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## Social media use and depression in adolescents: a scoping review

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### Abstract

There have been increases in adolescent depression and suicidal behaviour over the last two decades that coincide with the advent of social media (SM) (platforms that allow communication via digital media), which is widely used among adolescents. This scoping review examined the bi-directional association between the use of SM, specifically social networking sites (SNS), and depression and suicidality among adolescents. The studies reviewed yielded four main themes in SM use through thematic analysis: quantity of SM use, quality of SM use, social aspects associated with SM use, and disclosure of mental health symptoms. Research in this field would benefit from use of longitudinal designs, objective and timely measures of SM use, research on the mechanisms of the association between SM use and depression and suicidality, and research in clinical populations to inform clinical practice.

### Keywords

Social media; social networking sites; depression; suicidality; adolescents

### Introduction

Over the past several decades, adolescent depression and suicidal behaviours have increased considerably. In the USA, depression diagnoses among youth increased from 8.7% in 2005 to 11.3% in 2014 (Mojtabai, Olfson, & Han, 2016). Additionally, suicide is the second leading cause of death among youth between the ages of 10 and 34 (Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2017), with a 47.5% increase since 2000 (Miron, Yu, Wilf-Miron, & Kohane, 2019). One suggested cause for this rise in adolescent depression and suicide is the advent of social media (SM) (McCrae, Gettings, & Purssell, 2017; Twenge, Joiner, Rogers, & Martin, 2018).

The term ‘social media’ describes types of media that involve digital platforms and interactive participation. SM includes forms such as email, text, blogs, message boards, connection sites (online dating), games and entertainment, apps, and social networking sites (SNS) (Manning, 2014). Over the past decade, SNS platforms designed to help people

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communicate and share information online have become ubiquitous. Among youth, 97% of all adolescents between the ages of 13 and 17 use at least one of the following seven SNS platforms: YouTube (85% of adolescents), Instagram (72%), Snapchat (69%), Facebook (51%), Twitter (32%), Tumblr (9%) or Reddit (7%) (Pew Research Center, 2018a).

Concerns have arisen around the effects of SM on adolescents' mental health, due to SM's association with decreased face-to-face interpersonal interactions (Baym, 2010; Kraut et al., 1998; Nie, Hillygus, & Erbring, 2002; Robinson, Kestnbaum, Neustadt, & Alvarez, 2002), addiction-like behaviours (Anderson, Steen, & Stavropoulos, 2017), online bullying (Kowalski, Limber, & Agatston, 2012), social pressure through increased social comparisons (Guernsey, 2014), and contagion effect through increased exposure to suicide stories on SM (Bell, 2014).

Conversely, others have described potential benefits of SM use in adolescents such as feelings of greater connection to friends and interactions with more diverse groups of people who can provide support (Pew Research Center, 2018b). In fact, higher internet use has been associated with positive social well-being, higher use of communication tools, and increased face-to-face conversations and social contacts in college students (Baym, Zhang, & Lin, 2004; Kraut et al., 2002; Wang & Wellman, 2010). These findings suggest that internet use, including SM, may provide opportunities for social connection and access to information (Reid Chassiakos et al., 2016).

Recent systematic reviews examining the association between online technologies and depression have found a 'general correlation' between SM use and depression in adolescents, but with conflicting findings in some domains (e.g. the association between time spent on SM and mental health problems), overall limited quality of the evidence (Keles, McCrae, & Grealish, 2019), and a relative absence of studies designed to show causal effects (Best, Manktelow, & Taylor, 2014). The scope of search in these reviews is broader in topic, including online technologies other than SM (Best et al., 2014) or focussed on a select number of studies in order to meet the requirements of a systematic review (Keles et al., 2019). With this scoping review, we aim to expand the inclusion of studies with a range of designs, while narrowing the scope of the topic of SM to those studies that specifically included SNS use. Additionally, we aim to expand the understanding and potential research gaps on the bi-directional association between SM and depression and suicidal behaviours in adolescents, including studies that consider SM use as a predictor as well as an outcome. A better understanding of this relationship can inform interventions and screenings related to SM use in clinical settings.

## Methods

This scoping review was initiated by a research team including 3 mental health professionals with clinical expertise in treating depression and suicidality in adolescents. We followed the framework suggested by Arksey and O'Malley (2005) for scoping reviews. The review included five steps: (1) identifying the research question; (2) identifying relevant studies; (3) study selection; (4) charting the data; and (5) collating, summarizing and reporting the results.

## Research question

The review was guided by the question: *What is known from the existing literature about the association between depression and suicidality and use of SNS among adolescents?* Given that much of the literature used SM and SNS interchangeably, this review used the term ‘social media’ or ‘SM’ when it was difficult to discern if the authors were referring exclusively to SNS.

## Data sources and search strategy

The team conceived the research question through a series of discussions, and the first author (CV) consulted an informationist to identify the appropriate search terms and databases. A search of the database PsychINFO limited to peer-reviewed articles was conducted on 5 June 2019 (see Table 1 for search strategy). No additional methods were identified through other sources. The search was broad to include articles measuring depression as an outcome variable, and as a co-variate or independent variable. There was no restriction on the type of study design included, and English and Spanish language articles were included in the search. Articles were organized using Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia).

## Eligibility criteria

(1) The study examined SM (versus internet use in general) and made specific mention of SNS; (2) participants were between the ages of 10 and 18. If adults were included, the majority of the study population was between 10–18 years of age, or the mean participant age was 18 or younger; (3) the study examined the association between SM use and depression and/or suicidality; (4) the study included at least one measure of depression; and (5) if the focus of the study was on SM addiction or cyberbullying, it included mention and a measure of depressive symptoms. We did not include articles in which: (1) the study primarily focussed on media use other than SM, or that did not specifically mention inclusion of SNS (e.g. studies that focussed only on TV, video game, smartphone use, blogging, email); (2) included primarily adult population; (3) was not an original study, but a case report, review, commentary, erratum, or letter to the editor; (4) focussed on addiction and cyberbullying exclusively without a depression measure; and (5) the method used was content analysis of SM posts without specification of the population age range.

## Title and abstract relevance screening

The search yielded 728 articles of which six duplicates were removed. One author (CV) screened the remainder of the articles by title and abstract and a second author (TL) reviewed every 25th article for agreement. All authors screened full-text articles and extracted data from those that met the inclusion criteria. The authors met over the course of the full-text review process to resolve conflicts and maintain consistency among the authors themselves and with the research question. Of the total number of studies included for full-text review, 505 articles were excluded. Out of the 223 full-text studies assessed for eligibility, 175 were excluded. A total of 42 articles were eligible for review (see Figure 1: PRISMA flow chart for details). A form was developed to extract the characteristics of each study that included author and year of publication, objectives of the study, study method,

country where the study was conducted, depression scale used, number of participants, participant age, and results (see Table 2 for details).

