

Are Social Media Ruining Our Lives? A Review of Meta-Analytic Evidence

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Manuscript accepted for publication in the journal *Review of General Psychology*.

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This work was supported by the German Science Foundation (DFG) Grant AP 207/2-1, awarded to Markus Appel.

Abstract

A growing number of studies have examined the psychological corollaries of using Social Networking Sites (SNSs) such as Facebook, Instagram or Twitter (often called social media). The interdisciplinary research area and conflicting evidence from primary studies complicate the assessment of current scholarly knowledge in this field of high public attention. We review meta-analytic evidence on three hotly debated topics regarding the effects of SNSs: well-being, academic achievement, and narcissism. Meta-analyses from different labs draw a rather equivocal picture. They show small associations in the $r = .10$ range between the intensity of SNSs use and loneliness, self-esteem, life satisfaction, or self-reported depression, and somewhat stronger links to a thin body ideal and higher social capital. There is no indication for potential devastating effects of social media on school achievement, social media use and school grades are unrelated for adolescents. The meta-analyses revealed small to moderate associations between narcissism and SNS use. In sum, meta-analytic evidence is not in support of dramatic claims relating social media use to mischief.

Keywords: Social Media; Meta-Analysis; Narcissism; Achievement; Well-Being

Are Social Media Ruining Our Lives? A Review of Meta-Analytic Evidence

The immense popularity of Social Networking Sites (SNSs) such as Facebook, Twitter, Instagram, or Snapchat (often referred to as social media) has fueled a debate on the psychological antecedents, correlates, and consequences of using these platforms. Numerous popular science books, newspaper articles, and blog posts have highlighted the supposedly negative consequences that intense social media use has on individuals and societies as a whole (e.g., Carr, 2010; Lanier, 2018; Turkle, 2011; Twenge, 2017a, 2017b). Others have argued for a more positive view on social media use (e.g., Pinker, 2018). Both perspectives appear to be backed by theory and empirical evidence. There is a large number of diverging empirical findings on social media, thus, commentators can cherry-pick whatever study result fits their scientific, journalistic, or personal narrative. For researchers and educators not deeply involved in the specifics of this research field, evaluating empirical evidence is difficult, if not impossible.

This review goes beyond individual findings. We will clarify the relationships between more or less intensive social media use and key psychological variables by reviewing recent meta-analytic evidence. We focus on three topics of research: well-being, academic achievement, and narcissism. All three areas have attracted a substantial amount of scholarly attention and they are extensively discussed by researchers inside and outside the imminent field, journalists, educators, and parents.

Social Networking Sites and the Public Debate

Innovations in the field of communication and technology have been met with criticism since ancient times. Socrates condemned the stylus (a writing utensil made of reed or bone), which enabled people to communicate written language, as he prophesized a downturn of human's memory and cognition (Plato 399-347 BCE / Cooper, 1997). The printing press was met with skepticism (Gessner, 1545, as cited in Blair, 2003), as were newspapers, because they

ostensibly isolated readers from social gatherings. More recently, it was the telephone, the radio, and then the television that were linked to an excess of information, a loss of manners, and a decline of skills and academic performance (e.g., Postman, 1985; see for example Karabell, 2018). Today, SNSs are among the innovations that are perceived to darken the future of individuals and humankind. As of March 2019, the biggest SNS Facebook reports 2.38 billion monthly active users (Facebook, 2019) and more than half of US citizens aged 64 or younger use SNSs regularly (Pew Research Center, 2018).

The popularity of social media and the smartphone has been characterized as a challenge of epic dimensions: Twenge (2017a), for example, states that “the twin rise of the smartphone and social media has caused an earthquake of a magnitude we’ve not seen in a very long time, if ever” and that individuals born since 2000, individuals who grew up with smartphones and SNSs (sometimes referred to as *iGen*) are doomed: “it’s not an exaggeration to describe iGen as being on the brink of the worst mental-health crisis in decades”.¹

Do these and similar worries reflect the status quo of scientific evidence? We review empirical research on the notions that activities on SNSs a) are related to lower well-being and psychological health, b) are associated with lower performance at school, and c) suit and reinforce narcissism. Unlike other available reviews (e.g., Holland & Tiggemann, 2016; Kuss & Griffiths, 2011; Wilson, Gosling, & Graham, 2012) our focus is on meta-analytic research. Meta-analyses are – as we argue in the following section – a key approach to garner evidence in a field that is contested and rich of conflicting primary studies.

¹ Online source without pagination

The Meta-Analytic Method and Social Media

Research on Facebook, Twitter, and social media in general has surged in recent years. Within five years, academic publications on SNSs and its psychological correlates have nearly doubled (see Figure 1). Today, more is known on the antecedents and consequences of social media than any time before; but at the same time, the ability to draw generalizable conclusions is limited because few researchers manage to keep track of the steadily increasing research output. Rather, the complexity of the field tempts authors to refer to individual studies that fall in line with their assumptions while ignoring contradictory findings. Borrowing a famous quote, “we find ourselves in the mildly embarrassing position of knowing less than we have proven“ (Glass, 1976, p. 8). Therefore, systematic reviews are indispensable to organize the empirical evidence in a field and summarize the current state of knowledge. Particularly, quantitative reviews in the form of meta-analyses have been advocated to cumulate empirical results on important psychological phenomena (e.g., Braver, Thoemmes, & Rosenthal, 2014; Schmidt & Hunter, 2014).

Meta-analysis refers to a set of statistical methods to aggregate empirical results from individual studies to derive population-level effects between variables (Glass, 1976). Importantly, they allow for the estimation of unbiased effects by correcting for artifacts inherent to most individual studies (Schmidt & Hunter, 2014). Seemingly conflicting findings published in the literature can be frequently attributed to sampling error, measurement error, or other biasing influences that compromise empirical studies (cf. Gnambs, 2014, 2015; Lakens & Etz, 2017; Viswesvaran, Ones, Schmidt, Le, & Oh, 2014). Such conflicting findings are prevalent in research on social media: Some studies, for example, showed that the intensity of using social media was related to more loneliness and less self-esteem (e.g., Lemieux, Lajoie, & Trainor, 2013; Petrocchi, Asnaani, Martinez, Nadkarni, & Hofmann, 2015), whereas others found no such

associations (e.g., Jin, 2013; Wohn & LaRose, 2014). Meta-analyses of the available empirical results are able to identify a common effect across all studies and examine whether the heterogeneity in the observed study results can be attributed to third variables moderating the bivariate relationship or are merely a consequence of unaccounted artifacts. Thus, the meta-analytic method is an essential tool to evaluate the generalizability of psychological phenomena that has been increasingly questioned during the recent replication debate (Open Science Collaboration, 2015). Regarding research on social media, meta-analyses can scrutinize the stability of associations across, for example, different social media platforms, populations, or activities on SNSs (cf. Ebersole et al., 2016; Klein et al., 2014, 2018; O'Donnell et al., 2018). Moreover, meta-analyses can alleviate the problem of insufficient power in many individual studies (Szucs & Ioannidis, 2017) to identify small effects that are typically encountered in psychological research (Bosco, Aguinis, Singh, Field, & Pierce, 2015; Gignac & Szodorai, 2016). However, one caveat needs to be noted: Precise effect size estimation in meta-analyses presumes no substantial file drawer problem. Because published effects sizes from underpowered studies tend to be, on average, larger (Szucs & Ioannidis, 2017), this effect size inflation can lead to substantially exaggerated pooled effects in meta-analyses, particularly, if many underpowered studies are included and negative findings from unpublished studies are ignored (Nuijten, van Assen, Veldkamp, & Wicherts, 2015). However, the extent of publication bias and the frequency of questionable research practices in psychology is a matter of ongoing debate (Stanley, Carter, & Doucouliagos, 2018).

