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Influence Of The Use Of Social-Media On Adolescents' Psychological Well Being

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Abstract
Social media platforms emerged with the promise to increase social connections and conversation, both of which are presumably conducive to mental health and happiness. However, early research appeared to suggest that social media use, particularly for adolescents, may have the opposite effect, with studies showing negative effects of social media use on well-being, prompting calls for greater scrutiny and regulation of social media platforms. In contrast, the more recent large-scale meta-analytic and longitudinal studies suggest that the effects may be minimal to the point of being inconsequential. In this research, we review the latest findings on the effects of social media use on adolescent psychological well-being, with the aim of making sense of these conflicting findings. In doing so we discuss methodology issues that hamper the interpretation and generalization of previous findings and provide a research agenda a fro consumer researcher interested in studying the effects of adolescence social media use.

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I. Introduction

The introduction and proliferation of social media have undoubtedly changed how and with whom people communicate. Social media use is most closely linked with the introduction of Facebook in 2004, which diffused throughout the population at an unprecedented rate, with individual usage growing to nearly three billion users worldwide by the end of 2022 (Statista 2023). Like disruptive technologies before it (e.g., printing press, radio, television), the rapid diffusion of social media brought concern about its potential effects (Orben 2020; Kross et al. 2021). Concerns were further bolstered as Facebook quickly grew beyond its initial target of college students to reach the general population, including children and adolescents, but also, along with other new social media platforms (Twitter, Instagram, etc.), rapidly evolved into a new ecosystem for social interaction (Kross et al. 2021).

Questions about the potential effects of this new communication technology spawned an explosion of research to Address these concerns (Kross et al. 2021; Valkenburg, Meier, and Beyens 2022), with a focus on the effects of social media use on psychological well-being. Perhaps ironically, the same advances in electronic communication that made social media attractive (fast, easy, and cheap communication) also made empirical investigations fast, easy, and cheap, leading to a rapid accumulation of research findings. Thus, instead of systematic investigations in which new research methodically built on findings of previous research, the new re-search environment resembled a "free-for-all" that effectively dumped a plethora of new findings into the literature, many of which were loosely connected to each other, resulting in findings that often appear contradictory.

The objective of this review is to make sense of the re-search to date, and in doing so, provide a template for consumer researchers interested in studying social media use effects. In keeping with the topic of this issue, we focus primarily on adolescents (roughly, ages 13–21), but make a few exceptions when research on adolescents is minimal.

II. Review Of Related Literature

Providing a review of social media use effects presents several challenges that necessarily influence our decisions on this review's scope and comprehensiveness. First, although the accumulated corpus of research on social media use effects is voluminous, research specifically on adolescents is surprisingly small in some areas. For example, numerous cross-sectional studies have focused on adolescents (or the studies provide the ability to disentangle age effects), but virtually no experimental studies have done so. Longitudinal studies on adolescent social media use effects are increasing, but slowly, which means that meta-analyses of adolescent social media use effects are primarily driven by cross-sectional studies, which have well-known limitations. Second, the quality of the studies varies dramatically, and this is particularly true for early studies on social media (Orben 2020; Kross et al. 2021), which were often severely underpowered.

Third, as we discuss in more detail in a later section, what falls under the category of "social media" has dramatically changed since its introduction, and this is especially the case in recent years (or even months). Thus, to address these issues, we have focused our review based on several criteria. First, we primarily focus on higher-powered studies, particularly for cross-sectional studies, whose larger sample sizes typically allow for more nuanced analyses within select groups (e.g., age, gender, etc.). Second, we have organized the review in terms of methodology (cross-sectional, longitudinal, experimental, meta-analytical) because the methods themselves have important implications for generalizability, and thus even though the number of studies to date within methodologies varies greatly, each is represented .

Third, in some cases (e.g., experimental studies), there are very few studies that allow an assessment of effects only on adolescents. Thus, we have included a discussion of a few studies that have some participants that fall slightly outside the adolescent age range (e.g., college students), particularly when the results appear to corroborate findings using other methodologies. Finally, we restrict our discussion of studies to include only the most recent ones, to at least in part address the rapid changes in all aspects of social media (platform, features, etc.), which we discuss in more detail in later sections. Table S1 (avail-able online) provides a summary of the studies reviewed, including descriptions of variables, main findings, and sample characteristics.

