Social Media and Mental Health: What We Know

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ABSTRACT

There are seemingly opposing findings on social media's effect on mental well-being. While some studies report detrimental effects, others report no association, and others still report positive or buffering effects. However, social media has rapidly evolved over a short span of time, and so has people's use of social media platforms. Collecting an accurate measure of social media use and other methodological challenges particularly affect the data in this area. In this commentary, we discuss two longitudinal studies to reconcile the contradictory findings on the effect of social media use on mental health.

🏷 **KEYWORDS**
Social media, Mental health, Commentary, Opposing findings

1 | INTRODUCTION

During the COVID-19 pandemic, the issue of social media use and mental health has become particularly salient, with the pandemic bringing an increase in socialization through online platforms to respect social distancing rules. Systematic review evidence has quickly tried to answer growing concerns about the effect of increased social media use on mental health; for instance, one review identified social media exposure as a risk factor for the newly observed high rates of anxiety, depression, and other psychological distress in the general population of several countries. (1) In the pre-COVID-19 literature, meta-analyses caution against "dramatic claims" of the "mischief" of social media. (2) For instance, Appel et al. (2020) noted small associations between intensity of social networking use and school achievement, depression, life satisfaction, and more. Frost and Rickwood (2017) also reported a mix of evidence and restated the need for comparing single or similar platforms. (3) A review of the Bergen Addiction Scales for social media use found small negative associations between addictive social media use and well-being. (4) Some studies are even optimistic, with a 2019 review finding that Facebook-based social support had positive effects on well-being. (5) For some populations, there may be especial con-

cern. Several studies more cautiously interpreted the evidence, identifying links with risky behaviour in adolescents, (6) harmful social comparisons, (7) and maladaptive personality traits. (8)

Many research studies have found opposing results of social media's impact on mental health. Even systematic reviews, which consider the heterogeneity of studies and various methodological challenges, come to different conclusions. Thus, a detailed case-by-case analysis may be advantageous. In this commentary, we describe the methodologies of two studies which we chose given their longitudinal design, recency, and impact (with nearly 350 citations between the two). (9, 10) In effect, we provide a summary of if and how social media use can have opposing effects on well-being using two studies. We highlight the particularities of studies in this area that are among the potential reasons for these differing findings, provide examples of their effects, and make recommendations for future work.

2 | SOCIAL MEDIA USE AND MENTAL HEALTH AMONG ADULTS

2.1 | Study Objectives and Background

The *American Journal of Epidemiology* published an article in 2017 tracking the longitudinal associations between Facebook use and well-being. (10) Given the "ubiquity of online social networking sites" and the considerable impact of social relationships on well-being, including lowering mental health risks, negative health behaviours, mortality, and morbidity, the authors identified a need for longitudinal, objective data on the potential risks and benefits of social media use on well-being. Thus, Shakya and Christakis (2017) compared the longitudinal associations of real-world social networks and Facebook use with four aspects of well-being: self-reported mental health, life satisfaction, physical health, and body mass index (BMI). Additionally, they controlled for the buffering effect of in-person social networks on social media use.

2.2 | Methods

The data collection occurred in three waves over a three-year period, recruiting from a nationally representative online panel of American households (Gallup Panel 2013-2015). Approximately 40,000 Gallup Panel members were randomly selected and emailed an invitation across the three waves of the study (n=10,680 respondents across three waves). Among the measures were self-reported well-being and life satisfaction, as well as objective measures of social networking use. When granted access, the researchers recorded the participants' number of friends on Facebook (*friend count*), likes since the creation of the account (*lifetime like count*), links clicked in the last 30 days (*link count*), and status updates in the last 30 days (*status count*). Participants provided height and weight data for calculation of BMI. The participants also provided their number of friends, closeness with them, and the number of face-to-face interactions with friends per week in a friend nomination exercise.

The statistical analyses included linear regression and prospective multivariate analyses. Interestingly, the authors chose to conduct both cross-sectional and prospective analyses with stacked data (compiling Waves 1, 2, or 3 into one dataset in various combinations). Less than 5% of all participants responded to each of the three waves, but the authors adjusted the stacked data for potential clustering as a precautionary measure. They also controlled for wave-level fixed effects and several demographic variables (income, educational level, age, sex, marital status, race, and Hispanic ethnicity). Each of their self-reported measures were standardized into *z-scores*.