Despite the potential benefits of meta-analyses, they also leave room for imprecision and subjectivity on part of the researcher (Bangert-Drowns, 1997; Fava, 2002; Lakens, Hilgard, & Staaks, 2016). Although the reproducibility of single meta-analyses has rarely been examined, available evidence suggests that many meta-analytic results in psychology cannot be reproduced

in independent replications (Lakens et al., 2017) and methodological errors are common (Gøtzsche, Hróbjartsson, Marić, & Tendal, 2007). Even less is known about the commonality of meta-analytic results conducted with a similar goal by different research labs. Case-wise evidence suggests that different decisions made with respect to the inclusion of studies and statistical procedures can lead to remarkably diverging meta-analytic results. For example, until the emergence of social media, the topic of media violence had dominated scholarly and public discussions on the impact of media use. In this field, meta-analysts have come to diverging results and interpretations with researchers showing clear evidence for a violent media-aggression link (Anderson et al., 2010; Greitemeyer, & Mügge, 2014; see also Boxer, Groves, & Docherty, 2015; Rothstein & Bushman, 2015), whereas others demonstrate that there is no such substantial link (Ferguson, 2015; Ferguson & Kilburn, 2009; Furuya-Kanamori, & Doi, 2016).

The present review is focused on meta-analyses of correlational studies between social media use on the one hand and narcissism, academic achievement, or well-being on the other hand. These three domains are chosen for two reasons. First, these themes have been extensively discussed by academics and the general public alike. New studies addressing these variables are still published regularly. Second, at least three meta-analyses have been published for each research theme in the past months, allowing us to assess not only the meta-analytic evidence on key themes of social media use, but also on the *converging* evidence between meta-analytic studies in this research area. There is no other topic that has received a similar amount of scholarly attention.

We review the available meta-analytic evidence on the correlates of SNS use and evaluate to what degree the pessimistic assertions that have dictated public discussions are supported by empirical evidence. We focus exclusively on cross-sectional, non-experimental research that has dominated research so far and, therefore, has been meta-analytically summarized. Although

bivariate correlations do not indicate causality, they are a pre-condition without which a search for causal mechanisms seems futile. Our attempt is falsification: if SNSs destroyed our lives as suggested by some (e.g., Twenge, 2017a), we would expect moderate to large correlations. Statements on the abysmal influence of social media would suggest large correlations between social media use and psychological indicators of maladjustment. However, large effects are very rare in psychological research (cf. Bosco et al., 2015; Gignac & Szodorai, 2016), so it would be unfair to expect large effects ($r = .50$) in terms of frequently cited benchmarks (Cohen, 1992). Rather, we would reasonably expect effects between $r = .10$ and $r = .30$ that represent typical effects in social psychology according to empirical effect size distributions (Richards, Bond, & Stokes-Zoota, 2003). Thus, we will interpret the available evidence against an association of $r = .20$, reflecting that 4% or more of variations in well-being (and academic achievement and narcissism) co-vary with social media use.²

Social Media Use and Well-Being

Theoretical Background

Since the advent of social networking sites, researchers have connected digital communication to users' well-being, including their self-concept in terms of self-esteem, life satisfaction, loneliness, and social capital. Several lines of argumentation have been brought up that connect social media use to lower well-being. First, communication on social media might be a replacement of spending valuable time on face-to-face communication (Nie, 2001). There is ample evidence that face-to-face communications with family, friends, and acquaintances is related to higher well-being (cf. Sullivan, 1953; Adams, Santo, & Bukowski, 2011). According to

² To put this benchmark into perspective: A correlation of .20 corresponds to the effectiveness of nicotine patches on smoking abstinence, is even twice the correlation between gender and risk-taking behavior (Meyer et al., 2001), and compares to the effect of four additional years of education on intelligence gains (Ritchie & Tucker-Drob, 2018).

this line of argumentation, communication on SNSs does not provide the same benefits to well-being as face-to-face encounters, because the former supposedly lacks quality and depth (cf. Yang, Brown, & Braun, 2014). As a consequence, more intense use of SNSs in terms of time spent online or login frequency should lead to lower well-being. This effect could be amplified by users' negative thoughts and feelings about having wasted time online (Sagioglou & Greitemeyer, 2014).

Second, social media provide ample opportunities for social comparisons (cf. Festinger, 1954). SNS users can compare themselves with other users or celebrities on dimensions that are relevant to self-worth such as attractiveness or social connectedness. Other things equal, individuals tend to engage in upward social comparisons and evaluations tend to be in contrast to the target rather than in line with the target (contrast over assimilation), as corroborated in a recent meta-analysis (Gerber, Wheeler, & Suls, 2018). Thus, the intensity of using SNSs should be associated with more detrimental social comparisons, which in turn should be related to lower well-being. The tendency of online community members to select and create highly flattering portrays of themselves should contribute to negative social comparisons outcomes (Feinstein et al., 2013; Fox & Vendemia, 2016).

Third, intense SNSs use increases the likelihood of being exposed to and engaging in highly self-worth endangering online communication, such as cyberbullying, grooming by strangers, and sexting. Being the victim (as well as the perpetrator) of cyberbullying has been connected to lower well-being (for meta-analytic evidence see Kowalski, Giumetti, Schroeder, & Lattanner, 2014). Finally, the more individuals are 'permanently online – permanently connected' on SNSs (Vorderer, Reinecke, Hefner, & Klimmt, 2017), the higher the mental load due to multitasking, the higher their stress, and the worse the quality and quantity of sleep, all factors associated with lower well-being.

Other lines of argumentation have related social media use to a potential for higher well-being. First, social contacts on SNSs could be valuable by providing and psychologically representing social capital (Ellison, Steinfield, & Lampe, 2007; Wang, Chua, & Stefanone, 2015), that is, “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition” (Bourdieu, 1985, p. 51). More social capital, in turn, is associated with higher well-being. Second, the feedback obtained on SNSs is often positive (there is no dislike button on Facebook) and positive feedback is related to higher well-being (Burrow & Rainone, 2017). Third, SNSs provide ample access to information and communication partners, they offer extra means and time to create one’s own messages, and the level of anonymity can be adjusted. As compared to face-to-face communication, these additional opportunities increase people’s degrees of freedom and the controllability of social encounters. Therefore, SNSs can assist users’ self-presentation and self-disclosure (cf. Valkenburg & Peter, 2011). Successful self-presentation and self-disclosure, in turn, are associated with higher well-being (Kim & Lee, 2011).

