children only). Participants were recruited via social media, e-mails to principals, sport and music clubs, and word of mouth. Interested parents were provided with online information on the study and could decide to enroll themselves and their children in the study. The study consisted of four parts that were conducted as online questionnaires on soscisurvey.de. First, participating parents completed a questionnaire \((\sim 10\text{ min})\) assessing background information on parents and children (e.g., parental employment). Then, participating children filled in a baseline questionnaire \((\sim 30\text{ min})\) that began with a video in which we explained the study procedure and guided participants on how to answer the questions. Following the video, children were asked to respond to items about their typical social media use and well-being, for instance. The 14-day diary part of the study began the following day. Children received a daily e-mail at 7 p.m. with a link to an online questionnaire that could be accessed from 7 p.m. to 10 p.m. Participants were instructed to complete it \((\sim 10\text{ min})\) just before bedtime. The day after the last day of the diary part, children were asked to fill in a post questionnaire \((\sim 10\text{ min})\) that contained similar questions to the baseline questionnaire as well as additional measures (e.g., problematic social media use) and feedback on study participation. Study participation was voluntary and could be terminated at any time. A total of 200 parents and children consented to participate in the study and completed at least one of the daily questionnaires. Compliance during the 14-day diary part was good (85%), revealing 2,382 available data points. No child dropped out during the study. Completion of the baseline questionnaire and the post questionnaire was remunerated with 5€ each. For each completed daily questionnaire, children received 1€. If at least 12 (of 14) daily questionnaires were completed, the amount was increased by a bonus of 10€. At the end of the study, participants could choose a voucher equal to the amount achieved. The study was approved by the local ethics committee (DIPF_EK_2021_11).

Measures

Daily Measures

Subjective Social Media Use

To indicate subjective intensity of social media use, participants indicated how much \((1 = \text{not at all} \to 5 = \text{very much})\) they had used each of the following social networking sites on that day: Instagram, TikTok, and YouTube.

Objective Social Media Use

Participating children were instructed to navigate to either the iOS Screen Time application implemented on iPhones
or to an application installed for the purpose of the study (Android) that provided information on social media use. They were then asked to enter the minutes and hours they had used each of the following apps that day: Instagram, TikTok, and YouTube. The response was converted into minutes for the analyses. A similar approach to assessing objective smartphone/social media use has recently been used in studies with adults (Sewall & Parry, 2021; Sewall et al., 2022).

**Boredom**
Participants indicated whether they had used social media because they had been bored or had had nothing else to do on that day on a scale from 1 (“not at all true”) to 5 (“completely true”).

**Active and Passive Use**
For Instagram, TikTok, and YouTube, participants were asked to indicate whether they had used it actively or passively (if they had used it at all). Appropriate items were developed for each platform (see Table 1). Items were answered on a scale from 1 (“not at all/nothing”) to 5 (“very much”).

**Person-Level Variables**

**Gender**
Parents indicated the gender of their child (0 = male, 1 = female, 2 = nonbinary). However, as no parent reported their child to be nonbinary, the gender variable was dichotomous in this study.

**Age**
Parents reported their child’s age (range 10–14).

**Personality**
We used the German short version of the Big Five Inventory for Children and Adolescents (BFI-K KJ) to assess

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**Table 1. Descriptive statistics**