2.3 | Results

Participants who shared their social media data with study authors were significantly different from those who did not, being younger in age, having attained a higher level of education, more likely to be female, and unmarried. Those who shared data also reported lower baseline scores of mental health and life satisfaction, a

higher number of friends, and less time spent interacting with friends (p<0.001 for each variable).

The study found that Facebook use is associated with worse mental health. Though a greater number of Facebook friends was significantly associated with better mental health, a greater lifetime like count, 30-day link click count, and status update count were all significantly associated with worse mental health. All associations with mental well-being were significant in cross-sectional and prospective analyses, except for nominating more friends and spending more time with friends, which lost significance prospectively. Similar negative associations were found for life satisfaction and Facebook use. Following prospective analyses, most of the described associations remained significant, except status count and interaction with friends. Lastly, social media use was associated with worse self-reported physical health and higher BMI.

Conversely, reporting greater closeness with friends and interacting with them more frequently in-person were associated with improved mental health. Considering the possibility that individuals experiencing social isolation may be more likely to use Facebook, the authors adjusted for the number of friends and average closeness with friends in their models, and all results remained significant.

3 | SOCIAL MEDIA USE AND MENTAL HEALTH IN ADOLESCENCE AND EMERGING ADULTHOOD

3.1 | Study Objectives and Background

Previously reported cross-sectional and longitudinal studies have relied on traditional regression techniques that solely model between-person relations among variables and have ignored the examination of opposing directions of effects between mental health and social media use. Moreover, many studies have short follow-up periods (i.e., months to 2 years), which limits the investigation of social media use across development. To respond to the limitations in the literature, Coyne et al. (2020) published a longitudinal study examining a causal model of the associations between time spent using social media and mental health (depression and anxiety) during the transition from adolescence to emerging adulthood in *Computers in Human Behavior*.

3.2 | Methods

This eight-year (2009-2016) study recruited participants from another study on inner family life. Participants between the ages of 10 and 13 were recruited from a large Northwestern city in the United States via database, referrals, and flyers. Interviewers conducted assessments in participants' homes, and the analyses from the present study were taken from the data collected via questionnaires.

Social media use was measured with the question, "How much time do you spend on social networking sites, like Facebook, on a typical day?" Depression was measured using the Centre for Epidemiological Studies Depression Scale for Children (CES-DC). (11) Anxiety was measured using the Spence Child Anxiety Inventory. (12) To disentangle the within- and between-person sources of variance in this longitudinal study, the authors used an autoregressive latent trajectory model with structured residuals. Trait-like and stable individual characteristics (e.g. ethnicity) were controlled for by the model design. To conduct analyses, the authors restructured participants' age during the study so that the variables could be considered when the participants were the same age, and they accounted for missing data with imputation.

3.3 | Results

Coyne et al. found that social media use increases throughout adolescence. At 13 years old, adolescents spent 31-60 minutes per day using social media, with levels increasing steadily up to two hours per day for young adults. Age and gender moderated the association of social media use with depression and anxiety. Social networking at age 13 was positively correlated with depressive symptoms for girls, but rates of change were not associated. For boys, social networking and depres-

sive symptoms were initially unrelated at age 13, but rates of change in social networking covaried with an increase in depressive symptoms. Yet, those with more social networking at age 13 showed higher levels of anxiety at that age, and more rapid increases in social networking were associated with more rapid increases in anxiety symptoms.

The results also indicated no future prediction of anxiety and depression. Increases in adolescents' social networking beyond their typical levels could not explain changes in depressive symptoms one year later. Similarly, depressive symptoms at a given age were mostly unrelated to social networking in the following year, except at age 16, in which depressive symptoms predicted lower use of social networking at age 17. Social networking did not predict future anxiety, and anxiety did not predict future social networking. While adolescents with higher social media use have more mental health challenges on average, their individualized fluctuations in social media use were not associated with changes in their mental health.

4 | COMPARABILITY OF MENTAL HEALTH AND SOCIAL MEDIA STUDIES

Shakya and Christakis reported that the use of Facebook was generally negatively associated with well-being. Conversely, Coyne et al. did not find associations between time spent using social media and mental health outcomes from early adolescence into young adulthood. These conflicting findings may be due to differences between objectives and methodologies, which weaken the supposition of contradicting literature. A summary of the articles' methods and results are provided in Table 1.

4.1 | Objectives and Research Question Differences

One explanation for seemingly opposing findings may be different objectives and even research questions.