Meta-Analytic Evidence

Four meta-analyses have recently addressed the relationship between social media use and indicators of well-being (Huang, 2017; Liu, Ainsworth, & Baumeister, 2016; Liu & Baumeister, 2016; Mingoia, Hutchinson, Wilson, & Gleaves, 2017)³. This includes meta-analytic analyses on self-esteem, life satisfaction, depression, and loneliness. Moreover, meta-analytic findings on social capital and the internalization of a thin body ideal are reported, as these variables represent

³ A fifth meta-analysis (Yoon, Kleinman, Mertz, & Brannick, 2019) examining the association between SNS use and depression was published after finishing this manuscript. The identified effect closely mirrors the findings in Huang (2017).

relevant mechanisms assumed to reflect the association between SNSs and well-being. Note that one additional meta-analysis on loneliness was not included in this review because the validity of this meta-analysis is questionable (Song et al., 2014).⁴

Main findings are summarized in Figure 2 and Table S1 in the Online Supplement. The associations between the time spent on SNSs or a global measure of SNSs intensity on the one hand and the well-being indicators on the other hand were significantly ($p < .05$) negative, as indicated by findings on self-esteem (Huang, 2017: $r = -.04$, 95% CI[-.08; -.00]; Liu & Baumeister, 2016: $r = -.09$, 95% *CrI*[-.14; -.03]⁵), life satisfaction (Huang, 2017: $r = -.03$, 95% CI[-.11; -.01]), and depression (Huang, 2017: $r = .11$, 95% CI[.07; .15]). However, the identified pooled effects were rather small: SNS use explained about 1% of variance in the well-being indicators at the most. These results provide only weak support for the assumption that the intensity of SNSs use is associated with lower self-esteem, less life satisfaction, and more depression. Regarding loneliness, the associations were quite similar to the other well-being indicators (Huang, 2017: $r = .08$, 95% CI[.04; .13]; Liu & Baumeister, 2016: $r = .17$, 95% *CrI*[-.09; -.24]) and also failed to substantiate a large association. When different patterns of SNS behaviors were analyzed, the size of one's social network (i.e., the number of followers or friends) was positively associated with self-esteem; however, the respective effects were small, $r = .07$, 95% *CrI* [.01; .14] (Liu & Baumeister, 2016). Generally stronger support was obtained for the relationship between SNS use and the internalization of a thin body ideal, $r = .18$, 95% CI[.12, .23] (Mingoia et al., 2017), and for the relationship between SNS use and social capital

⁴ In their meta-analysis on SNSs and loneliness Song and colleagues (2014) also included primary studies that investigated the link between SNSs and extraversion/introversion, because introversion was perceived to be a measure for loneliness. We believe that introversion and loneliness are too different to conceive one as a measure of the other (see, for example, Mund & Neyer, 2016).

⁵ The authors did not report standard errors or confidence intervals but provided the credibility interval (*CrI*).

(Liu et al., 2016): SNSs use indicators were associated with the creation and maintenance of superficial interpersonal relationships (without strong emotional involvement) at $r = .32$, 95% CI[.27, .37] and, to a lesser degree, also with the maintenance of close, intimate relationships at $r = .22$, 95% CI[.21, .24]. Thus, meta-analytical evidence provides some support for both, social comparison processes (linked to lower well-being) as well as for higher social capital (linked to higher well-being).

Some meta-analyses observed substantial heterogeneity between the pooled studies indicating unaccounted moderating influences. For example, the 95% credibility interval for SNS effects on self-esteem (Liu & Baumeister, 2016) ranged from $r = -.14$ to $-.03$. With respect to moderation analyses, Liu and Baumeister (2016) found some indication of cultural differences: The relationships between general SNS use or SNS interactions on the one hand and self-esteem on the other hand were smaller in studies with Western samples (North America and Europe) as compared to studies with Asian samples (e.g., China or Korea). Moreover, SNS use and bridging social capital (i.e., regarding superficial, weak ties) were more strongly related in Western cultures; no influence of culture was observed for bonding social capital (Liu et al., 2016). Regarding moderation effects of gender, findings were mixed. Whereas Huang (2017) and Liu and Baumeister (2016) identified no effect of gender (i.e., the proportion of female participants in the primary studies), the relationship between SNS use and social capital decreased with an increasing proportion of women, indicating the link between SNS use and bridging social capital could be more pronounced for men than for women (Liu et al., 2016).

Conclusion

The available meta-analyses provide only weak support for a negative linear association between well-being and SNS use. Our benchmark of $r = .20$ (4% shared variance) – indicating a noteworthy support for potential devastating effects of social media – was not met in the

relationships between social media use and life satisfaction, depression, or related indicators of well-being. Despite claims made by journalists or authors of popular science books, meta-analytic summaries show no strong linear link between the overall intensity of SNSs use and loneliness, self-esteem, life satisfaction, or self-reported depression. Social capital, a more proximate correlate of SNS use, exceeded our benchmark of effect sizes greater than .20. This association is remarkable: SNSs seem to provide a platform for the creation and maintenance of close and intimate (but also more shallow) relationships (Liu et al., 2016). However, given the rather small correlation between the number of friends or followers on SNSs and self-esteem (Liu & Baumeister, 2016), it is questionable whether increases in social capital with the help of SNSs can translate into meaningful well-being gains. Overall, the available meta-analytic evidence casts doubt on the assumption of substantial associations between social media use and well-being.

Social Media Use and Academic Achievement

Theoretical Background

Given the popularity of social media among students, the relationship between SNS use and academic success has become a major topic of debate. Social media use is reported to be a risk factor for academic underperformance (Kirschner & Karpinski, 2010). Several processes may account for a negative link between social media use and academic performance. A time displacement rationale suggests that the time spent with social media reduces the time spent for learning and preparation (Nie, 2001; see Tokunaga, 2016). Other things equal, less study time would in turn contribute to poorer academic performance (Stinebrickner & Stinebrickner, 2004). Relatedly, the time spent with social media could also reduce the quality and quantity of sleep (Orzech, Grandner, Roane, & Carskadon, 2016; Xanidis & Brignell, 2016) and healthy sleep is beneficial for academic achievement (Dewald, Meijer, Oort, Kerkhof, & Bögels, 2010). As a

further challenge, social media can be used during times of instruction and learning. This social media multitasking likely reduces the working memory capacity available for the concurrent scholastic activities and could therefore lead to a negative association between social media use and academic achievement (van der Schuur, Baumgartner, Sumter, & Valkenburg, 2015; Wood et al., 2012).

From a different perspective, however, social media use could contribute to better academic achievement. Social media can be used as a means to communicate school-related information. Social media can facilitate student-to-student discussions of learning matter, establish course groups, or enable student-teacher interactions (e.g., Junco, Heiberger, & Loken, 2011; Lampe, Wohn, Vitak, Ellison, & Wash, 2011). As outlined earlier, social media could further help at developing social capital (Ellison et al., 2007, 2011; Wang et al., 2015). Social capital in turn is an important resource for students' academic achievement (Eckles & Stradley, 2012; Yu et al., 2010).

Meta-Analytic Evidence

Three meta-analytic summaries were recently published on this topic of social media and academic achievement (Huang, 2018; Liu, Kirschner, & Karpinski, 2017; Marker, Gnambs, & Appel, 2018). As illustrated in Figure 3, all three meta-analyses reported significant ($p < .05$) associations between school grades and general measures of SNS use, time spent, frequency of logins, and other measures of SNS use intensity (see also Table S2 in the Online Supplement). The reported findings were highly consistent across these meta-analyses with associations ranging from $r = -.09$ to $r = -.07$. The respective pooled effects were rather small, with the SNS indicators explaining less than 1% of variance in school achievement. Importantly, the negative association was only found for studies that used self-reported achievement measures, $r = -.09$, 95% CI[-.15, -.03], whereas objective achievement (e.g., grade point averages retrieved from

official school records) was not related to social media use, $r = .01$, 95% CI[-.02, .04] (Marker et al., 2018). These results provide no to rather weak support for the assumption that the intensity of social media use contributes to underperformance in school.