### Data summary and synthesis

After reviewing the table, each study was labelled according to the main focus of research related to SM, based on the objectives, variables used, and results of the study. The topics were classified into nine different categories based on the main SM focus of the article; categories were discussed and reviewed by two authors (TL and CV) (Table 2). All authors then discussed the categories and grouped them into four main themes of studies looking at SM and depression in adolescents.

## Results

A total of 42 studies published between 2011 and 2019 met the inclusion criteria. Of the studies included, 16 were conducted in European Countries, 14 in the USA, 5 in Asia, 3 in Canada, 2 in Australia, and 2 in Latin American Countries. The number of participants per study ranged from 23 in a qualitative study (94 in the smallest quantitative study) to 118,545 participants in the largest study (Table 2).

The studies reviewed were grouped into four themes with nine categories according to the main focus of the research. The themes and categories were: (1) quantity of SNS use: effects of the frequency of SM use and problematic SM use (or evidence of addictive engagement with SM); (2) quality of SM use: characteristics of SNS use and social comparisons; (3) social aspects of SM use: cyberbullying, social support, and parental involvement; and (4) disclosure of mental health symptoms: online disclosure and prediction of symptoms and suicide contagion effect (Figure 2).

### Quantity of SM use

The majority of studies ( $n = 24$ ) examined quantity of SM use by measuring either frequency or time spent on SM ( $n = 17$ ), or problematic or addictive engagement with SM ( $n = 7$ ).

**Frequency of use**—The majority of studies found a positive correlation between time spent on SNS and higher levels of depression (Akkın Gürbüz, Demir, Gökcalp Özcan, Kadak, & Poyraz, 2017; Marengo, Longobardi, Fabris & Settanni, 2018; Pantic et al., 2012; Twenge et al., 2018; Woods & Scott, 2016). Higher frequency of SM use (2 h a day) was also found to be positively associated with suicidal ideation (Sampasa-Kanyinga & Lewis, 2015) and attempts (Sampasa-Kanyinga & Hamilton, 2015), in addition to deficits in self-regulation (Lee, Ho, & Lwin, 2017). Factors such as the number of SM accounts and the frequency of checking SM (Barry, Sidoti, Briggs, Reiter, & Lindsey, 2017) were associated with a variety of symptoms, including depression.

A study (Oberst, Wegmann, Stodt, Brand, & Chamarro, 2017) examining SM use as an outcome suggested that depression may affect SM use both directly, and indirectly, mediated by the Fear of Missing Out (or the apprehension of missing rewarding experiences that

others might be enjoying) (Przybylski, Murayama, DeHaan, & Gladwell, 2013). Adolescents with depression were also found to have more difficulty regulating their SM use (Lee et al., 2017).

Longitudinal studies suggested a reciprocal relationship between quantity of SM use and depression. Frison and Eggermont (2017) found that frequency of Instagram browsing at baseline predicted depressed mood six months later and depressed mood at baseline predicted later frequency of photo posting. Additionally, heavy use (>4 h per day) of the internet to communicate (including social networking) and play games (gaming) predicted depressive symptoms a year later (Romer, Bagdasarov, & More, 2013). Further, depressive symptoms predicted increased internet use and decreased participation in non-screen activities (e.g. sports). Finally, Salmela-Aro, Upadyaya, Hakkarainen, Lonka, and Alho (2017) found that school burnout increased the risk for later excessive internet use and depressive symptoms. Conversely, Houghton et al. (2018) found small, positive bi-directional associations between depressive symptoms and screen use 1 year later, but their final model did not support a longitudinal association.

Yet, not all studies found a positive association between frequency of use and depressed mood. While Blomfield-Neira and Barber (2014) reported a link between adolescents having a SM profile and depressed mood, they found no correlation between SM frequency of use and depressed mood. Rather, investment in SM (a measure of how important SM is to an adolescent) was linked to poorer adjustment, lower self-esteem and depressed mood. Moderate SM use (a stable trend in the time spent on SM during adolescence and into early adulthood that did not interfere with functioning) was associated with better emotional self-regulation (Coyne, Padilla-Walker, Holmgren, & Stockdale, 2018) and healthier development, especially when used to acquire information (Romer et al., 2013). Finally, Rodriguez Puentes and Parra (2014) found a positive association between SM and externalizing behaviours, but no significant association between SM use and depression.

Additionally, age moderated the effects of frequency of use on depression. For example, in one study, older adolescents with higher SM use had higher 'offline' social competence, while younger adolescents with higher SM use had more internalizing problems and diminished academics and activities (Tsitsika, Janikian, et al., 2014).

**Problematic SM use**—Seven studies explored problematic use or engagement with SM or the internet in an addictive manner (a dysfunctional pattern of behaviour similar to that of impulse control disorders, which causes distress and/or functional impairment) (Critselis et al., 2014).

An addiction-like pattern of internet use (including SM use) was associated with emotional maladjustment (Critselis et al., 2014), internalizing and externalizing symptoms (Tsitsika, Tzavela, et al., 2014), and depressive mood (Van Rooij, Ferguson, Van de Mheen, & Schoenmakers, 2017). Further, depressive mood predicted problematic internet use (both SM and gaming, independently) (Kircaburun et al., 2018; Van Rooij et al., 2017).

Bányai et al. (2017) assessed the prevalence of problematic internet use conducting a latent profile analysis to describe classes of users and found that the class described as 'at risk' for problematic internet and SM use tended to be female, use the internet for longer periods, and have lower self-esteem and more depressive symptoms. Yet, while Banjanin, Banjanin, Dimitrijevic, and Pantic (2015) found a positive correlation between internet addiction and depression in high school students (particularly for females), no such correlation was found with engagement with SM (measured by number of pictures posted).

Several studies examined mediators of the association of problematic SM use and depression. Wang et al. (2018) found that rumination mediated the relationship between SM addiction and adolescent depression, with a stronger effect among adolescents with low self-esteem. Additionally, insomnia partially mediated the association between SM addiction and depressive symptoms (Li et al., 2017). Woods and Scott (2016) found that nighttime-specific SM use (in addition to overall use and emotional investment in SM) was associated with poorer sleep quality, anxiety and depressive symptoms. Finally, problematic SM use mediated the association between depressive symptoms and cyberbullying perpetration (Kircaburun et al., 2018).

### Quality of SNS use

In addition to the frequency of adolescents' engagement with SM, another focus of research has been the ways in which adolescents engage with SM. Of the studies selected, four primarily examined engagement styles with SM and two specifically examined social comparisons with other users.