Cross-Sectional Studies: Main Effects

Cross-sectional studies typically measure the presumed in-dependent variable (social media use) and presumed dependent variable (indicator of psychological well-being) and compute the statistical relation (correlation) between the two, controlling for potential confounding variables and when possible, performing analyses within relevant groups (e.g., age, gender, etc.).

Although cross-sectional research on social media effects has been highly variable (Kross et al. 2021), the general conclusion of reviews is that there is a stable negative correlation between social media use and adolescent psychological well-being, but that it is on average small (r 5 2:10 to 2.15; Orben 2020). This negative but small correlation was corroborated by Orben and Przybylski (2019), who analyzed data from three large-scale studies to examine the relation between digital technology use (frequency of use) and adolescent psychological well-being. They found that the overall association between digital technology use and well-being was negative but very small, "explaining at most .4% of the variation in well-being," a correlation that was roughly equal to the negative effect of "regularly eating potatoes," and "too small to warrant policy change."

Although these findings were highly provocative (Stillman, 2019), some closer looks at the data within sub-groups painted a different picture, or at least a more nuanced on e (Twenge et al. 2022). First, the low correlation was obtained from analyses that aggregated across all measures of digital media use that included not only social media use, but other types of digital media use (e.g., television viewing, playing video games), which may have negligible effects on psychological well-being. However, when Orben and Przybylski (2019) analyzed the data separately for social media use only, the negative relation with well-being was stronger (b 5 2:035 and 2.056 for two data sets vs. 2.005 for all digital media use combined).

Although the correlation between social media use and adolescent well-being is stronger than the overall digital media use correlation, it is still relatively small. However, a second criticism of Orben and Przybylski (2019) is that they only considered linear effects, whereas several studies have shown that the effects are nonlinear. For example, in one of the first studies to test the media usage that are "just right and thus beneficial for well-being), Przybylski and Weinstein (2017) analyzed a large-scale data set of UK adolescents that correlated frequency of digital screen time use and psychological well-being. They found the relation between frequency of digital screen time use and psychological well-being was best explained by a quadratic function. The results followed a J-shaped curve (when digital screen time is plotted on the x-axis and low well-being on the y-axis) in which low levels of social media usage (1–3 hours per day) improve psychological well-being relative to zero usage, after which increased usage decreases well-being. Importantly, the J-shaped curve has been replicated in other large-scale studies across different measures of well-being

(Twenge, Martin, andCampbell2018; Twenge and Campbell 2019; Twenge and Martin 2020; Twenge and Farley 2021; Twenge et al. 2022).

A third criticism of Orben and Przybylski (2019) is that they do not consider the effects of gender (Twenge et al. 2020). Several studies show that the negative relations between social media usage and adolescent psychological well-being are stronger for girls than for boys (Booker, Kelly, and Sacker 2018; Twenge and Farley 2021; Twenge et al. 2022), consistent with research showing that girls spend more time on social media than boys (Twenge and Martin 2020), are more prone to depression (Salk, Hyde, and Abramson 2017), and are more prone to social comparison (Nesi and Prinstein 2015). For example, in an analysis of the millennium cohort study, the correlation between hours per day of social media use and mental health (composite of four scales measuring self-harm behaviors, depressive symptoms, self-esteem, and life satisfaction) was greater for girls than for boys (Twenge and Farley 2021). More specifically, boys exhibited the J-shape function such that there were positive effects of very low levels of social media use (0–2 hours per day), at which point increased social media use was associated with de-creases in psychological well-being. In contrast, girls did not exhibit any positive effects of low-level social media use and increases beyond two hours per day resulted in much more negative scores on the psychological well-being measure.

Social Comparison. Social comparison is the tendency to compare oneself with others, which can involve comparisons to those perceived to be better off (upward comparison), worse off (downward comparison), or to similar others. Numerous studies find that social media use is associated with increased upward social comparison tendencies, which in turn is associated with lower psychological well-being across a variety of indicators, including lower self-esteem, life satisfaction, and body satisfaction, and more depressive symptoms and suicide ideation (cf. Hanna et al. 2017; Burnell et al. 2019; Fardouly et al. 2020; Kingsbury et al. 2021; see table S1). For example, in a study of under-graduates in the United States, frequency of Facebook use was positively correlated with social comparison tendencies, which in turn predicted lower self-esteem, poorer mental health, and greater body shame (Hanna et al. 2017).