Marker and colleagues (2018) also highlighted different associations between two specific types of SNSs use and academic achievement: The association between measures of multitasking social media use and achievement yielded an average association of $r = -.10$, 95% CI[-.16, -.05], whereas social media used for academic purposes resulted in a significant association in the opposite direction, $r = .08$, 95% CI[.02, .14]. Finally, the authors also provided a meta-analytic test of the time displacement hypothesis (Nie, 2001; see Tokunaga, 2016) that is presumably responsible for the negative association between SNS activities and school achievement. SNS use was found to be unrelated to study time, $r = -.03$, 95% CI[-.11, .06], therefore, providing no support for a time displacement rationale in a related meta-analytical structural equation model (MASEM; Cheung, 2015).

Moderator analyses for the three meta-analyses identified some consistent influences of third variables. For example, time spent with social media was more strongly related to academic achievement, $r = -.10$, 95% CI[-.13, -.06] as compared to frequency of social media use, $r = -.01$, 95% CI[-.07, .05] (Huang, 2018); similar results were also reported by Liu et al. (2017), albeit based on only two to three effects. Negative associations between SNS use and academic achievement seem to be slightly larger for older respondents such as college students, $r = -.09$, 95% CI[-.16, -.01] (Liu et al., 2017), or undergraduates and adults, $r = -.08$, 95% CI[-.14, -.02] (Marker et al., 2018) as compared to middle and high school students, $r = .01$, 95% CI[-.09, .12] (Liu et al., 2017) or adolescents $r = .01$, 95% CI[-.05, .06] (Marker et al., 2018). In contrast, Huang (2018) identified no age-related differences. Regarding gender differences, no consistent results were reported. Although Liu and colleagues (2017) identified a stronger negative

association in samples with a larger percentage of women, Huang (2018) failed to corroborate this effect. Cross-cultural differences were only addressed in Marker et al. (2018), but revealed no unique pattern.

Conclusion

All three meta-analyses identified average associations below $r = -.10$. Based on the current evidence, the relationship between SNS use and academic achievement is far lower than our benchmark of $|r = .20|$. Moreover, the credibility intervals (see Figure 3) make it doubtful that unidentified moderating influences might exceed this size and lead to pronounced academic effects of SNS use. Thus, there is no indication for potential devastating effects of social media on school achievement. Remarkably, two meta-analyses obtained no relationship at all between SNS use and grades among the subgroup of younger, adolescent participants.

Social Media Use and Narcissism

Theoretical Background

Scholars have observed a severe increase in average narcissism personality scores in the last decades (“generation me”, e.g., Twenge, 2014; Twenge, Konrath, Foster, Campbell, & Bushman, 2008; for opposing positions see for example Trzesniewski & Donnellan, 2010). Against this background, it has been argued that narcissistic tendencies can be expressed and nourished by engaging with SNSs, leading to even more narcissism on the societal level (Twenge, 2013).

There are several features of communication on SNSs that differ from offline communication (Valkenburg & Peter, 2011), features that might be particularly appealing for individuals high on narcissism (Gnambs & Appel, 2018). First, SNSs enable individuals to communicate self-related information to a large number of friends, acquaintances, and strangers,

and others can give feedback to an individual's SNSs activities. Narcissists are highly motivated to reach a large number of communication partners in order to receive constant validation of their embellished self-views, hence, SNSs should be sought after platforms. Second, users of SNSs can choose which information to communicate and which information to keep to themselves. Parts of the self that do not fit a narcissist's self-concept can be more easily hidden than in face-to-face interactions. Third, SNSs allow to meticulously choreograph one's online appearance. Communication is asynchronous and verbal and visual messages can be selected and improved prior to posting. Moreover, the intense self-focus initiated by many SNS activities could promote users' narcissism (Gentile, Twenge, Freeman, & Campbell, 2012).

Meta-Analytic Evidence

In recent years, three meta-analyses on the link between narcissism and social media have been published (Gnambs & Appel, 2018; Liu & Baumeister, 2016; McCain & Campbell, 2018). These meta-analyses were based on primary studies that had connected self-reported narcissism to self-reported usage intensity and activities on SNSs. The majority of primary studies and meta-analytic results related to grandiose narcissism (characterized by a sense of self-importance, grandiosity, and dominant behavior), much fewer research was devoted to vulnerable narcissism (characterized by interpersonal hypersensitivity and social withdrawal; cf. Miller et al., 2011). The main meta-analytic results are represented in Figure 4 and Table S3 in the Online Supplement.

Grandiose narcissism and global measures of SNS use, such as the time spent or usage intensity, were positively related with associations ranging from $r = .11$, 95% CI[.04, .18] in the meta-analysis by McCain and Campbell (2018) to $r = .17$, 95% CI[.04, .33] in the meta-analysis by Gnambs and Appel (2018). In all three meta-analyses, usage behavior that reflects active self-presentation yielded associations with narcissism in the range of $r = .14$, 95% CI[.06, .21] for

posting selfies (McCain & Campbell, 2018) to $r = .26$, 95% CI[.18; .33] for posting photos (Liu & Baumeister, 2016). A relatively large average correlation was reported for SNS interactions (i.e., posting comments or providing ‘likes’), $r = .42$, 95% CI[.17; .62] in Liu and Baumeister (2016), however, based upon six effects only. Number of friends and narcissism were consistently associated with coefficients ranging between $r = .18$, 95% CI[.05; .30] and $r = .20$, 95% CI[.09; .31] in all three studies.

Meaningful moderation effects were observed for the country or culture the primary studies were conducted in. Liu and Baumeister (2016) reported a tendency indicating that relationships between narcissism and SNS use were stronger in Asian and collectivistic cultures than in the Western and individualistic cultures. Based on Hofstede’s cultural dimensions, Gnambs and Appel (2018) observed a linear increase of the focal effect size with the countries’ power distance: Countries with larger power distance (such as Malaysia or India) exhibited larger associations between narcissism and SNS behavior than countries with smaller power distance (such as Austria or the Netherlands). Other sample characteristics like the age or gender distribution exhibited no moderating influences (Gnambs & Appel, 2018; Liu & Baumeister, 2016).

Conclusion

Meta-analytic evidence is in support of small to moderate associations between narcissism and SNS use. We do find associations that exceed the threshold effect size of $r = .20$ (4% shared variance) – indicating that grandiose narcissism is substantially linked to SNS activities. Narcissists tend to have more social media friends and it appears that popular activities that enable self-promotion are particularly strongly associated with narcissism. Moreover, these relationships appear to be larger in non-Western than in Western countries.

General Discussion

The rise of smartphones and social media use is arguably one of the most challenging developments that the social sciences of today are faced with. Popular science books and news features on the psychological implications of social media use sell well and many of these works draw a rather scary picture: Social media supposedly change individuals and societies to the worse. Is this assessment backed by empirical evidence? The field is characterized by a large number of recent study results and high heterogeneity, thus, researchers, commentators and politicians, along with parents and teachers struggle at gaining a conclusive overview of the field. Under these circumstances, meta-analyses appear to provide greater clarity (Glass, 1976). However, like primary studies (Silberzahn et al., 2018), meta-analyses involve researchers' degrees of freedom, therefore one and the same question addressed with meta-analytical methods could lead to very different statistical approaches and answers (for diverging meta-analytical evidence on media violence see Anderson et al., 2010; Greitemeyer, & Mügge, 2014; Ferguson & Kilburn, 2009; Furuya-Kanamori, & Doi, 2016). Among the possible negative implications of social media use, three assumptions were addressed in this review: The use of social media supposedly leads to and reinforces lower well-being, worse school achievement, and a rise in narcissism. These three topics were chosen for in-depth analyses because they have attracted substantial public and scholarly attention, and several meta-analysis were published recently on each of the three questions. All reviewed meta-analyses focused on cross-sectional, non-experimental primary studies.