Coyne et al. examined associations between time spent using social media and mental health (depression and anxiety) during the transition from adolescence to emerging adulthood. On the other hand, Shakya and Christakis examined the associations of real-world social networks and Facebook use with well-being measured as a broader construct (mental health, life satisfaction, physical health, and BMI). In congruence with the distinct objectives of the studies, the methodology differed.

4.2 | Methods

4.2.1 | Sample Characteristics: Data availability and Historical Factors are Important Limitations

Shakya and Christakis examined social media use in a limited sample of adults within the general population. While they used a subset of participants from a nationally representative sample, the final sample was considerably smaller once they excluded participants who had not provided data for the three assessment waves, and even more so when including only participants who agreed to use of their Facebook data. The exclusion of individuals who were not comfortable sharing this private data limits the generalizability of their findings to the general population and to Coyne et al. Further supporting this argument, the authors reported that participants who shared their data were significantly different from those who did not on several variables that are known to impact mental health, such as a greater number of women, less likely to be married, lower scores on mental health and life satisfaction, and less spent time interacting with friends.

In Coyne et al., the sample was composed of adolescents, particularly from what the authors defined as Generation Z ("iGen"). iGen represents those born into a world with ubiquitous smartphone use, technological advancement, Internet accessibility, and social media use. Consequently, individuals of this generation are found to spend more time using devices than previous generations. (13-15) The authors in this study defined

Publication	Shakya and Christakis (2017)	Coyne et al. (2020)
Methods		
Follow-up	Three-year longitudinal study (2013-2015)	Eight-year longitudinal study (2009-2016)
Sample	• Adults within the general population (data from nationally representative online panel of American households) • N = 71,833 participants across 3 waves; 6,730 included in analysis (those who provided access to Facebook data) • Average age of 48.4 years • 58% female	• Children between the ages of 10 and 13 recruited from a large northwestern city in the United States (via a database, referrals, and flyers) • N = 487 participants retained over the eight years of the study (83% retention rate) • Average age of 13.8 years • 51.6% female
Data	• Data on both in-person and online social networks (Facebook only)	• Data from online social networks (e.g., Facebook and Instagram)
Measures	Mental Health • One item on a rating scale of 1 indicating *poor*, 2 indicating *fair*, 3 indicating *good*, and 4 indicating *excellent* Objective measures of Facebook use • Friend count • Lifetime like count • Link click count • Status count	Mental Health • Depression: The Centre for Epidemiological Studies Depression Scale for Children (CES-DC) • Anxiety: The Spence Child Anxiety Inventory Social media use • "How much time do you spend on social networking sites, like Facebook, on a typical day?"
Statistical analyses	• Linear regression • Prospective multivariate analyses with stacked data	• Autoregressive latent trajectory model with structured residuals
Covariates	• Income, education level, race, age, sex, marital status, Hispanic ethnicity	• Trait-like and stable characteristics (e.g., ethnicity) controlled by within- and between-person variance
Results		
Association between social media use and mental health	• Greater number of Facebook friends was significantly associated with better mental health. • Greater lifetime like count, 30-day link click count, and status update count were significantly associated with worse mental health. • Almost all associations remained consistent in directionality and significance across prospective analyses.	• For girls aged 13, social networking positively correlated with depressive symptoms but not rates of change. • For boys aged 13, social networking and depressive symptoms were not associated, but rates of change in social networking covaried with change in depressive symptoms. • Higher social networking at age 13 correlated with higher levels of anxiety at age 13. • More rapid increases in social networking correlated with more rapid increases in anxiety symptoms.

TABLE 1 Comparison of studies examined

iGen as those born between 1993 and 1997. However, this is inconsistent with the Pew Research Center definition of Generation Z, which is those born between 1997 and 2012. The preceding generation, known as Millennials, are those born between 1981 and 1996. (16) Other studies examining the iGen generation are generally consistent with these definitions. (13, 15, 17)

While Coyne et al. described little effect of social media among iGen, their sampling is somewhat inconsistent. Firstly, 15% of the sample was recruited in a manner different from the rest, yet no group-level differences were analyzed. Coyne et al.'s sample is also not consistent with the ranges described, being a study of individuals born in the years 1993-1997 and not actually a part of the iGen generation. Their sample, instead, is representative of a relatively small bracket of Millennials who grew up as widespread smartphone use first began and social media was developing.