<table>
<thead>
<tr>
<th>Items</th>
<th>M (SD)</th>
<th>M ISD (SD)</th>
<th>ICC</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subjective social media use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“How much did you use Instagram today?”</td>
<td>1.28 (0.72)</td>
<td>0.18 (0.34)</td>
<td>.70</td>
<td></td>
</tr>
<tr>
<td>“How much did you use TikTok today?”</td>
<td>1.65 (1.13)</td>
<td>0.33 (0.45)</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>“How much did you use YouTube today?”</td>
<td>2.17 (1.22)</td>
<td>0.73 (0.37)</td>
<td>.55</td>
<td></td>
</tr>
<tr>
<td><strong>Objective social media use: Now please enter the time you spent on the following social media today.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instagram</td>
<td>5.21 (19.74)</td>
<td>5.00 (14.96)</td>
<td>.33</td>
<td></td>
</tr>
<tr>
<td>TikTok</td>
<td>24.60 (51.34)</td>
<td>15.21 (23.94)</td>
<td>.71</td>
<td></td>
</tr>
<tr>
<td>YouTube</td>
<td>46.28 (80.04)</td>
<td>36.62 (48.85)</td>
<td>.50</td>
<td></td>
</tr>
<tr>
<td><strong>Boredom</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“I used social media today, because I was bored or had nothing else to do.”</td>
<td>2.52 (1.43)</td>
<td>0.81 (0.49)</td>
<td>.56</td>
<td></td>
</tr>
<tr>
<td><strong>Active use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“How much did you post or share on Instagram today (whether in the story or the feed)?”</td>
<td>1.43 (0.93)</td>
<td>0.44 (0.52)</td>
<td>.50</td>
<td></td>
</tr>
<tr>
<td>“How much did you post or share on TikTok today?”</td>
<td>1.21 (0.62)</td>
<td>0.35 (0.46)</td>
<td>.12</td>
<td></td>
</tr>
<tr>
<td>“How much did you post on YouTube yourself today?”</td>
<td>1.13 (0.63)</td>
<td>0.11 (0.34)</td>
<td>.57</td>
<td></td>
</tr>
<tr>
<td><strong>Passive use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>“How much did you look at others’ posts, stories, or profiles on Instagram today?”</td>
<td>2.94 (1.10)</td>
<td>0.67 (0.44)</td>
<td>.51</td>
<td></td>
</tr>
<tr>
<td>“How much did you look at others’ posts or profiles on TikTok today?”</td>
<td>3.27 (1.22)</td>
<td>0.81 (0.34)</td>
<td>.47</td>
<td></td>
</tr>
<tr>
<td>“How much did you watch videos or profiles of others on YouTube today?”</td>
<td>3.09 (1.20)</td>
<td>0.69 (0.42)</td>
<td>.56</td>
<td></td>
</tr>
<tr>
<td><strong>Personality</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>3.49 (1.02)</td>
<td></td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>Neuroticism</td>
<td>2.61 (0.89)</td>
<td></td>
<td>.79</td>
<td></td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>3.33 (0.75)</td>
<td></td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>Agreeableness</td>
<td>3.83 (0.70)</td>
<td></td>
<td>.70</td>
<td></td>
</tr>
<tr>
<td>Openness</td>
<td>3.67 (0.66)</td>
<td></td>
<td>.75</td>
<td></td>
</tr>
</tbody>
</table>

Note. All items were presented in German. ICC = intraclass correlation (proportion of between-person to total variance); M ISD = mean intraindividual SD. Reliability was calculated as McDonald’s Omega. Please note that the ICC and M ISD cannot be calculated for Level-2 variables and that Omega cannot be calculated for single-item measures.
extraversion, agreeableness, conscientiousness, neuroticism, and openness (Kupper et al., 2019). The questionnaire comprises 26 items (e.g., "I worry a lot") and was answered on a scale from 1 ("not at all true") to 5 ("completely true"). Reliability estimates of all personality variables are presented in Table 1.

Analyses

Data comprised a multilevel structure with repeated measures (Level 1) being nested within participating children (Level 2). First, we descriptively explored the two measures of social media use, examining their means, SDs, intraclass correlations, and intraindividual SDs.

To visualize the relation among subjective and objective reports (RQ1), we created separate boxplots for each social media platform showing whether a higher number of minutes of use was associated with higher subjectively indicated use (ranging from 1 to 5). To further quantify this association, we calculated between- and within-person correlations of subjective and objective social media use. Furthermore, we computed multilevel models (MLMs) with the nlme package (Pinheiro et al., 2019) of the statistical software R for Windows, Version 4.2.2 (R Core Team, 2017) using maximum likelihood estimation. A conventional α level of .05 was applied to all tests and significance of fixed effects was evaluated with the package’s default estimation of degrees of freedom. Significance of random effects was tested via likelihood ratio tests, comparing the fit of the model with versus without the random variance component. We allowed intercept and slope to vary across children, indicating differences in the strengths of the associations of subjective and objective social media use.