As a first major result, we acknowledge that the three meta-analyses yielded largely overlapping results. This is an important observation, given that meta-analysts have substantial leeway for different, yet defensible decisions regarding the inclusion of studies, effect sizes, and moderator variables (Lakens et al., 2016; 2017). These forking paths could lead to *false positive* meta-analytical findings (Simmons, Nelson, & Simonsohn, 2011). Maybe even more importantly,

in the current case these forking paths could as well lead to *false negative* findings, that is, meta-analyses could wrongfully downplay associations. Identifying more congruency than difference across different labs is therefore reassuring.

Converging Evidence: Associations are Small in Size

One of the most pressing questions regarding the rise of social media is the relationship between an individual's social media activities and his or her affect and well-being. An increase in depressive symptoms in the years since the start of popular social media platforms (cf. Weinberger et al., 2017) has fueled questions about the negative affective consequences of social media activities. Our review shows that most average relationships between general SNS activity measures and well-being, loneliness, self-esteem or depression are significantly negative, but they are small in size (Huang, 2017; Liu & Baumeister, 2016, see also Orben & Przybylski, 2019a). The relationships did not vary systematically with the number of female participants in the samples, which is particularly noteworthy as women are often considered to show particularly negative effects of social media activities (Walton, 2019).

Regarding academic performance, our review of meta-analytic results revealed no indication of substantial negative associations between the intensity of social media activities and school achievement. For children and adolescents and whenever school grades were documented (as compared to self-reported) the associations were essentially zero (Liu et al., 2017; Marker et al., 2018). It has been argued that social media activities displace time for homework or time for learning. The meta-analytic evidence, however, does not support this mechanism. Small associations were observed in line with the assumption that social media activities relate to stronger performance when used for academic purposes but relate to weaker performance when used during learning and instruction.

Are social media a breeding ground for narcissists? The meta-analyses that are reviewed point out small associations between global indicators of SNS use on the one hand and grandiose narcissism on the other. Relationships of small to moderate size were identified when self-presentational activities and the number of social media contacts (such as Facebook friends) were focused on. Of note, two meta-analyses (Liu & Baumeister 2016; Gnambs & Appel, 2018) found that these relationships appear to be larger in non-Western (high power distance) than in Western countries (low power distance).

Limitations and Caveats

In an explicit attempt at providing a balanced overview of available evidence, this review focused on three fields in which more than one meta-analysis were published recently. All of the meta-analyses had focused on cross-sectional primary studies. Thus, the well-known limitations of cross-sectional, non-experimental work apply to the reviewed meta-analyses. Our starting point were assumptions on the detrimental causal effects of social media use on individuals that are frequently expressed in academia and public discourse. Co-variation is a prerequisite for causality. The correlational evidence reviewed informs about a necessary condition for establishing causality (but demonstrating co-variation is not sufficient for demonstrating causality). Based on the effect size of the average associations reviewed here, we would expect causal effects, if any, that are rather small in size. At this point, we need to emphasize that the identified associations can be meaningful, even if they are small in size. As others have argued, correlations of $r = .10$ can have high practical relevance (e.g., Rosenthal, 1986). We argue, however, that the average size of the associations identified by scholarly research up to now needs to be recognized. Regarding causality, primary studies with research designs that allow for causal interpretations have not consistently identified social media as a cause of, for example, lower well-being and mental health. Whereas passive social media use preceded declines in

affective well-being in one seminal study (Verduyn et al., 2015), this causal interpretation could not be corroborated in a more recent longitudinal study: passive social media use did not longitudinally predict depression or loneliness, whereas previous levels of well-being predicted usage patterns (Aalbers, McNally, Heeren, de Wit, & Fried, 2018). Based on the latter study, it seems that psychological symptoms might lead respondents to engage more strongly with social media and not the other way around, as frequently discussed in popular science outlets.

This review is silent on all research that deals with *screen media* per se or any digital activities outside of social networking, such as research that is focused on computer gaming or digital learning (e.g., Delgado, Vargas, Ackerman, & Salmeron, 2018; Gnambs, Stasielowicz, Wolter, & Appel, 2018). Moreover, meta-analytic work outside the three focused topics was beyond our scope (e.g., social media use and personality, Liu & Campbell, 2017).

Finally, the reviewed evidence, albeit based on meta-analytic summaries, reflects the quality of the available individual studies. If the reported evidence on the corollaries and consequences of social media use provides distorted results, this might have also affected our review. Recently, re-analyses of data including more than 350,000 respondents that has been frequently used in publications on the consequences of new media use highlighted how flexibilities in item selection and analytical choices allow researchers to tell dramatically different stories about social media effects (Orben & Przybylski, 2019a). Depending on various (mostly defensible) methodological choices, digital technology use was either significantly positively or negatively associated with adolescent well-being and, thus, allowed arguing for negative as well as positive technology effects, despite being based on the same data. The researcher degrees of freedom (Simmons et al., 2011) can lead to flawed and conflicting results in primary studies, which might be also reflected in the aggregated meta-analytic results. Therefore, the robustness of findings on digital media effects should be routinely evaluated against

flexibilities in data-analytic decision to derive more generalizable effects in individual studies (see Gnams et al., 2018, or Orben & Przybylski, 2019a, for recent applications).

General Conclusion

Warnings about the supposedly negative consequences of social media use are widespread. A review of cross-sectional meta-analytic evidence regarding well-being, school achievement, and narcissism was conducted showing that the average associations with social media use are small. Available meta-analytic evidence does not support the assumption that social media use has – on average – severe detrimental consequences. The impact of social media on individuals and societies has attracted a lot of attention. As media content tends to be self-referential (Nöth & Bishara, 2007), social media topics are popular on social media and promise clicks and shares for journalistic outlets. At the same time, news values are in favor of spreading negative news (Harcup & O’Neill, 2017). Journalists and commentators are advised to recognize the meta-analytic evidence when reporting on new empirical results.

Our assessment is, of course, not final. Like the single meta-analyses underlying this summary, our review represents a temporary assessment (Lakens et al., 2016). In a flourishing research field, meta-analyses need to be updated on a regular basis. This is particularly relevant at the intersection of technology and psychology, given that the technological environments and applications are constantly changing. Continuously cumulating meta-analysis is a promising method to quantify up-to-date evidence regarding a given research question (Braver et al., 2014). In this framework, new empirical data are tied to an existing pool of studies and the combined evidence is studied. Meta-analyses, conventional or cumulating, rely on their pool of the primary studies. Scholars in this interdisciplinary field need to take seriously prior calls for reporting studies irrespective of the results’ effect size or statistical significance, being transparent about research data, and ending questionable research practices (Schmidt & Oh, 2016). Importantly,

social media research needs to develop and adopt more stringent criteria for operationalizing and measuring study variables. Single-item self-reports appear to be the de-facto standard in this field. However, the validity of self-reported technology use seems to be rather limited because many respondents are unable to accurately estimate their time use (e.g., Araujo, Wonneberger, Neijens, & de Vreese, 2017; Junco, 2013; Scharkow, 2016). Therefore, the measurement of online social networking behaviors should more regularly incorporate behavioral data (rather than self-reports) such as automatically generated procedural data (e.g., logfiles) or experience sampling methods that collect behavioral data in situ (Orben & Przybylski, 2019b). At this point, it is an open question whether improved methods and practices will point out lower or higher effect sizes.