Active versus Passive Use. Some studies have investigated moderators of the social media use–well-being relation. For example, how individuals use social media seems to matter, in particular, whether social media usage is primarily active (e.g., posting one's own content) or passive (e.g., browsing other users content), although the findings are mixed. Some studies have linked passive usage with lower levels of psycho-logical well-being such as lower life satisfaction (Ding et al. 2017) and higher levels of depression (Cheng, Nguyen, and Nguyen 2023), whereas other studies find that passive social media use reduces self-injury and suicide ideation (Kingsbury et al. 2021) and increases affective well-being (Beyens et al. 2020). However, Kingbury et al. also found that whether the active use was public or private also mattered, with active public use increasing but active private decreasing self-injury and suicidal thoughts. The type of social media may also impact psychological well-being. In one study, the use of social media networking sites (which are more conducive to passive usage) was associated with higher levels of fear of missing out and loneliness, but the use of messaging apps was associated with decreased loneliness and unrelated to fear of missing out (Fumagalli, Dolmatzian, and Shrum 2021).

Cross-Sectional Studies

Mediators and Moderators Cross-sectional studies have investigated possible underlying processes of the effects of social media use on adolescent psy-chological well-
being and variables that may moderate the ef-fect. We focus on one potential mediator (social comparison tendency) and three moderators (active/passive use, age, gender) that have been consistently identified in larger-scale studies.

Social Comparison. Social comparison is the tendency to compare oneself with others, which can involve comparisons to those perceived to be better off (upward comparison), worse off (downward comparison), or to similar others (lateral comparison). Numerous studies find that social media use is associated with increased upward social comparison tendencies, which in turn is associated with lower psychological well-being across a variety of indicators, including lower self-esteem, life satisfaction and body satisfaction, and more depressive symptoms and suicide ideation (cf. Hanna et al. 2017; Burnell et al. 2019; Fardouly et al. 2020; Kingsbury et al. 2021; see table S1). For example, in a study of under-graduates in the United States, frequency of Facebook use was positively correlated with social comparison tendencies, which in turn predicted lower self-esteem, poorer mental health, and greater body shame (Hanna et al. 2017).

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The results are striking and very much in line with the findings of Twenge, Haidt, and colleagues (Haidt and Twenge 2023). Cross-sectional analyses revealed that the negative effects of social media use are strongest for younger adolescents (approximately ages 11–15 years) and more negative for girls than for boys, but only for younger adolescents, for whom there is no Goldilocks(J-shaped) curve, but instead a linear effect. For younger female adolescents (11– 13 years), moderate to heavy users of social media are less satisfied with their lives than are light or nonusers. For younger boys, the negative effects are somewhat less pronounced and occur later (14–15 years). In contrast, for slightly older adolescents (16–18 years), the effects become nonlinear along the J-curve function and gender differences become much less pronounced, and after age 18 the gender differences all but disappear, and the J-shaped function is evident across the remainder of the lifespan. The moderating effects of gender are also consistent with the findings of Nesi and Prinstein (2015) that frequency of using social media for social comparison purposes is positively related to depressive symptoms, but that the effects are stronger for girls than boys.

Longitudinal studiestypically measure both the independent(predictor) variable and dependent (criterio n) variable at 2 or more points in time, which improves on cross-sectional studies by allowing assessment of time order of occurrence and potential bidirectional effects. Recent larger-scale longitudinal studies have produced highly variable findings. One feature of the mixed findings pertains to whether the longitudinal effects pertain to between-person effects (correlations between time 1 and time 2 variables between people) or within-person effects (actual changes within each person between time 1 and time 2).