Random effects were allowed to covary. To examine whether subjective social media use was biased, we assumed objective social media use to be the “true” (i.e., nonbiased) measure (see also Johannes et al., 2021). Hence, we investigated the between- and within-person effects of objective social media use on subjective social media use. We calculated the individual person-mean of objective social media use as the respective average aggregated across all up to 14 assessments of a child. This person-mean was centered on the grand mean, that is, on the mean of all daily assessments across all children, and was entered as a Level-2 predictor. Daily responses to objective social media use were centered on the person means and entered as Level-1 predictors. Furthermore, we investigated potential motivational or learning effects by including the moderation between a centered variable coding study day and person-mean centered objective social media use. Furthermore, we calculated changes in pseudo-\(R^2\) for the between- and within-person level (for more information see ESM 1, part I). To examine RQ2 and RQ3, we performed one moderator analysis per outcome, respectively. Thus, we included the (cross-level) interaction between daily objective social media use and either all person-level (RQ2) or all day-level moderators (RQ3). This allowed us to examine whether potential moderator variables explained differences between children in the strengths of the associations of subjective and objective social media use.

Results

Descriptive Statistics

There were 2,382 available data points out of a possible maximum of 2,800, indicating good participant compliance (85%). Descriptive statistics can be found in Table 1 and indicated that, overall, children reported the highest use for YouTube, followed by TikTok and Instagram. The intraclass correlation and the intraindividual SD showed that all items demonstrated interindividual and intra-individual variation, indicating that children differed from each other in how much they used each platform and that, within children, the amount of use varied across days. Figures showing objective and subjective use of Instagram, TikTok, and YouTube across age and gender can be found in ESM 1, Figures E1 and E2.

RQ1: How Congruent Are Children’s Reports of Subjective and Objective Use of Different Social Media Platforms?

We first descriptively compared the two measures of social media use by creating individual boxplots for each social media platform (i.e., Instagram, TikTok, YouTube; see Figure E3 in ESM 1). Across platforms, higher subjective use was associated with a higher number of objectively reported minutes of use. Hence, subjective and objective social media use were positively associated with each other. To further quantify this association, we calculated between-person and within-person correlations of subjective and objective use. These correlations were significant for all social media platforms on the between-person level (Instagram: \(r_b = .95\); TikTok: \(r_b = .93\); YouTube: \(r_b = .77\)) and on the within-person level (Instagram: \(r_w = .36\); TikTok: \(r_w = .58\); YouTube: \(r_w = .49\)). As a next step, we computed multilevel models in which subjective social media use was predicted by objective social media use. The analyses showed that objective use positively predicted subjective use on the between-person level (Instagram: \(b = 0.04, p < .001\), \(\Delta\text{pseudo-}R^2 = 0.82\); TikTok: \(b = 0.02, p < .001\), \(\Delta\text{pseudo-}R^2 = 0.86\); YouTube: \(b = 0.01, p < .001\),
Δpseudo-$R^2 = 0.60$), indicating that children who generally had higher objective use of social media also reported higher subjective use. Likewise, associations on the within-person level were significant (Instagram: $b = 0.03, p < .001$, Δpseudo-$R^2 = 0.44$; TikTok: $b = 0.02, p < .001$, Δpseudo-$R^2 = 0.56$; YouTube: $b = 0.02, p < .001$, Δpseudo-$R^2 = 0.53$), implying that days on which children objectively used more social media than usually were days on which they subjectively reported higher social media use. Furthermore, we investigated whether the strength of the association between subjective and objective use changed across the course of the study (i.e., motivational or learning effects). For TikTok and YouTube, these moderator effects were not significant (TikTok: $b = -0.000, p = .11$; YouTube: $b = -0.000, p = .37$). For Instagram, there was a significant negative effect, $b = -0.001, p < .001$, indicating that the association between subjective and objective use became weaker as study days increased. This may be due to declining motivation to answer the question carefully.