**Characteristics of SM use**—The ways in which adolescents use SM may also have an effect on depression. One study (Frison & Eggermont, 2016) characterized SM use as public (e.g. updating one's status on a profile) vs private (e.g. messaging), and active (e.g. interacting with others on SM) vs passive (e.g. browsing on SM) and found that public Facebook use was associated with adolescent depressed mood. Among girls, passive use of Facebook yielded negative outcomes such as depressed mood, while active use yielded positive outcomes such as perceived social support (Frison & Eggermont, 2016). A longitudinal study of Flemish adolescents by the same group (Frison & Eggermont, 2017) found passive SM use at baseline to predict depressive symptoms 7 months later, while depressive symptoms predicted active use of SM. Interestingly, there was no association between depressive symptoms and Facebook use (frequency of use, network size, self-presentation, and peer interaction) in a study conducted among healthy adolescents (Morin-Major et al., 2016).

Romer et al. (2013) found that the types of internet activities utilized (e.g. SNS, blogs, etc.) were associated with the frequency of self-reported depression-like symptoms. Additionally, using the internet for information searching was associated with higher grades, more frequent participation in clubs, and lower reports of depressive symptoms, while using the internet more than 4 h per day to communicate or play games was associated with greater depression-like symptoms, suggesting that Internet use for acquiring information is associated with healthy development.

A qualitative study further explored positive and negative aspects of SM use among adolescents diagnosed with clinical depression (Radovic, Gmelin, Stein, & Miller, 2017). Participants described positive SM use as including searching for positive content (e.g. entertainment, humour, content creation) or social connection, while they described negative SM use as sharing risky behaviours, cyberbullying, or making self-denigrating comparisons with others. Furthermore, this study found that adolescents' use of SM shifted from negative to positive during the course of treatment.

**Social comparisons**—Two studies examined social comparisons made through SM and the association with depression. Nesi and Prinstein (2015) found that technology-based social comparison and feedback-seeking were associated with depressive symptoms, even when controlling for the effects of overall frequency of technology use, offline excessive reassurance-seeking, and prior depressive symptoms. This association was strongest among females and adolescents low in popularity (as measured by peer report). Niu et al. (2018) found that negative social comparisons mediated the association between Qzone use (a Chinese SM site) and depression, and that the association between Qzone use and negative social comparisons was stronger among individuals with low self-esteem. However, there was no direct effect of Qzone use on depression. An additional study that primarily focussed on studying frequency of use (Marengo et al., 2018) found that increased use of highly visual SM (e.g. Instagram) predicted internalizing symptoms and body image concerns in a student sample. Moreover, in this study, the effect of highly visual SM on internalizing symptoms was mediated by body image concerns.

### Social aspects of SM use

Several studies looked at the social aspects of engagement with SM, either by evaluating the effects of cybervictimization ( $n = 4$ ) on depression, parental involvement both through monitoring of SM use or direct engagement with the adolescent ( $n = 3$ ), and aspects of social support received by the adolescent within and outside of SNS ( $n = 2$ ).

**Cyberbullying/cybervictimization**—Four studies examined cyberbullying via SM and depressive symptoms. Duarte, Pittman, Thorsen, Cunningham, and Ranney (2018) found that symptoms of depression, post-traumatic stress disorder, and suicidal ideation were more prevalent among participants who reported any past-year cyberbullying (either victimization or perpetration). After adjusting for a range of demographic factors, only lesbian, gay, and bisexual status correlated with cyberbullying involvement or adverse mental health outcomes. Another study found that cyberbullying victimization fully mediated the association between SM use and psychological distress and suicide attempts (Sampasa-Kanyinga & Hamilton, 2015). Furthermore, a 12-month longitudinal study found that cybervictimization predicted later depressive symptoms (Cole et al., 2016). Depressive symptoms have also been shown to be a risk factor (rather than an outcome) for cybervictimization on Facebook (Frison, Subrahmanyam, & Eggermont, 2016), showing evidence of the bi-directionality of this association.

**Social support**—While many studies examined potential negative effects of SM use, some studies examined the positive effects of SM use on youth outcomes, including social

support. Frison and Eggermont (2015) found that adolescents seeking social support through Facebook had improved depressive symptoms if support was received, but worsened symptoms if support was not received. This pattern was not found in non-virtual social support contexts, suggesting differences in online and traditional social support contexts. A later study that primarily focussed on the characteristics of SM use (Frison & Eggermont, 2016) found that perception of online support was particularly protective against depressive symptoms in girls with 'active' Facebook use (e.g. those who update their status or instant message on Facebook). Finally, Frison et al. (2016) showed that support from friends can be a protective factor of Facebook victimization.

**Parental involvement/parental monitoring**—Studies examining parent and family role in adolescent SM use and its outcomes were heterogeneous. One study (Coyne, Padilla-Walker, Day, Harper, & Stockdale, 2014) explored adolescent use of SM with parents and found lower internalizing behaviours in participants who used SNS with their parents (mediated by feelings of parent/child connection). Another study (Fardouly, Magson, Johnco, Oar, & Rapee, 2018) examined parent control over preadolescents' time spent on SM and found no association between parental control and preadolescent depressive symptoms.

Family relationships offline were also associated with adolescent outcomes. Isarabhakdi and Pewnil (2016) examined adolescents' engagement with offline relationships and found improved mental health outcomes with higher involvement in family activities and with peers, while internet use did not significantly improve mental well-being. This finding suggests that in-person support systems were more effective for the promotion of mental well-being. Interestingly, in Szewedo, Mikami, and Allen (2011), negative interactions with mothers during early adolescence were associated with youth preferring online versus face-to-face communication, experiencing more negative interactions on webpages, and forming close friendships with someone they met online 7 years later. An additional study that primarily focussed on suicide contagion (Tseng & Yang, 2015) found that family support was protective for both males and females, while friend support was protective only for females. However, 'significant other' support was a risk factor for suicidal plans among females.

### **Disclosure of mental health symptoms on SM**

A few of the studies selected focussed on studying the disclosure of depressive symptoms on SM and explored the potential of disclosure of symptoms of distress on SM to predict depression and suicide, in addition to the phenomenon of suicide contagion.

**Online disclosure and prediction of mental health symptoms**—Although content analysis is a method theorized to have potential to predict and prevent non-suicidal and suicidal self-injurious behaviours, the data are mixed. Ophir, Asterhan, and Schwarz (2019) examined the predictive validity of explicit references to personal distress in adolescents' Facebook postings, comparing these postings with external, self-report measures of psychological distress (e.g. depression) and found that most depressed adolescents did not publish explicit references to depression. Additionally, adolescents published less verbal



content than adult users of SNS. Conversely, Akkın Gürbüz et al. (2017) found that while disclosures of depressed mood were frequent among both depressed and non-depressed adolescents, those who were depressed shared more negative feelings, anhedonia, and suicidal thoughts on SM than those who were not depressed.