For example, a 3-year study of US adolescents found between-person effects of social media usage on internalizing and externalizing problems (Riehm et al. 2019; within-person effects were not reported). Similarly, a 4-year longitudinal study of Canadian adolescents found both between-person and within-person positive asso-ciations between earlier levels of social media use (operationalized as screen time) and later levels of depressive symptoms (Boers et al. 2019), but the within-person analyses assessed changes only within the same year. In another study (Jarman et al. 2021), based on between-person analyses, frequency of use of appearance-focused social media (Snapchat, Instagram) at time 1 was negatively related to body satisfaction at time 3, and this relation was mediated by frequency of social comparisons at time consistent with the cross-sectional mediation findings reported earlier. In contrast, an eight-wave annual longitudinal study of 500 adolescents found pos-itive between-person effects of social media use across time on both depressive symptoms and anxiety but found no within-person effects. Individuals who increased their social media use did not experience later increases in depression or anxiety, and similarly decreasing social media use did not improve their later psychological well-being (Coyne et al. 2020).

One factor that may contribute to lower and at times non significant overall effect sizes for social media effects is that the moderators discussed in the cross-sectional section (age, gender) are not assessed. Indeed, none of the longitudinal studies just discussed assessed age or gender effects. However, a recent study addressed this issue. Along with the cross-sectional findings we discussed earlier, Orben et al. (2022) analyzed longitudinal data from over 17,000 UK adolescents to assess the effects of social media usage on life satisfaction, and vice versa. Although most of the within-person effects were non significant across the full sample, the large sample size allowed for analyses within age groups and gender. Their results corroborated their cross-sectional findings: increases in estimated social media use from expected (individual mean) levels were associated with sub-sequent decreases in life satisfaction one year later for girls 11–13 and 19 years old and for boys 14–15 and 19 years old. Thus, importantly, the negative effects of social media use appear only at certain ages and at a slightly earlier age for girls than boys (what Orben et al. [2022] refer to as "windows" of developmental sensitivity to social media).

Another aspect that seems related to the inconsistencies in the results of longitudinal studies is the length of the time interval between observations. Several recent studies employed experience sampling

methodologies to assess changes over time in which they take multiple daily measures of social media use over a short period. For example, Beyens and col-leagues conducted two longitudinal studies over a 1-week (Beyens et al. 2020) and 3-week (Beyens et al. 2021) period in which they collected social media use and affective well-being measures 6 times per day. Beyens et al. (2021) found negative between-person relations between social media use and affective well-being but no within-person associations, and no differences as a function of active versus passive use of social media, whereas Beyens et al. (2020) found no between-person effects but found small positive within-person effects of social media use on affective well-being.

The experimental sampling method findings are note-worthy because they used similar methodologies but found different effects, and they used longitudinal methods that used moment-to-moment measures to test their longitudinal hypotheses. Given that outcomes often depend on the length of time intervals (Dormann and Griffin 2015), these findings are difficult to reconcile because it is not clear that momentary increases or decreases in social media use should immediately affect psychological well-being.

Experimental Studies

Experiments on social media effects typically involve interventions that manipulate use of social media to assess causal effects. Unfortunately, very few studies focus specifically on adolescents, particularly younger ones. Thus, we also include here reviews of studies on college undergraduates, most (but not all) of which fall in the upper end of the adolescent age range. We believe that these studies have particular relevance given the findings of Orben et al. (2022) that found effects of social media around age 19 years (for both men and women).

The nature of the experimental manipulations can vary greatly, with some studies manipulating general frequency of social media use (e.g., taking a break from or reducing frequency of use of social media in general) and others manipulating use of or exposure to platforms that may vary in their features (e.g., Facebook vs. Instagram), and the findings have been highly variable. For example, several find that social media use causally affects body image and appearance satisfaction. In one study, limiting social media use to 1 hour per day resulted in increases in appearance and weight self-esteem compared to no restrictions (Thai et al. 2023).

In another study that manipulated type of social media use (Facebook vs. Instagram vs. control, 7-minute intervention), those viewing Instagram reported making more appearance comparisons, decreased body satisfaction and positive affect, and increased negative affect than those viewing Facebook (Engeln et al. 2020). One study that focused exclusively on adolescent girls (14–18 years) and manipulated whether Instagram photos were enhanced (retouched or reshaped) found that those who viewed the enhanced photos reported lower body image, but this was true only for those scoring high on social comparison tendency (Kleemans et al. 2018), consistent with cross-sectional and longitudinal findings.

Other studies have investigated the effects of social media use restrictions on various indicators of well-being, and these have yielded very mixed findings. For example, in a study that randomly assigned participants to either give up Facebook use for 1 week or use Facebook as they normally would, those in the restriction condition reported lower levels of depression and engaged in more healthy activities but also reduced their news consumption and were less likely to recognize politically skewed news stories (Mosquera et al. 2020). Similarly, limiting social media use to 30 minutes per day over 2 weeks decreased anxiety, depression, loneliness, and negative affect Gentile 2023).