When studying social media's effects on mental health, historical factors like generation and the evolution of technology at the time are both important caveats. Data collection for Coyne et al. began in 2009, a time when social media networks had recently launched and were rapidly changing. For context, Facebook was launched to the public in 2006, Instagram launched in 2010, and Snapchat first launched in 2011. While Coyne et al.'s findings on social media and mental health may have been true at the time, it is questionable whether they still apply. Thus, the paper must carefully be considered within its context. More current studies report that adolescents aged 12 to 18 use up to 7 hours and 22 minutes of social media per day, (18) whereas Coyne et al. found an average of 30 minutes of daily use among the first wave of 13-year-old participants. The article's application to the current context is thus considered a weak point.

A strength of Coyne et al. over Shakya and Christakis was their coverage of a broader developmental period, disaggregating the effects of age on associations between social media use and well-being. While both studies were longitudinal in design, they varied in the length of the follow-up period. Coyne et al. were able to study this issue over an 8-year period, which is much longer than most similar studies. The length of the follow-up period allowed for the study of the entire developmental period (i.e., from early adolescence into young adulthood). Contrarily, the article by Shakya and Christakis only had a 3-year follow-up, which does not allow for the investigation of different stages in development. However, this was not the purpose of this study, and a longer follow-up period may not be necessary when studying older age groups.

4.2.2 | Self-Reported Social Media Use is Different from Objective Markers

There are differing measures for social media use and mental well-being, each with their own strengths and weaknesses. Typically, there is concern about one-item self-reported measures, and especially those that have not been psychometrically validated, as used in Shakya and Christakis. It is questionable whether one item can fully represent complex concepts like mental health and life satisfaction. Coyne et al. also used self-reported measures; however, they used well-known and validated scales for depression and anxiety. Yet, these measures are equally criticized for their specificity to symptoms of mental disorders, potentially missing broader dimensions of well-being such as those in Shakya and Christakis. A final consideration is the use of objective measures of social media use, like Shakya and Christakis's multiple indices of Facebook, while some others like Coyne et al. may use single-item or self-reported measures of social media use, despite other studies suggesting that people under-report their social media use.

4.2.3 | Statistical Analyses: The Importance of Within-Person Variance, Effect Sizes, and Controlling for Covariates

The regression techniques used by Shakya and Christakis only model between-person relations among variables, thus ignoring the individual processes that are important to understanding the true relationship between these variables. In contrast, Coyne et al. used rigorous statistical techniques to examine the within-person as-

sociations between social media use and mental health. Thus, disaggregating the between- and within-person effects can provide a more comprehensive understanding of the relationship between mental health and social media use. Shakya and Christakis only tested for unidirectional effects (i.e. the effect of social media use on mental health), but Coyne et al. found that mental health can influence people's time spent on social media. Indeed, Coyne et al. used two well-known theories within the field to guide their research design, which prompted them to also examine whether mental health influenced duration of social media use.

Although some findings may demonstrate statistical significance, the implications in the real world are still unknown. For instance, Shakya and Christakis reported small effect sizes for their findings. A recent study using three nationally representative datasets from the U.S. and the U.K. found that digital technology use was associated with well-being to the same extent as eating potatoes regularly. (19) Another recent large-scale national study in New Zealand reported that the association between time spent on social media and psychological distress was very weak, with only excessive amounts resulting in changes in level of distress. (20) Additionally, covariates may partially explain some findings. Although Shakya and Christakis controlled for sociodemographic variables, several important confounding variables were not considered, including physical health and substance use (e.g. smoking, alcohol use, medication, etc.). For example, significant distress has been reported in individuals suffering from physical health conditions, and smoking is associated with poorer mental health outcomes (i.e., symptoms of depression and anxiety). (21-24)

5 | CONCLUSIONS

In our critical analysis of some of the key issues involved in research on social media and mental health, we chose two influential and recent longitudinal studies, both of which had several strengths to their designs and had an impact on the literature on social media. Nevertheless, each had some critical limitations and weaknesses,

which made their comparison difficult and highlights some important standards for future studies on social media to achieve peak generalizability and validity. First, data collection and availability are a key issue. There are clear benefits to more objective and multi-item measures of social media use as seen in Shakya et al., such as avoidance of the social desirability effect and recall bias. This approach also allows a more accurate examination of the impact of the different aspects of social media on mental health, avoiding broad generalizations about these complex technologies. Nevertheless, Shakya et al. also exemplifies more methodologically taxing issues of data availability and sampling bias, which are risks that accompany use of more objective and invasive measures. Second, as technology continues to evolve at accelerating rates, researchers must be careful of generational effects, especially when attempting to generalize their findings. Third, future research should carefully examine the moderators of social media's effects on mental health, such as stages of development and person-to-person variance, when assessing the risks of social media.

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