**Suicide contagion effect**—One longitudinal study examined suicide contagion effects (Dunlop, More, & Romer, 2011) finding that even though traditional SNS (e.g. Facebook or MySpace) were a significant source of exposure to suicide stories, this exposure was not associated with increases in suicidal ideation one year later. On the other hand, exposure to online discussion forums (including self-help forums) did predict increases in suicidal ideation over time. Notably, this study found that in a quarter of the sample, the exposure to suicide stories took place through SM. Another study (Tseng & Yang, 2015) found that higher importance attributed to web communication (e.g. chatting or making friends online) was associated with increased risk of self-injurious thoughts and behaviours in boys.

## Discussion

The recent rise in the prevalence of depression and suicide among adolescents has coincided with an increase in screen-related activities, including SM use (Twenge et al., 2018), sparking an interest in investigating the effects of SM use on adolescent mental health. This interest has given rise to a broad scope of research, ranging from observational to experimental and qualitative studies through interviews or analysis of SM content, and systematic studies. This scoping review aimed to understand the breadth of research in the area of depression and SM (with a focus on SNS) and to identify the existing research gaps.

We identified four main themes of research, including (1) the quantity of SM use; (2) the quality of SM use; (3) social aspects associated with SM use; and (4) SM as a tool for disclosure of mental health symptoms and potential for prediction and prevention of depression and suicide outcomes.

Most research on SM and depressive symptoms has focussed on the effects of frequency of SM use and problematic SM use. The majority of articles included in this review demonstrated a positive and bi-directional association between frequency of SM use and depression and in some instances even suicidality. Yet some questions remain to be determined, including to what degree adolescents' personal vulnerabilities and characteristics of SM use moderate the association between SM use and depression or suicidality, and whether other environmental factors, such as family support and/or monitoring, or cultural differences influence this association. Although moderate SM use may be associated with better self-regulation, it is unclear if this is due to moderate users being better at self-regulation.

Findings from the studies examining problematic SM use were consistent with prior studies linking problematic internet use with a variety of psychosocial outcomes including depressive symptoms (Reid Chassiakos et al., 2016). Though limited in number, studies reviewed here suggested that problematic or addictive SM use may be more common in females (Banyai et al., 2017; Kircaburun et al., 2018) and in those starting use at a younger

age (Tsitsika, Janikian, et al., 2014). These findings suggest a possible role of screening for addictive SM use, with a particular focus on risk stratification for younger and female adolescents.

With respect to the effects of patterns and types of SM use, studies reviewed here suggest possible differential effects between passive and active, and private versus public SM use. This suggests that screening only for time spent on SM may be insufficient. Moreover, though there are types of SM use that have adverse mental health effects for adolescents (e.g. addictive patterns, nighttime use), other types of SM use, such as for information searching or receiving social support, may have a positive effect (Coyne et al., 2018; Frison & Eggermont, 2016; Romer et al., 2013). Furthermore, over time, depressed adolescents can successfully shift their use of SM from negative (e.g. cyberbullying) to positive (e.g. searching for humour), possibly through increasing awareness of the effect of SM use on their mood (Radovic et al., 2017). Given the ubiquity of SM use, these results suggest that interventions targeting changes in adolescents' use of SM may be fruitful in improving their mental health.

Consistent with prior research (Feinstein et al., 2013), studies examining social comparisons found significant associations between social comparisons made via SM and depression. The tendency of individuals to share more positive depictions of themselves on SM (Subrahmanyam & Greenfield, 2008), and the increased opportunities for comparisons (Steers, Wickham, & Acitelli, 2014) may suggest a confluence of risks for depression and an important avenue for interventions. Moreover, the studies reviewed and previous findings (Buunk & Gibbons, 2007) suggest that individuals with low self-esteem may be at higher risk for the negative effects of social comparisons on mental health.

As previously shown (Cénat et al., 2014), most studies found cyberbullying (either perpetration or victimization) was either associated with mental health problems (Cole et al., 2016; Duarte et al., 2018) or moderated the relationship between SM use and depression and suicidality (Sampasa-Kanyinga & Hamilton, 2015). Additionally, cyberbullying may be a distinctive form of victimization that requires further investigation in order to understand its impact on adolescent mental health (Dempsey, Sulkowski, Nichols, & Storch, 2009).

Studies examining social support highlight the association of both depressed mood and low in-person social support with social networking and online support-seeking (Frison & Eggermont, 2015). Moreover, while social support online can be beneficial (Frison & Eggermont, 2015), excessive reliance on online communication and support may be problematic (Twenge et al., 2018). Of note, parental involvement both positively and negatively affected SM use and adolescent outcomes. These mixed findings suggest a need to include parental relationships in research (both via online and 'offline' communication), to better understand their role in adolescents' SM use and depression.

Surprisingly, depressed adolescents were not more likely to publish explicit references to depression on SM platforms than their healthy peers (Ophir et al., 2019) which suggests that screening for depression via SM may not be useful when used alone. However, some depressed adolescents posted more negative feelings, anhedonia and suicidal ideation (Akkin

Gürbüz et al., 2017), suggesting that SM may be used as a supplemental tool to track the course of depressive mood over time and start discussions about mental health.

Suicide contagion effect is a relatively understudied area, despite concerns raised that increased exposure to SM may amplify this effect (Bell, 2014). Given that adolescents are particularly vulnerable to the group contagion effect of suicide (Stack, 2003) and the potential for increased exposure to suicide stories online (Dunlop et al., 2011), interventions to limit this exposure could decrease suicide contagion.

The studies reviewed identified several potential moderators of the association between SM use and adolescent depression, including age and gender. The differential effects of SM use on mental health depending on the age of the adolescent (Tsitsika, Tzavela, et al., 2014) are not surprising given the developmental differences in social and mood regulation skills between younger and older adolescents. Likewise, potential mediators of the effects of SM on mental health such as social comparisons (Niu et al., 2018), body image concerns (Marengo et al., 2018), perceived support online (Frison & Eggermont, 2015), and parent–child relationship (Coyne et al., 2014) may also be important targets for future interventions.

The studies reviewed present several limitations. Most studies were cross-sectional and could not elucidate the directionality of the association between SM use and depression. Most of the studies included self-report rather than clinician-administered measures of depression, and retrospective reports, asking participants to report on past activities. Newer methods that measure actual (and not just reported) use (e.g. news feed activity, number of likes and comments) and more frequent and timely reports of SM use (e.g. diaries) could more accurately explain these associations. Another limitation is that many of the studies recruited participants in schools, limiting the generalizability to clinical samples. It is possible that those students not in school were spending more time on SM and/or experiencing more depressive symptoms. Most studies included general assessments of SM without specifying whether the use was limited to SNS or other forms of SM or internet use. While we tried to narrow our search to studies that explicitly included questions on SNS use, many also asked about other types of SM use. Separating the different types of SM use may be difficult when asking for adolescents' self-reports, but more immediate measures of mood symptoms and SNS use could be more specific and informative. Finally, while some studies included contextual factors such as the educational and family environments, other contextual factors such as ethnicity and cultural context are areas of potential for investigation.