How-ever, another study that restricted social media use to only 10 minutes per day found no effects (Collis and Eggers 2022). Still other studies find that restricting social media use can result in worse psychological well-being. For example, giving up Facebook for 5 days reduced hormonal stress indicators (cortisol level) but also decreased life satisfaction (Vanman, Baker, and Tobin 2018), and giving up social media for two consecutive days reduced participants' feelings of related-ness and satisfaction with their day (Przybylski et al. 2021). Thus, short abstinence appears to negatively affect certain types of psychological well-being, findings that are consistent with an addiction model of social media effects (Andreassen 2015).

Finally, we include a recent highly powered quasi-experiment that linked Facebook use with decreases in mental health. In a natural experiment, Braghieri, Levy, and Makarin (2022) leveraged the staggered introduction of Facebook across college campuses from 2004 to 2006 and combined it with over 400,000 responses to the National College Health assessment survey. The introduction of Facebook had a negative effect on the mental health of students: the effect appeared around 1–2 years after the introduction, increased with prolonged exposure, and were greater for those prone to upward social comparisons. These findings are notable because they show relatively immediate negative effects of social media use based on the initial introduction of Facebook, whereas most of the attention on negative effects of social media use pinpoint around 2012 as a turning point in declines in adolescent mental health (Twenge 2017).

Meta-Analyses

Meta-analyses of social media effects on psychological well-being combine the results of multiple studies that may address the research question in different ways, in particular different operationalization of the independent and dependent variables. Meta-analyses have the advantages of greater statistical power and greater accuracy and precision that result from pooling across studies that may vary greatly in terms of sample size and variability, and in theory, allow for generalizations across populations (Nelson [2022] for a discussion of potential problems in interpreting meta-analytic results). Although there is now a sizeable literature on meta-analytic studies on the effects of social media use, only two have focused specifically on adolescents. They both test the effects of social media use on depression-related out-comes and both found small positive correlations (Liu et al. 2022). Notably, Liu et al. (2022) found that gender moderated, with stronger effects for girls than boys, consistent with the large-scale cross-sectional studies reviewed earlier. Both studies reported very high heterogeneity (high variation in study outcomes), which suggests that there are likely several important unmeasured moderators that may mask the true effects.

Summary

The research on the effects of social media use on adolescent psychological well-being has been inconsistent at best, and this is true even though our review has focused primarily on the most recent findings. Moreover, even when researchers analyze the exact same data, they may come to different conclusions or differ on the importance of the findings (cf. Orben and Przybylski 2019, 2020; Twenge et al. 2020). Although the inconsistent findings are troubling for many reasons, some specific conceptual and methodological limitations emerged in our review that potentially explain many of the inconsistencies.

III. Conceptual And Methodological Limitations

There are several features of extant research on social media effects that make the interpretation of the results challenging. The primary ones we highlight are the lack of consensus on definitions of key constructs, the related problem of aggregating across findings that obscure potentially important nuances such as type of social media platform, and the problem of studying a medium that is constantly evolving. Lack of Consensus on Definitions and Operationalization Independent Variables: Social Media Use.

One problem in interpreting research findings on social media use effects is a lack of consensus on the definition of social media (Bayer, Triệu, and Ellison 2020; Meier and Reinecke 2021). Social media is a broad term composed of many different subtypes. For example, many studies have focused narrowly on Face-book, which is merely one type of social media (social net-working site) and thus does not necessarily represent general social media use effects. Similar ambiguity arises when social media use is defined as the time spent across many different types of social media (e.g., Instagram, WhatsApp; Valkenburg et al. 2022).

Even when research focuses on a specific subtype such as social networking sites, not only is there a lack of consensus on its definition, but there are several social net-working sites other than Facebook (e.g., Instagram, LinkedIn, WeChat), all of which may vary substantially in terms of primary features, architecture, and norms of use (Kross et al. 2021). Thus, although aggregating across all to measure total social networking site use may have some utility, it risks obscuring platform-specific effects on psychological well-being and also ignoring differences in user demographics across platforms.