**RQ2: Are Interindividual Differences Associated With the Congruence of Subjective and Objective Use of Different Social Media Platforms?**

First, we examined the significance of random effects to test whether there were reliable interindividual differences in the within-person effects of objective use on subjective use. We found highly significant random effects for all three platforms [Instagram: $\chi^2(2) = 825.03$, $p < .001$, TikTok: $\chi^2(2) = 693.05$, $p < .001$, YouTube: $\chi^2(2) = 715.91$, $p < .001$]. Then, we explored whether these interindividual differences could be explained by person-level characteristics. Of the 24 cross-level interaction effects investigated, only three reached significance. That is, for all three platforms, we found higher average objective use to be associated with a weaker link between daily objective and subjective use, hence, with a systematic bias in the subjective measure and lower congruence of both measures. Detailed results can be found in Table E1 in ESM 1.

**RQ3: Are Daily Characteristics of Use Associated With the Congruence of Subjective and Objective Use of Different Social Media Platforms?**

We examined whether daily characteristics of use were related to the strengths of the links between subjective and objective social media use, hence, to higher or lower congruence. Of the nine interaction effects, two were found to be significant. Thus, active use of Instagram was linked to higher congruence of subjective and objective Instagram use, and passive use of TikTok was linked to lower congruence of subjective and objective TikTok use. Detailed results can be found in Table E1 in ESM 1.

**Sensitivity and Robustness Analyses**

Further analyses on the robustness of our findings revealed that the significances of our results remained essentially the same for different subsets (excluding children/days without social media use) and for log transformation of data. For details on these analyses, please see ESM 1, part II.

**Discussion**

The present study examined the congruence of a subjective and an objective assessment of the use of three social media platforms (i.e., Instagram, TikTok, and YouTube) in children aged 10–14 years. Notably, this work extends previous research by investigating a newly developed measure of subjective social media use: Every day, children were instructed to rate how much they had used each of the social media platforms on a scale from *not at all* to *very much* instead of trying to estimate the exact time they had spent on each platform. Our findings showed that these subjective measures are associated with objective measures on the interindividual and intrapersonal level; however, subjective and objective reports do not completely coincide. Verbeij and colleagues (2021) investigated between-person and within-person correlations of subjective time estimates and objective digital trace data of social media use in adolescents using an intensive longitudinal study. Compared to them, we found descriptively stronger associations between our subjective intensity measure and objectively reported use. Hence, the between-person correlation of subjective and objective Instagram use was .22 in the study by Verbeij and colleagues (2021), while it was .95 in the present study. Likewise, within-person correlations of subjective and objective Instagram use were .19 in the study by Verbeij and colleagues (2021) and .36 in the present study. Also, our correlations on both levels were (descriptively) higher than those for actual and estimated social media use reported by Boyle and colleagues (2022) and by Sewall and colleagues (2020), although the authors intended to measure the exact same construct subjectively and objectively (i.e., time spent on social media). Notably, there are also studies documenting nonsignificant correlations between subjective and objective measures of social media use (e.g., Mahalingham et al., 2023). By contrast, our findings were highly robust, remaining significant when log-transforming the objective measure, when excluding children who consistently did not use social media, and when considering only days on which social media had been used at all. This suggests that our subjective intensity measure might be a valid and accurate (in terms of congruence with an objective measure) alternative to subjective time estimates.
Further analyses pointed to systematic biases in the subjective measure, as indicated by interindividual characteristics as well as daily characteristics of use being linked to higher or lower convergence of subjective and objective measures. We consistently found that children who on average used a platform more than other children had a lower congruence of subjective and objective measures. This suggests that it might be more difficult for heavy users to classify whether they had used TikTok *much* or *very much* on a given day than for lighter users. However, our findings remained significant when considering only children who had used a specific social media platform at all across the study. When considering only days on which platforms had been used at all, higher average TikTok use and higher average YouTube use still were associated with lower congruence of respective subjective use, whereas Instagram was not. This suggests that the interaction of Instagram, specifically, might mainly be driven by nonuse. However, our findings are consistent with previous research showing that heavier users estimate their social media use less accurately than lighter users (e.g., Facebook; Burnell et al., 2021; Sewall et al., 2020) and extends prior work to different platforms and much younger users. Further research is needed to replicate these findings.