## Conclusions

In summary, extensive research on the quantity and quality of SM use has shown an association between SM use and depression in adolescents. Given that most studies are cross-sectional, longitudinal research would help assess the direction of this association. At the same time, some aspects of SM use may have a beneficial effect on adolescent well-being, such as the ability to have diversity of friendships and easily accessed supports. Furthermore, the use of SM content to detect symptoms has potential in depression and suicide prevention. Finally, moderators of the association between SM and adolescent

depression and suicidality (e.g. gender, age, parental involvement) are areas to explore that would allow more targeted interventions. Since SM will remain an important facet of adolescents' lives, a better understanding of the mechanisms of its relationship with depression could be beneficial to increase exposure to mental health interventions and promote well-being.

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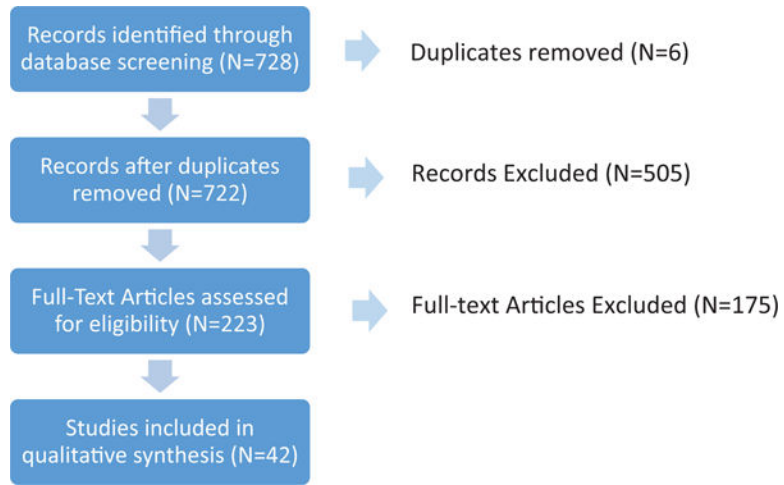
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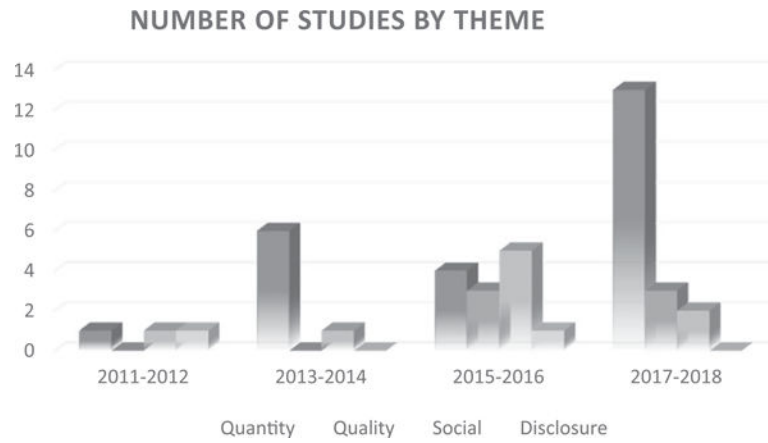
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**Figure 1.**  
PRISMA flow chart of data selection process.



**Figure 2.** Number of studies by theme (quantity, quality, social and disclosure) and time period (2011–2012, 2013–2014, 2015–2016 and 2017–2018).

**Table 1.**

Search strategy.

Area searched	Search terms
Internet use	(DE 'Digital Gaming' OR DE 'Computer Games' OR 'computer game' OR 'computer games' OR 'video game' OR 'video games' OR 'gaming' OR DE 'Social Media' OR DE 'Online Social Networks' OR DE 'Online Community' OR DE 'Internet Usage' OR 'social media' OR 'online community' OR 'online communities')
Social networking sites	OR 'Instagram' OR 'Snapchat' OR 'Facebook' OR 'Twitter' OR 'YouTube' OR 'WhatsApp' OR 'social app' OR 'social apps' OR 'social networking app' OR 'social networking apps' OR 'Kik' OR 'Tumblr'
Mobile use	OR DE 'Mobile Phones' OR DE 'Smartphones' OR DE 'Mobile Applications' OR DE 'Sexting' OR DE 'Smartphone Use' OR DE 'Text Messaging' OR 'smartphone' OR 'smartphones' OR 'mobile application' OR 'mobile applications' OR 'mobile app' OR 'mobile apps' OR 'text message' OR 'text messages' OR 'text messaging' OR 'sexting' OR 'sexts')
Symptoms, behaviours and disorders	AND (DE 'Depression Emotion' OR DE 'Major Depression' OR DE 'Addiction' AND DE 'Anxiety' OR DE 'Anxiety Disorders' AND DE 'Aggressive Behaviour' OR DE 'Aggressiveness' OR DE 'Suicide' OR DE 'Suicidal Ideation' OR DE 'Self-Injurious Behaviour' OR DE 'Victimization' OR DE 'Internet Addiction' OR DE 'Internet Addiction' OR DE 'Cyberbullying' OR 'depression' OR 'depressed' OR 'addiction' OR 'addicted' OR 'addicting' OR 'anxiety' OR 'anxious' OR 'bullying' OR 'bullied' OR 'bully' OR 'cyberbullying' OR 'cyberbullied' OR 'cyberbully' OR 'victimized' OR 'victimization' OR 'internalizing' OR 'externalizing' OR 'aggressive' OR 'aggressiveness' OR 'gaming disorder')
Adolescents	AND (DE 'Middle School Students' OR DE 'High School Students' AND DE 'Adolescent Attitudes' OR DE 'Adolescent Behaviour' OR DE 'Adolescent Development' OR 'middle school' OR 'high school' OR 'adolescent' OR 'adolescence' OR 'teen' OR 'teens' OR 'teenager' OR 'teenagers' OR 'youth' OR 'youths')

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Data charting form including author and year of publication, objectives of the study, method used, country where the study was conducted, depression scale used, number of participants, participant age, results and main social media focus.