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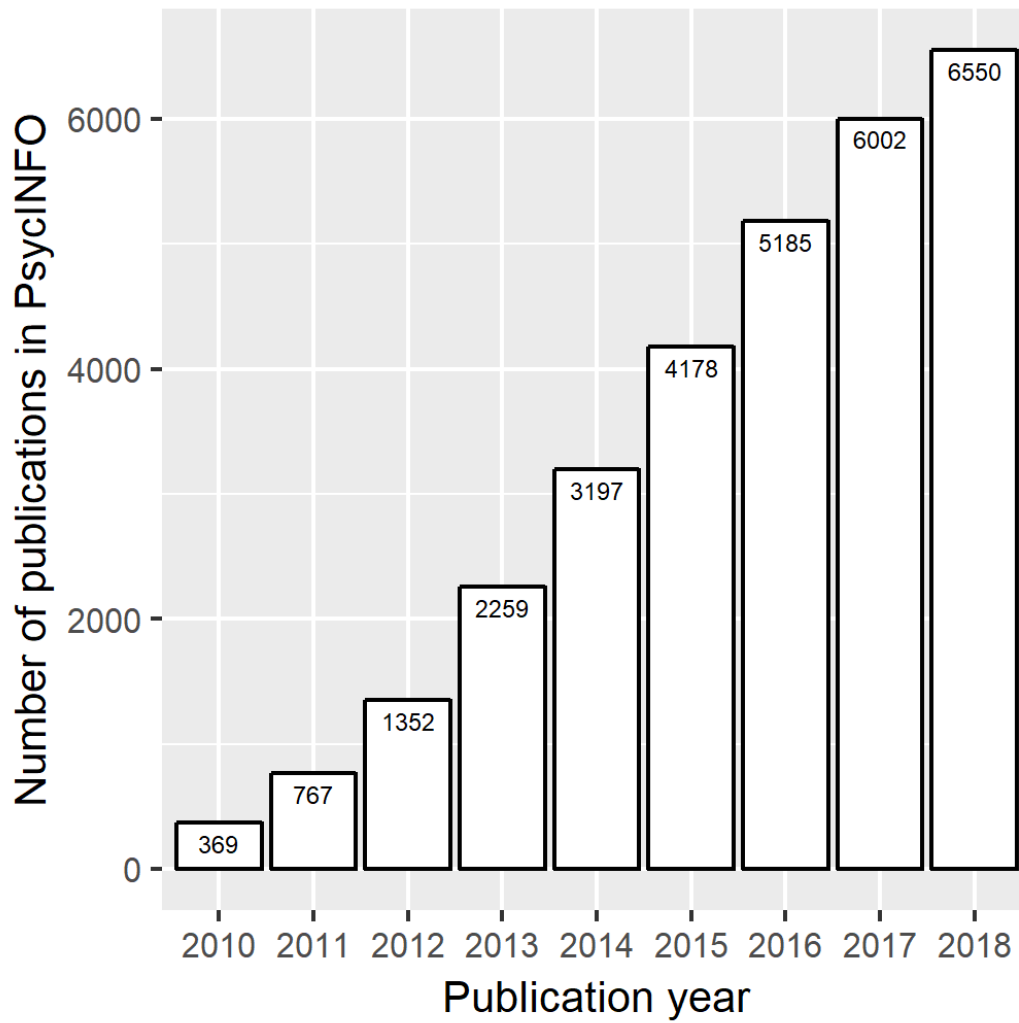


Figure 1. Number of publications indexed in PsycINFO for the keyword “online social networks” between 2010 and 2018.

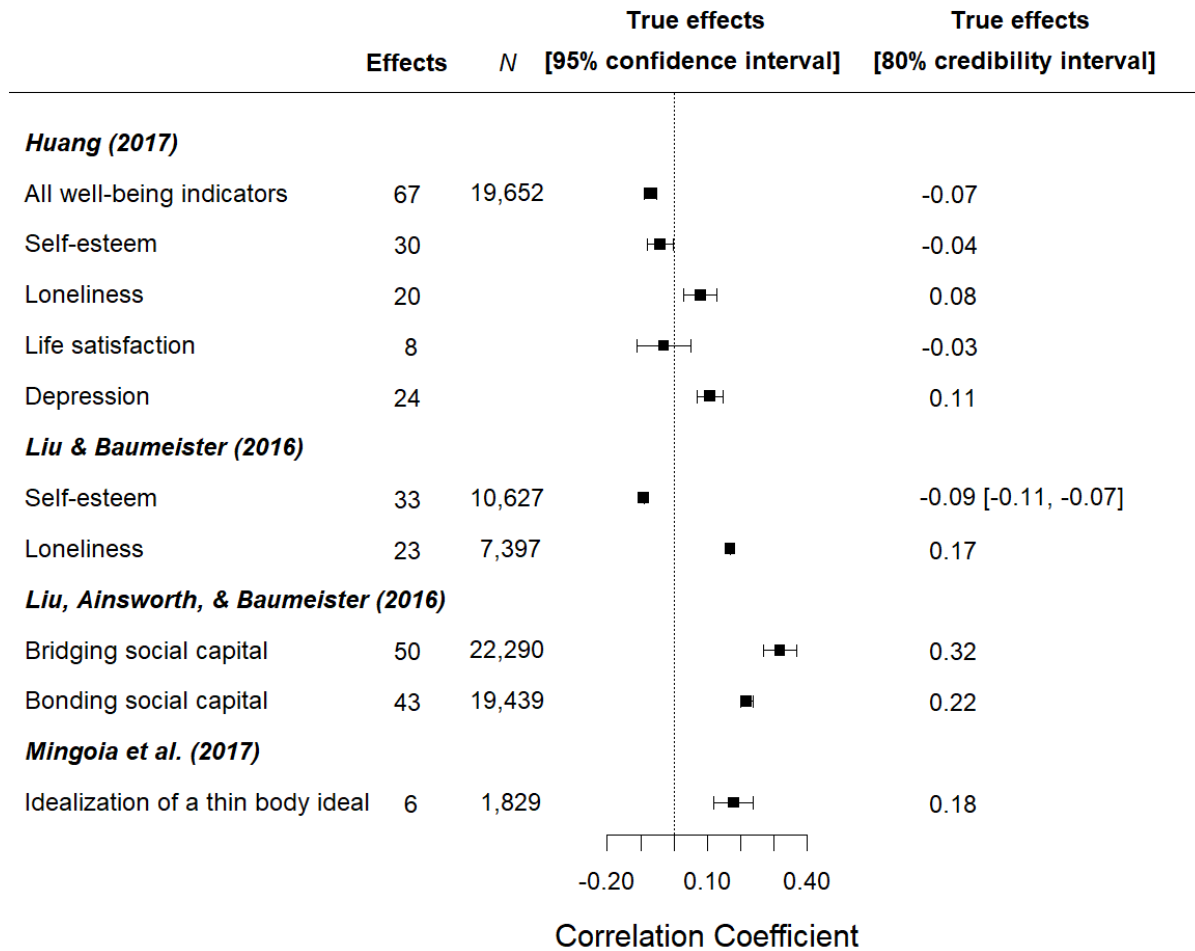


Figure 2. Meta-analytic associations between general indicators of SNS use and measures of well-being. Huang (2017) included only time spent on SNS as indicator. Missing information for sample sizes or credibility intervals was not reported in the meta-analyses.