Contrary to the results reported by Boyle and colleagues (2022), we did not find females to show a lower congruence of subjective and objective use of any of the three examined platforms than males. However, it is important to note that we examined 10–14-year-olds, while Boyle and colleagues (2022) examined college students. Thus, it is quite possible that gender differences have not (yet) developed in our younger sample. In contrast to a study comparing adolescents with adults (Steele et al., 2023), we did not find evidence for the congruence of subjective and objective measures to vary across age in our study. However, we examined participants in late childhood to early adolescence, hence, a relatively small developmental stage, with comparably few children aged 14 years. Perhaps, there may emerge age differences when covering a wider age range.

Regarding personality, previous evidence has been inconclusive. In our study, we did not find personality to predict higher or lower congruence of subjective and objective social media use.

For daily characteristics, we did not find daily boredom to be associated with higher or lower congruence of subjective and objective social media reports. Thus, despite different measurements of boredom (as a reason to have used social media vs. as a general emotional state), our findings are mainly in line with Johannes and colleagues (2021). Furthermore, exploratory analyses revealed that on days children reported higher active Instagram use than usually, they showed a higher congruence of subjective and objective Instagram use. We also found that on days children reported higher passive TikTok use than usually, they showed a lower congruence of subjective and objective TikTok use. These findings have shown to be robust against log-transforming the objective measure, excluding children who had not used a specific platform, and excluding days on which a platform had not been used. Hence, our study demonstrates that daily characteristics of social media use may be associated with the congruence of subjective and objective measures of social media use.

**Limitations**

There are several limitations that should be considered when interpreting the current results. First, generalizability of findings is limited as we analyzed a convenience sample of German children. Furthermore, the sample seemed to be positively selected, as indicated by high education and high income of parents. Future studies should aim at selecting samples that are more diverse than and not as WEIRD as the present sample.

Second, we were not able to verify whether participants truthfully reported objective usage data provided by their smartphones. Hence, as we cannot preclude that some participants provided incorrect objective usage data, the present findings should be replicated using a method for objectively retrieving usage data directly from the smartphones.

Third, we did not include a subjective time estimate measure, which is why we were not able to directly compare our subjective intensity measure with such a time estimate. Related to this, our data did not allow to differentiate between overreporting and underreporting. Further research should follow up on this and explore and compare both types of measures more closely.

Fourth, we evaluated the prediction of subjective by objective use as meaningful (i.e., adequate) in case of a significant association. However, future work should aim at defining a smallest effect size of interest that can then be recorded in preregistrations of studies.

**Conclusion**

The current work advances research on social media use, as it examined the congruence of objective social media use with a subjective estimate of the intensity of use as an alternative to traditional subjective time estimates. We demonstrated that our subjective intensity measure exhibited correlations with objective measures that were descriptively higher than correlations between subjective and objective time measures documented in prior
Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1027/2151-2604/a0000535

ESM 1. Part I: Calculation of pseudo-R2 and sensitivity analyses. Figure E1: Subjective use across age and gender. Figure E2: Objective use across age and gender. Figure E3: Boxplots of subjective and objective use. Table E1: Effects of potential moderators. Part II: Sensitivity and robustness analyses.

References


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Conflict of Interest
The authors have no conflict of interest to report.

Publication Ethics
Informed consent was obtained from all participants in the study. The study was approved by the local Ethics committee.

Authorship
Andrea Irmer: Conceptualization, formal analysis, funding acquisition, investigation, methodology, writing – original draft preparation. Florian Schmiedek: Writing – review & editing. All authors approved the final version of the article.

Open Data
All data and analysis code necessary to reproduce the results reported in this manuscript are available in the accompanying Open Science Framework (OSF) repository: https://osf.io/qwtrv/ (Irmer & Schmiedek, 2023a). A study protocol containing more detailed information on our study and a codebook including information on all variables assessed can also be found on the project OSF repository: https://osf.io/7a3jy/ (Irmer & Schmiedek, 2023b).

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