**Table 2.**

Author and year	Objectives	Methods	Country	N	Ages (years)	Results	Main social media focus
Akkin Gurbiiz et al., 2017	Evaluate the SNS habits of depressed adolescents and the relationship between depression and disclosure on SNSs	Cross-sectional	Turkey	53 (cases) and 55 (control students)	13–18	The time spent on SNSs increased with depressive symptoms	Frequency of use
Banjanin et al., 2015	Investigate the potential relationship between internet addiction and depression in adolescents	Cross-sectional	Belgrade, Serbia	336 (65.5% female)	18	No relationship between time spent in SNS sites and depression and between depression and SNS activities (i.e.: number of friends)	Problematic use
Banyai et al., 2017	Test the psychometric properties of the BSMAS and assess the prevalence of problematic social media use in Hungarian adolescents	Cross-sectional	Hungary	6664 (49.06% female)	15–22 (M = 16.62, SD 0.96)	The class at risk of problematic social media use was more likely to be female, have a higher frequency of use, and have lower self-esteem and higher level of depressive symptoms	Problematic use
Barry et al., 2017	Investigate adolescent and parent reports of adolescent social media use and relation to adolescent psychosocial adjustment	Cross-sectional	USA	226 (113 parent-adolescent dyads) (51.3% female)	14–17 (M = 5.27, SD = 1.02)	Number of social media accounts and frequency of checking social media were correlated with depressive symptoms. Parental monitoring of social media was not associated with any of psychosocial adjustment variables	Frequency of use
Cole et al., 2016	Evaluate if cybervictimization is prospectively related to negative self cognitions and depressive symptoms beyond other types of victimization	Longitudinal (2 waves of data collection over a 6-week period) Cross-sectional	USA	827 (55.1 % female)	8–13 W = 10.90, SD = 1.18)	Victimization was correlated with negative cognition and depressive symptoms. Cybervictimization predicted depressive symptoms	Cybervictimization
Coyne et al., 2014	Examine association between parent-child use of SNS and feelings of connection and other adolescent outcomes	Cross-sectional	USA	491 families	12–17 (M = 14.4, SD = 1.07), (53% female)	Social networking with parents was associated with increased connection between parents and adolescents. Feelings of connection mediated the relationship between social networking with parents and depression. Adolescent social networking use without parents was associated with depression	Parental involvement
Coyne et al., 2018	Examine differential patterns of social media use over time and investigate predictors and outcomes of use patterns.	Cross-sectional	USA (Pacific North-west)	681 families (457 adolescents) (53% female)	11–14 at baseline (M = 13.5)	Moderate users had higher levels of self-regulation and lower levels of overall media use vs the other 2 classes (peak users and increasers), which had higher levels of depression and physical aggression	Frequency of use
Critselis et al., 2014	Assess the determinants and psychosocial correlates associated with internet addictive behaviours among adolescents	Cross-sectional	Nicosia, Cyprus	805	13–18	Adolescent BIU was associated with abnormal peer and conduct problems and elevated hyperactivity and emotional symptoms. AIU among adolescents was	Frequency of use

Author and year	Objectives	Methods	Country	N	Ages (years)	Results	Main social media focus
Duarte et al., 2018	Further elucidate which adolescents are at greatest risk for the clinically significant negative mental health outcomes of cyberbullying.	Cross-sectional	USA	1031	13–17 ( <i>M</i> = 14.9; <i>SD</i> = 1.39)	associated with lower emotional and psychosocial adjustment Sexual orientation was the only demographic factor correlated with cyberbullying and mental health symptoms. Increased use of SNS correlated with cyberbullying	Cybervictimization
Dunlop et al., 2011	Examine exposure to sources of suicide stories, how knowledge of suicidal behaviour spread among friends and acquaintances, and the relationships between exposure to sources of suicide reports and suicide ideation	Longitudinal	USA	719	14–24	While friends and family or newspapers remained strong sources of suicide stories, there was considerable exposure to such stories online and especially in SNS. Online discussion forums (but not SNS) were associated with increased suicidal ideation	Suicide contagion
Fardouly et al., 2018	Examine the association between parental control over the child's time spent on social media, number of appearance comparisons, appearance satisfaction, depressive symptoms and life satisfaction.	Cross-sectional	Sydney, Australia	284 preadolescents (53.2% female) and 1 parent (96.1% mothers)	<i>M</i> = 11.2 ( <i>SD</i> = 0.56)	Parental control over preadolescent time spent on social media was not associated with depressive symptoms. Lower frequency of social media appearance comparison was associated with higher preadolescent appearance and life satisfaction, and lower depressive symptoms	Parental involvement
Frison & Eggermont, 2015	Examine relationships among daily stress (i.e., school- and family-related stress), social support-seeking, perceived social support through Facebook and depressed mood among adolescents	Cross-sectional	Flanders, Belgium	910 (51.9% female)	13–20 ( <i>M</i> = 15.44; <i>SD</i> = 1.71)	Daily stress positively predicted adolescents' seeking of social support through Facebook. When social support was sought on Facebook and subsequently received, it decreased adolescents' depressed mood, but if not received, it increased depressed mood	Social support
Frison & Eggermont, 2016	Provide a deeper understanding of the relationships between different types of Facebook use, perceived online social support, and boys' and girls' depressed mood	Cross-sectional (2-step sampling method)	Flanders, Belgium	910 (51.9% female)	13–20 ( <i>M</i> = 15.44; <i>SD</i> = 1.71)	Harmful impact of Facebook use occurred among girls who passively use Facebook and among boys who actively use Facebook in a public setting. Girls who actively use Facebook in a public or private setting and subsequently receive online social support, benefit from using Facebook	Characteristics of SNS use
Frison & Eggermont, 2017	Examine relationships between different types of Instagram use (i.e., browsing, posting, and liking) and adolescents' depressed mood.	Longitudinal	Flanders, Belgium	T1 = 671; T2 = 622 at T2, 244 at both time points	12–19 ( <i>M</i> = 14.96; <i>SD</i> = 1.29)	Instagram browsing (but not posting or liking) at Time 1 positively predicted adolescents' depressed mood at Time 2. Depressed mood at Time 1 positively predicted Instagram posting (but not browsing and liking) at Time 2	Characteristics of SNS use
Frison et al., 2016	Address critical gaps in our understanding of online victimization and adolescents' depressive symptoms and life satisfaction	Longitudinal (2-wave panel study; 6-month interval)	Flanders, Belgium	1621 (48% female)	12–19 ( <i>M</i> = 14.8; <i>SD</i> = 1.41)	Facebook peer victimization predicted decreases in life satisfaction and vice versa. Depressive symptoms were a risk factor for peer victimization on Facebook. In addition, support from friends was	Cybervictimization