Apart from the problems in defining social media, studies also differ dramatically on how they operationalize the use part of social media use. Examples include total time spent on all social media, time spent on specific networking sites, frequency of checking social media, problematic social media use, intensity of social media use, moment-to-moment measures, and total screen time (Hancock et al. 2022).

The Moving Target Problem. The lack of consensus on definitions of key constructs in social media research hampers generalizing across research findings. However, the problem is not a new one, but one that is part and parcel of studying new and fast-changing technologies (the moving target problem; Lomborg 2017; Bayer et al. 2020): new technologies change frequently and rapidly, and thus what constitutes a clear concept (construct) initially may evolve into something more complex over time. Users migrate to more popular plat-forms and once-popular platforms fade away (e.g., Myspace), causing changes in user demographics.

For example, Face-book, once the most popular social media platform for teens, has plummeted in teen popularity, from 71% of teens saying they use Facebook in 2014 to only 37% in 2022, whereas 67% of teens said they used TikTok in 2022 and 16% said they use it almost constantly (Vogels, Gelles-Watnick, and Massarat 2022). Social media platforms also evolve in terms of their interfaces, adding/removing features that change how the platforms are used (Lomborg 2017), and new competitors enter the market representing hybrids of different social media types (Instagram, WhatsApp, etc.). Thus, platforms may differ greatly on the extent to which they possess specific characteristics, making it difficult to understand the underlying reasons for their effects. Dependent Variables: Psychological Well-Being.

A similar problem arises with the dependent variable: psychological well-being is a broad term that encompasses multiple indicators. Examples include life satisfaction, happiness, positive/ negative affect, and subjective well-being. Other studies operationalize psychological well-being in terms of potential proximal or distal causes of psychological well-being, such as depression, loneliness, stress, anxiety, and self-esteem. Again, different types of social media may have different effects on each of these well-being indicators, depending on characteristics of the platform and characteristics of the users (and their interaction).

Summary

Although research on the effects of social media use on adolescents is highly variable and the moving target problem a considerable methodological challenge, we think there is reason for optimism for future research on social media effects. For example, despite the inconsistencies, recent research points toward a convergence of views. At the beginning of this review, we detailed well-publicized disagreements between researchers on the size and importance of social media effects on adolescent psychological well-being, with Orben and Przybylski (2019) presenting evidence of no effects of social media usage on well-being based on analyses of large-scale data sets, and Twenge, Haidt, and colleagues criticizing the study for several analytical decisions, in particular not testing for nonlinear effects and ignoring gender as a moderator (Orben and Przybylski 2020; Twenge et al. 2020). Despite the points of disagreement, Orben et al. (2022) recently published the results of their analysis of another large data set that addressed those particular criticisms, and their findings basically corroborated Twenge and Haidt's arguments:

i) Even minimal social media usage can have negative effects on young adolescents,
ii) These negative effects are greater for girls than boys,
iii) These effects occur during specific developmental windows, and
iv) These effects occur at different developmental periods for girls and boys.

The results are particularly notable because they assess the effects using within person analyses of large-scale longitudinal data, which ad-dresses many of the criticisms of previous research. These recent findings, coupled with implications of the methodological and conceptual limitations just discussed, pave the way for clear recommendations for future research.

IV. Recommendations For Future Research

In this section, we provide suggestions for future research. These suggestions flow directly from the studies reviewed, and several appear in the just released US Surgeon General's Advisory on social media and youth mental health (US Department of Health and Human Services 2023), which is based on much of the same research we have reviewed here. The list of research questions is by no means exhaustive; rather, the ones we suggest are the ones that we think are most immediately needed. In addition, the research questions are not mutually exclusive but can be combined (e.g., to target specific individuals at specific times using specific social media features).

Link Social Media Effects Research to Child Developmental Stages

The results of Orben et al. (2022) suggest that decreases in psychological well-being associated with increased social media use occur at specific developmental stages: at approximately ages 11–13 for girls and 14–15 for boys. Although these findings are new and need to be replicated, they are generally consistent with research by Twenge and colleagues that we have reviewed. One key research question is what can explain these sudden (and generally fleeting) negative effects? One possibility is that they roughly correspond to the developmental windows of puberty onset (boys start puberty about 1–2 years later than girls). Although the link to puberty onset is purely speculative, it is a useful starting point for future research (Orben and Blakemore 2023). The age ranges also correspond to important psychological developmental changes in self-identity (Pfeifer and Allen 2021); thus, under-standing how social media affects adolescents during these crucial stages, and in particular what unique features of social media platforms may contribute to decreases in feelings of self-worth and happiness may effectively guide interventions to improve mental health.