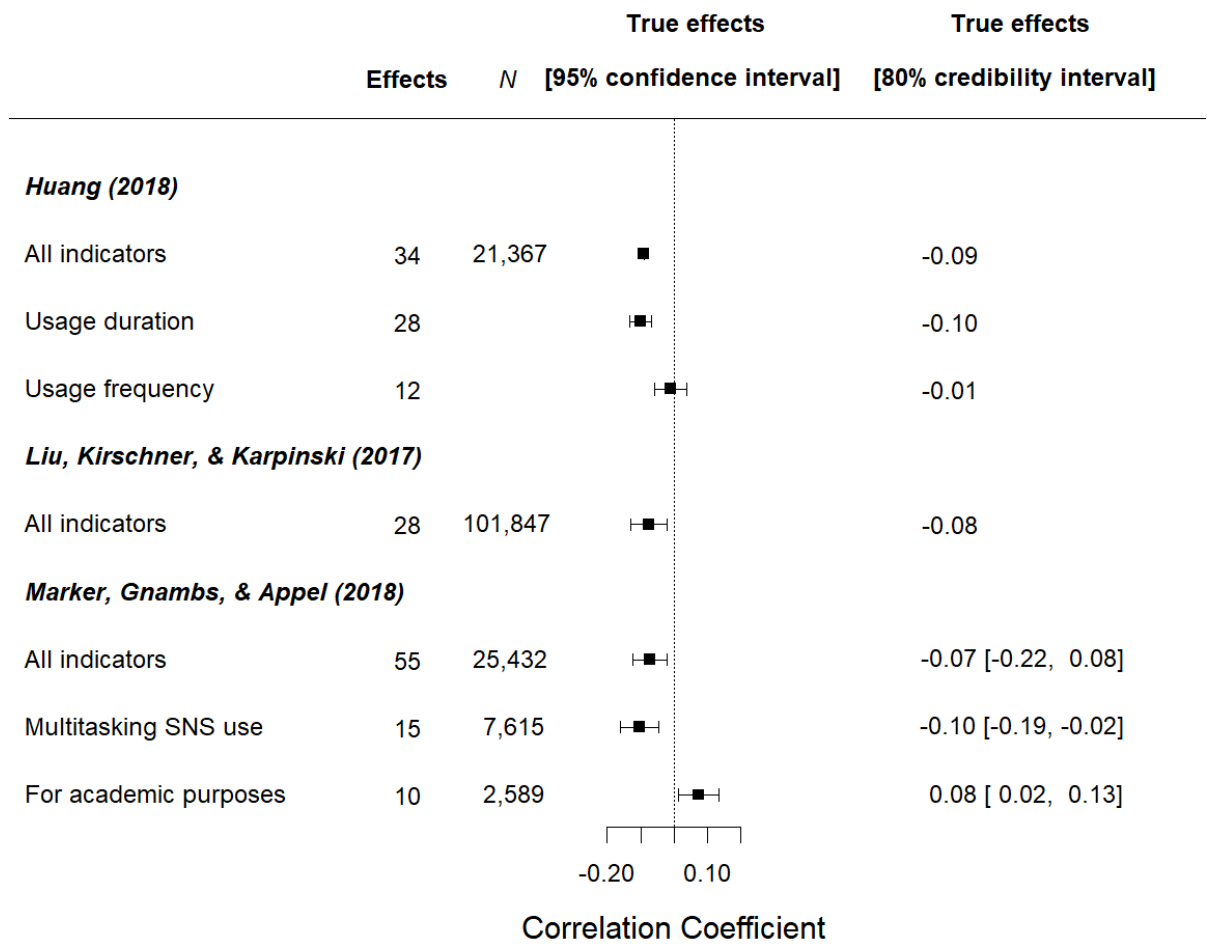


Figure 3. Meta-analytic associations between different indicators of SNS use and school grades. Missing information such as sample sizes or credibility intervals was not reported in the meta-analyses.

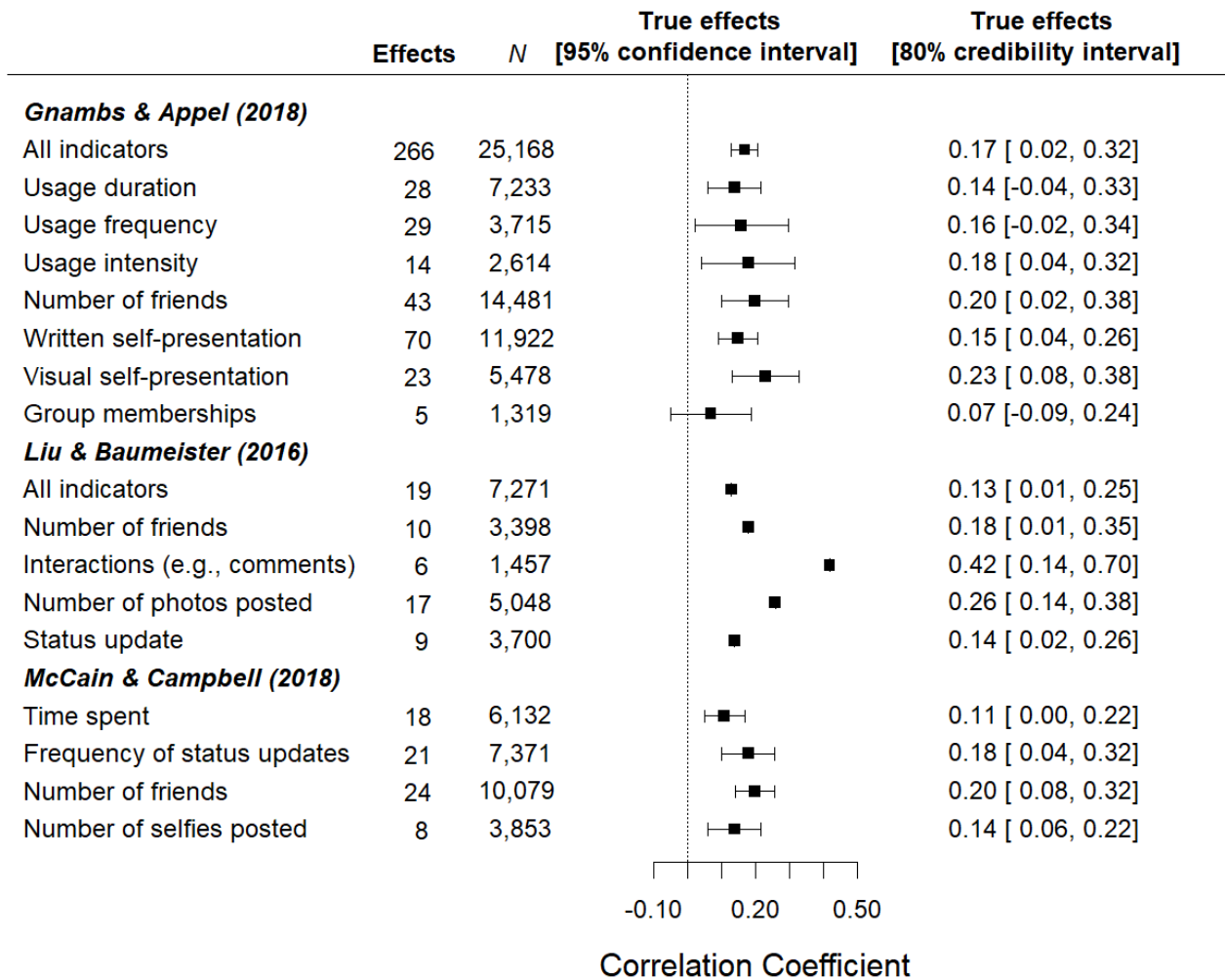


Figure 4. Meta-analytic associations between different indicators of SNS use and narcissism. Missing information such as standard errors was not reported in the meta-analyses.