Author and year	Objectives	Methods	Country	N	Ages (years)	Results	Main social media focus
Houghton et al., 2018	Identify the trajectories of depressive symptoms in adolescents and consider possible associations between trajectory classes and screen use time. Evaluate possible associations between screen use and subsequent depressive symptomatology and vice versa	Prospective cohort (6 waves of data collection)	USA	1749 (47% female)	10–17	protective from the harmful outcomes of peer victimization on Facebook  Three trajectories of depressive symptoms with differences on screen use (low-stable, high-decreasing, and low-increasing) were identified. Small, positive associations were evident between depressive symptoms and later screen use, and viceversa. Yet, there was no consistent support for a longitudinal association	Frequency of use
Isarabakdi & Pewnii, 2016	Assess the level of engagement in family and peer activities and Internet use among in-school youth and the effect of engagement in family and friend activities, as well as Internet use on mental well-being	Cross-sectional	Thailand	1074	15–19	Engagement of family activities improved mental health, and decreased depression and stress among youth. Engagement with peers had a significant effect on mental health and depression, but not on stress. Internet usage had a very low effect on mental well-being	Social support
Kircaburun et al., 2018	Understand how CBP and PSMU are associated with each other and to gender, age, depression, and self-esteem among high school students using a structural equation model.	Cross-sectional	Turkey	1143 students in study 1 [Study 2 with adults, not included]	14–21 (48% female; $M = 16.20$ , $SD = 1.03$ )	Depression directly predicted PSMU and indirectly predicted cyberbullying perpetration, although the associations were weak	Problematic social media use
Lee et al., 2017	Address weaknesses in the social cognitive model by using an extended version to understand both external and personal antecedents of adolescents' SNS usage	Cross-sectional	USA	3753	13–21 ( $M = 14.73$ )	Depression was positively associated with self-reactive outcome expectation and deficient self-regulation. Positive relationship with father (not mother) is negatively associated with adolescents' dependence on social media for identity formation. In addition to depression, loneliness was included as a psychosocial antecedent factor of high social media usage	Frequency of use
Li et al., 2017	Assess the mediating effects of insomnia on the associations between problematic Internet use, including IA and OSNA, and depression among adolescents	Cross-sectional.	China	1015 (41.2% female)	7th–9th graders	IA and OSNA were both associated with depression, with a stronger association for OSNA. Insomnia mediated the associations between IA/OSNA and depression	Problematic use
Marengo et al., 2018	Evaluate the association between social media use, and in particular that of HVSM, with body image concerns and internalizing symptoms in adolescents	Cross-sectional	Northern Italy	523 (53.5% female)	$M = 14.82$ ( $SD = 1.52$ )	Frequent use of HVSM positively predicted internalizing symptoms and body image concerns, while moderate use was not a significant predictor. Body image concerns mediated this association. Females had higher body image concerns and internalizing problems	Frequency of use
Morin-Majora et al., 2016	Explore the associations between Facebook behaviours (use frequency, network size, self-	Cross-sectional	Montreal, Canada	94 adolescents (53.1% female)	12–17 ( $M = 14.2$ , $SD = 1.7$ )	There was a positive association between Cortisol systemic output and number of Facebook friends but a negative	Characteristics of SNS use

Author and year	Objectives	Methods	Country	N	Ages (years)	Results	Main social media focus
Blomfield-Neira & Barber, 2014	presentation and peer interaction) and basal levels of cortisol among adolescent boys and girls Investigate whether there was a relationship between adolescents' use of SNSs and their social self-concept, self-esteem, and depressed mood.	Cross-sectional	Western Australia	1819 students (55% female)	13–17 /M= 14.6, SD = 1.05	association with Facebook peer interaction. There were no FB associations with depressive symptoms and HPA axis functioning There was no significant link between social media frequency and depressed mood but social media <i>investment</i> did predict depressed mood. There were differences by gender in the association between having social media and indicators of adjustment	Frequency of use
Nesi & Prinstein, 2015	Examine specific technology-based behaviours (social comparison and interpersonal feedback-seeking) that may interact with offline individual characteristics to predict concurrent depressive symptoms among adolescents	Longitudinal (levels of depressive symptoms at baseline, and 1 year later)	USA	619 students (M = 14.6; 57 % female) completed both self-report questionnaires	12–16 /M= 14.6; (57.3% female)	Technology-based social comparison and feedback-seeking were associated with depressive symptoms, with a strong association among females and adolescents low in popularity. Associations were found beyond the effects of frequency of technology use, offline excessive reassurance-seeking and history of depressive symptoms	Social comparisons
Niu et al., 2018	To investigate the association between Chinese adolescents' SNS (Qzone) use and depression, the mediating role of negative social comparison and the moderating role of self-esteem	Cross-sectional	China	764 (46.8% female)	12–18 W= 14.23, SD = 1.75	Negative social comparison mediated the relationship between Qzone use and depression. There were no significant direct effects of Qzone use on depression. Qzone use was less strongly associated with negative social comparison at higher levels of self-esteem	Social comparisons
Oberst et al., 2017	Analyse the link between psychopathological aspects and negative consequences of smartphone use, including role of FOMO and the intensity of social network use	Cross-sectional.	Latin American countries	1468 (74.3% females)	16–18 W= 16.59, SD = 0.62	Depression had a direct effect on CERM. The effect of depression on negative consequences was mediated by FOMO. SNI mediated the association between FOMO and CERM. Being depressed triggered higher SNS involvement in girls	Frequency of use
Ophir et al., 2019	Examine the predictive validity of explicit references to personal distress in adolescents' Facebook postings as well as non-explicit Facebook activity features	Cross-sectional	USA	Study 1: 86 (51.2% female). Study 2: 162 (51.3% female)	Study 1: 13–18 (<math>M = 15.98, SD = 1.3</math>). Study 2: adolescents (not specified)	While rare, explicit distress references predicted depression among adolescents. There were no additional differences in Facebook activity behaviours that could distinguish between depressive and non-depressive adolescents. Adolescents appeared to publish significantly less verbal content than adults' users of social media	Disclosure of symptoms
Pantic et al., 2012	Investigate the relationship between social networking and depression indicators in adolescent population	Cross-sectional	Pozarevac, Central Serbia	160	M = 18.02 (SD = 0.29)	Positive correlation was found between depression and time spent on social networking but not between TV viewing and depression. No statistically significant difference was noted between males and females in TV viewing, social networking, sleep duration and depression	Frequency of use