Orben et al. (2022) also document negative effects of social media use at age 19 years for both genders, which suggests different underlying processes occurring later in adolescence. For example, this approximate age corresponds to when many adolescents undergo important social changes

(gaining independence, moving away from home; Orben and Blakemore 2023). Again, understanding precisely why social media may have greater effects as a function of physical and social developmental changes is critical. Furthermore, it would be useful to determine whether particular negative psycho-logical well-being effects occur at these different develop-mental stages (e.g., self-esteem, loneliness, social exclusion effects, appearance self-esteem).

Develop Realistic Interventions for Vulnerable Group

Realistic interventions (randomized controlled trials) need to be tested on vulnerable age groups. For example, not only is requiring total abstinence from social media during an intervention unrealistic, but low to moderate amounts of social media use appear to be beneficial for some. Also, interventions that reduce social media use (e.g., from heavy to moderate use) should occur for sufficiently long periods (more than a day or a week), to account for the fact that reducing "doses" of media usage that some consider addictive may take some time for the benefits to psychological well-being to emerge. One possibility for a realistic intervention might

V. Recommendation For Future Research

Link social media effects research to child developmental stages

What can explain the sudden negative effects on psychological well-being at specific developmental stages (e.g., ages 11–13 for girls and 14–15 for boys) associated with increased social media use?

How does the link between social media use and psychological well-being relate to puberty onset or other crucial psychological developmental changes during adolescence?

What unique features of social media platforms may contribute to decreases in feelings of self-worth and happiness during these crucial developmental stages?

Do specific negative psychological well-being effects (e.g., self-esteem, loneliness, social exclusion effects, appearance self-esteem) occur at different developmental stages, and if so, how do they vary?

Develop realistic interventions for vulnerable groups

What realistic interventions (randomized controlled trials) can be designed and tested on vulnerable age groups to address the negative effects of social media use on psychological well-being? Are current apps that allow parents to restrict their children's social media use or allow older adolescents to manage (set up their own restrictions) their social media use effective?

How can interventions effectively reduce social media use for vulnerable individuals without requiring total abstinence, considering that low to moderate use may be beneficial for some?

What is the optimal duration of interventions to observe benefits to psychological wellbeing?

Considering that reducing media usage may take time for positive effects to emerge?

Focus on underlying processes (mediators) and specific types of well-being

How does social media use impact specific aspects of well-being (e.g., depressive symptoms, anxiety? stress) and corresponding behaviors (e.g., self-harm, suicide, anti-social behavior)?

What are the underlying factors (e.g., social comparison, peer relationships) that mediate the effects of social media on psychological well-being, and how do they differ during different developmental stages?

How do different social media platforms and specific features contribute to these underlying factors and may lead to reductions in psychological well-being?

Narrower operationalization of social media usage

How do specific social media platforms (e.g., Twitter vs. Instagram) differently affect psychological well-being, and what are the platform-specific effects on adolescents' needs (e.g., social connection, social approval)?

What role do specific features of social media platforms (e.g., synchronicity, anonymity, public visibility) play in shaping the effects on psychological well-being during adolescence?

Use of more objective measures of focal constructs

How can objective measures (e.g., custom applications, browser plug-ins, data donations) of social media use be employed to improve the accuracy of research findings on the impact of social media on psychological well-being?

What are the most accurate objective measures of psychological well-being and its correlates (e.g., EEG, eye-tracking, dopamine levels) that can help identify specific aspects of social media causing stress or anxiety?

Assess long-term impact of social media use during childhood

Does high social media use during childhood result in lasting effects on psychological well-being (e.g., happiness, self-esteem, social comparison) that persist into later stages of life?