----- Online Supplement -----

Are Social Media Ruining Our Lives? A Review of Meta-Analytic Evidence

----- Online Supplement -----

Table S1. Meta-analytic results on the association between patterns of SNS use and well-being indicators Page 2

Table S2. Meta-analytic results on the association between patterns of SNS use and academic performance Page 4

Table S3. Meta-analytic results on the association between patterns of SNS use and narcissism Page 5

Table S1. Meta-analytic results on the association between patterns of SNS use and well-being indicators

Publication	SNS indicator	Psychological variable	No of effect sizes	No of participants	Effect size r or ρ 95% CI [LL; UL]
Huang, 2017	Time spent on SNSs	Well-being total ^a	67	19,965	-.07 [-.09; -.04]
	Time spent on SNSs	Loneliness	20		-.08 [-.13; -.04]
	Time spent on SNSs	Self-esteem	30		-.04 [-.08; -.00]
	Time spent on SNSs	Life satisfaction	8		-.03 [-.11; -.01]
	Time spent on SNSs	Depression	24		-.11 [-.15; -.07]
Liu & Baumeister, 2016 ^b	All available indicators	Loneliness	23	7,397	.17 [.09; .24]
	All available indicators	Self-esteem	33	10,627	-.09 [-.14; -.03]
	No of friends	Self-esteem	11	3,035	.07 [.01; .14]
	Interaction	Self-esteem	3	969	.11 [-.10; .31]
	Photos	Self-esteem	8	1,964	-.01 [-.13; .10]
	Status	Self-esteem	4	685	-.02 [-.10; .07]
Mingoia et al., 2017	Global SNS use (time per day)	Internalization of a thin body ideal	6	1,829	.18 [.12; .23]
	Appearance-related SNS use	Internalization of a thin body ideal	6	539	.21 [.15; .28]
Liu et al., 2016	Global SNS use (frequency, intensity, time)	Bridging social capital	50	22,290	.21 [.27; .37]
	Self-disclosure	Bridging social capital	9	3,793	.19 [.27; .37]
	Entertainment/fun	Bridging social capital	4	1,651	.17 [.27; .37]
	Offline friends	Bridging social capital	6	1,937	.23 [.27; .37]
	Information seeking	Bridging social capital	13	4,532	.25 [.27; .37]
	Replying and maintaining	Bridging social capital	11	5,221	.36 [.27; .37]

Online friendship initiation	Bridging social capital	2	1,055	.09 [.27; .37]
Global SNS use (frequency, intensity, time)	Bonding social capital	43	19,439	.22 [.21; .24]
Self-disclosure	Bonding social capital	7	2,768	.20 [.16; .24]
Entertainment/fun	Bonding social capital	4	1,651	.12 [.07; .17]
Offline friends	Bonding social capital	5	1,817	.25 [.21; .30]
Information seeking	Bonding social capital	9	2,765	.18 [.14; .21]
Replying and maintaining	Bonding social capital	9	4,418	.24 [.21; .27]
Online friendship initiation	Bonding social capital	2	1,055	.03 [-.03; .09]

Notes: ^aAn aggregate of loneliness, self-esteem, life satisfaction, and depression.

^bCredibility Intervals were reported

Table S2. Meta-analytic results on the association between patterns of SNS use and academic performance

Publication	SNS indicator	Psychological variable	No of effect sizes	No of participants	Effect size r or ρ 95% CI [LL; UL]
Huang, 2018	General SNS Use (Time spent and frequency pooled)	School grades (two studies on writing included)	40	21,367	-.09 (-.07 without outlier)
	Time Spent	School grades	28	NA	-.10
	Log-in frequency	School grades	12	NA	-.01
Liu et al., 2017	General SNS Use ^b	School grades (2 studies on literacy included)	28	101,847	-.08 [-.13; -.02] ^a
Marker et al., 2018	General SNS use ^b	School grades total	55	25,432	-.07 [-.12; -.02]
	General SNS use ^b	School grades student-reported	41	NA	-.09 [-.18; -.01]
	General SNS use ^b	School grades documented	14	NA	-.01 [-.20; .19]
	General SNS use ^b	Time spent studying	10	3130	-.03 [-.11; .06]
	Multitasking SNS use	School grades	15	7,615	-.10 [-.16; -.05]
	SNS use for academic purposes	School grades	10	2,589	.08 [.02; .14]

Notes. ^aAlthough the upper bound is specified as .02 (without the negative sign) in the text, we infer from the text that this is a typo. ^bTime spent, frequency, or intensity of use. ^cAlthough the upper bound was specified as -.059 in Table 2 (with a negative sign), we infer from the text that the negative sign is a typo.

Table S3. Meta-analytic results on the association between patterns of SNS use and narcissism

Publication	SNS indicator	Psychological variable	No of effect sizes	No of participants	Effect size r or ρ 95% CI [LL; UL]	
Gnambs & Appel, 2018	All available indicators	Narcissism all indicators	289	25,631	.17 [.13; .20]	
	All available indications	Grandiose Narcissism	266	25,168	.17 [.13; .21]	
	All available indications	Vulnerable Narcissism	14	602	.08 [-.07; .24]	
	Usage duration	Grandiose Narcissism	28	7,233	.14 [.06; .22]	
	Usage frequency	Grandiose Narcissism	29	3,715	.16 [.02; .31]	
	Usage intensity	Grandiose Narcissism	14	2,614	.18 [.04; .33]	
	No of friends	Grandiose Narcissism	43	14,481	.20 [.09; .31]	
	Written self-presentation	Grandiose Narcissism	70	11,922	.15 [.10; .20]	
	Visual self-presentation	Grandiose Narcissism	23	5,478	.23 [.14; .33]	
	Group memberships	Grandiose Narcissism	5	1,319	.07 [-.05; .20]	
	Liu & Baumeister, 2016a	Global use indicators together	Narcissism	19	7,271	.13 [.06; .20]
		No of friends	Narcissism	10	3,398	.18 [.05; .30]
Interaction		Narcissism	6	1,457	.42 [.17; .62]	
Photos		Narcissism	17	5,048	.26 [.18; .33]	
Status		Narcissism	9	3,700	.14 [.03; .25]	
McCain & Campbell, 2018	Time spent on SNSs	Grandiose Narcissism	18	6,132	.11 [.04; .18]	
	No of friends	Grandiose Narcissism	24	10,079	.20 [.14; .26]	
	Selfies	Grandiose Narcissism	8	3,853	.14 [.06; .21]	
	Status Updates	Grandiose Narcissism	21	7,371	.18 [.11; .26]	
	No of friends	Vulnerable Narcissism	4	1,033	.21 [-.06; .49]	
	Selfies	Vulnerable Narcissism	3	967	.05 [-.02; .11]	

Status Updates	Vulnerable Narcissism	3	575	.42 [-.01; .85]
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