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Radovic et al., 2017	Examine descriptions of social media use among 23 adolescents who were diagnosed with depression to explore how social media use may influence and be influenced by psychological distress	Qualitative study (30–60 min semistructured interviews)	USA	23 (78.2% female)	13–20, (M = 16, SD = 2)	Adolescents described both positive (searching for information and social connection) and negative use (risky behaviours, cyberbullying, and making self-denigrating comparisons with others). There were 3 types of use including 'oversharing' (frequent updates or too much personal information), 'stressed posting' (sharing negative updates), and encountering 'riggerting posts'	Characteristics of use
Rodriguez Puentes & Parra, 2014	Explore the relationship between the amount of time spent in social networking and the presence of internalizing and externalizing behaviour problems in adolescents	Experimental or quasi-experimental study	Bogota, Colombia	96 (52.2% female)	11–15 (M = 11.98, SD = 0.68)	Greater time spent on social networks was associated with externalizing disorders such as aggressive conduct, rule breaking and attention deficits. There was no association with depression	Frequency of use
Romer et al., 2013	Determine the effects of both older and newer media use on academic, social, and mental health outcomes in adolescents and young adults	Cross-sectional	USA	719 (51% female)	14–22	Greater Internet use and video game playing were associated with recent depression. Information users had higher grades, participated in clubs more often, and were lowest in depression. Moderate internet use was best for healthy development	Frequency of use
Salmela-Aro et al., 2017	Examine the longitudinal paths between excessive internet use, depressive symptoms, school burnout and engagement. Specifically, whether excessive internet use leads to both depressive symptoms and/or school-related burnout, and vice versa	2 cross-sectional studies; 760 students at Time 1 and 1403 and at Time 2	Helsinki, Finland	Study 1: 1702 elementary school students; Study 2: 1636 high school students	Study 1: 12–14; Study 2: 16–18	Emotional engagement, school burnout and depressive symptoms each made a unique contribution to adolescent excessive internet use. Furthermore, students who burn out at school are at risk for excessive internet use and depressive symptoms	Frequency of use
Sampasa-Kanyinga & Hamilton, 2015	Examine the link between the use of social networking sites and psychological distress, suicidal ideation and suicide attempts, and test the mediating role of cyberbullying victimization on these associations in adolescents	Cross-sectional	Ottawa, Canada	5126 (48% females)	11–20 (M = 15.2; SD = 1.9)	Use of social media was associated with psychological distress, suicidal ideation and attempts. Cyberbullying victimization fully mediated the association between SNSs use and psychological distress and suicidal attempts; and partially mediated the association between SNSs use and suicidal ideation	Cybervictimization
Sampasa-Kanyinga & Lewis, 2015	Examine the association between time spent on social media and unmet need for mental health support, self-rated mental health, psychological distress and suicidal ideation in a sample of middle and high school children	Cross-sectional	Ottawa, Canada	753 (49% female)	M = 15.2 (SD = 0.2)	Those reporting unmet need for mental health support more likely reported using social media for >2 h a day. Use of social media for >2 h a day was associated with fair or poor self-rating of mental health, higher levels of psychological distress, and suicidal ideation	Frequency of use
Szwedo et al., 2011	Determine if youth who experience negative interactions	Cross-sectional (Participants)	USA (sub-urban and	138 (89 had a SNS webpage on	Time 1: M = 13.23 (SD =	Adolescents' depressive symptoms at baseline were positively associated with	Parental involvement



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Tseng & Yang, 2015	with their mothers as teenagers later prefer online communication, engage in more negative peer interactions on SNS, and have greater likelihood of forming a new friendship with someone they met online	drawn from a larger longitudinal study)	urban Southeastern)	Facebook or MySpace; 63 granted access (permission)	0.66) Time 2: $M = 20.53$ , (SD = 0.97)	later preference for online communication. Poor adolescent relationships with mother predicted preference for online communication, likelihood of forming friendships with people met online, and poorer quality of online relationships at an older age	Suicide contagion
Tsitsika, Janikian, et al., 2014	Investigate relationships of Internet use, web communication, and sources of social support with adolescent SITBs	Cross-sectional (2-phase sampling design)	Changhua and Nantou counties, Taiwan	2494	13–18	Web communication in adolescent boys was a risk factor for SITBs. Boys with higher levels of depressive symptoms had lower ability to communicate with others on the Internet due to more impaired functioning. Frequency of use was negatively associated with depression in boys	
Tsitsika, Tzavella, et al., 2014	Explore the prevalence of IAB among adolescents in seven European countries (Greece, Spain, Poland, Germany, Romania, Netherlands, and Iceland)	Cross-sectional	European countries	13,284	14–17 ( $M = 15.8$ , $SD = 0.7$ )	The prevalence of DIB was higher among adolescents who spent >2 h per day on SNS. DIB significantly predicted greater emotional and behavioural problems	Problematic use
Tsitsika, Tzavella, et al., 2014	Investigate associations between heavier SNS use, and adolescent competencies and internalizing problems	Cross-sectional	European countries	10,930	14–17	Heavier SNS use was associated with more offline social competence among older adolescents, but more internalizing problems, and lower academic performance and activities scores, especially among younger adolescents	Frequency of use
Twenge et al., 2018	Determine if the prevalence of depressive symptoms and suicide-related outcomes has increased in U.S. adolescents in recent years and whether these birth cohort trends differ by socio-demographic characteristics and examine possible causes behind trends, primarily focussing on shifts in adolescents' use of leisure time	Cross-sectional	USA	388,275; YRBSS ( $N = 118,545$ )	13–18	Adolescents who spent more time on screen activities were more likely to have high depressive symptoms or at least one suicide-related outcome. Social media only had a significant effect on depressive symptoms among those low in in-person social interaction, not among those high in in-person social interaction. Over the same period that depression and suicide outcomes increased, screen activities increased and non-screen activities decreased	Frequency of use
Van Rooij et al., 2017	Explore abandoning a unified approach to problematic 'Internet use' by splitting the concept into more specific application level measurement (gaming, internet use and Social media use)	Cross-sectional	Netherlands	3945	12–15	PIU was associated with depression and both gaming and social media activities. Specific PIU measures for social media use and gaming differed, with male gender more associated with on and offline gaming. Both problematic social media use and gaming were associated with depression	Problematic use
Wang et al., 2018	Test the mechanisms underlying the association between SNS addiction and depression in	Cross-sectional	China	365	14–18; $M = 15.96$ (SD = 0.69)	Social Media addiction adolescent depression was positively associated. This association was mediated by rumination.	Problematic use

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Woods & Scott, 2016	adolescents, whether rumination plays a mediating role, and whether self-esteem buffers the mediating effect of rumination Explore the association between social Cross-sectional media use (including specific nighttime use and emotional investment in SNS) with sleep quality, anxiety, self-esteem and depression	Cross-sectional	Scotland	467	11–17	The effect of SNS on adolescent depression was stronger the lower the self-esteem Greater general and nighttime- specific SNS use as well as social media investment were all poorer sleep quality and anxiety and depression. After controlling for depression, anxiety and self-esteem, nighttime-specific SNS use still predicted poor sleep	Frequency of use

AIU = Addictive internet Use; BIU = Borderline Addictive Internet Use; BSMAS = Bergen Social Media Addiction Scale; BIU = Borderline addictive internet use; CBP = Cyberbullying Perpetration; CERM = Cuestionario de Experiencias Relacionadas con el móvil (Questionnaire of Experiences Related to the cellphone); DIB = Dysfunctional Internet Behaviour; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders (4th edition, Text Revision); FOMO = Fear of Missing Out; HVSM = Highly Visual Social Media; SNI = Intensity of social network use; IA = Internet Addiction; IAB = Internet Addictive Behaviour; OSNA = Online social networking addiction; PSMU = Problematic Social Media Use; RADS-2 = Reynolds Adolescent Depression Scale - Version 2; SITBs = self-injurious thoughts and behaviours; SNS = social networking sites.