Focus on Underlying Processes (Mediators) and Specific Types of Well-Being

General psychological well-being is a multifaceted construct. Although it is useful to know how social media use affects global well-being such as life satisfaction and happiness, well-being measures such as

depressive symptoms may be more predictive of corresponding behaviors (self-harm, suicide, anti-social behavior, etc.). Other well-being-related variables such as anxiety and stress are associated with social media usage and may lead to downstream unhappiness and depression. Understanding the underlying factors of social media effects provides valuable information on what aspects of social media platforms (features, motivations for usage) may cause reductions in psychological wellbeing.

Social comparison has been identified as a mediator, and it tracks closely with adolescent social development. As adolescents transition through developmental stages, they increasingly rely on peer relationships as indicators of self-worth, become more concerned with peer approval and status, and engage in greater social comparison (Nesi, Choukas-Bradle, and Prinstein 2018). These developmental processes are not new. But what is new in terms of potential social media effects is the intensity, ease, and frequency with which these processes play out: more people to which to compare oneself, more things on which to fear missing out, greater opportunities for successful social connections but also greater opportunities for social rejection. Research on how particular social media platforms and particular platform features contribute to these underlying factors may provide leads to how to mitigate harmful effects of social media use.

More Narrow Operationalization of Social Media Usage

Given that so many new social media platforms and social networking sites have developed that have different features, total social media usage is too blunt of an instrument to allow for precision in detecting effects. Thus, testing for social media usage effects as a function of specific platforms may provide more illuminating findings. Even more precision may be obtained by focusing on specific features of platforms. Examples include synchronicity (time between communications), whether users are anonymous, whether the information is publicly available to a wide audience (e.g., broad- vs. narrow-casting), and the extent to which visuals are common and normative (Bayer et al. 2020). Different features may relate to different social developmental needs of adolescents (social connection, social approval), which may dictate potential effects (Nesi et al. 2018).

Use of More Objective Measures of Focal Constructs

Social Media Use. Researchers should avoid relying solely on self-report measures for social media use. Adolescents often overestimate their social media use with retrospective reports and experience sampling method reports, self-reports are only moderately correlated with objective measures, and objective measures often show weaker correlations with critical outcome variables (e.g., self-esteem, well-being) than do self-report measures (Parry et al. 2021). Objective data might be obtained through custom applications, browser plug-ins, or data donations from participants (e.g., sharing smartphone screenshots of data usage; Fumagalli et al. 2021; for a review, see Parry et al. 2022). Not only is having more accurate measures of social media use critical in hypothesis testing, but it also allows for a more accurate determination of precisely how much social media use is detrimental, which is critical for setting guidelines to limit social media use to reduce its negative effects.

Dependent Variables and Mediators. Objective measures of psychological well-being and its correlates would also be useful. For example, physiological measures such as EEG, eye-tracking, or measures of brain activity may help researchers pinpoint more precisely what aspects of social media seem to cause stress or anxiety or capture the most attention. We noted that negative effects of social media may be linked to developmental stages such as puberty; pubertal hormones collected through saliva samples may answer the question of whether the effects are a function of age or pubertal stage (Orben and Blakemore 2023). Similarly, social media use effects on dopamine levels may also accurately assess effects of social media on stress, motivation, and addiction.

Assess Long-Term Impact of Social Media Use during Childhood

Most studies have focused on the short-term impact of social media use (e.g., longitudinal studies linking current social media use with psychological well-being a year later; Orbenet al. 2022). What is left unaddressed is whether high levels of use at early ages, which can result in lower psychological wellbeing (less happiness, lower self-esteem, greater social comparison, etc.), may have lasting effects. Although costly, long-term longitudinal studies that track the psychological well-being of heavy and light social media users over time can address whether childhood social media use can have lasting effects.

VI. Conclusion

Social media is an inescapable and dominant part of inter-personal communication for today's adolescents. Although the potential positive effects of social media use are intuitive, the negative effects have received considerable media attention, with worries that such considerable time spent on social media is addictive, causes psychological harm, and under-mines the quality of social relationships. But what

does the science say? Unfortunately, the research to date has been far from conclusive. In this review, we have detailed the nature of these inconsistencies and possible reasons for them, to chart a path forward for researchers interested in answering the question of whether social media use is harmful to users, particularly adolescents. Despite the ambiguities in past research, recent research has moved toward more consensus on whether, for whom, and why social media usage has detrimental effects on aspects of adolescent psychological well-being, which in turn informs more focused research questions on how to reduce social media's harmful effects.

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