

Systematic Review of Studies Measuring Social Media Use and Depression, Anxiety, and Psychological Distress in Adolescents: 2018-2020

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ABSTRACT

Introduction: Previous systematic reviews have examined social media use and adolescent mental health. The current literature has yet to examine study characteristics that may influence these associations.

Objective: This systematic review examined research on the association between adolescent social media use and mental health, focusing on depression, anxiety, and psychological distress, with particular attention to demographic differences and reporting quality.

Methods: PubMed, Embase, PsycINFO, Cumulative Index to Nursing and Allied Health, and Social Sciences Citation Index were searched for studies that included measures of social media use and mental health concerns with adolescent participants from 2018 through June 2020. We identified and described: (1) social media use measures used, (2) associations between use and depression, anxiety, and psychological distress, (3) differences in associations by demographic characteristics, and (4) quality of reporting.

Results: Of the 3131 studies identified, 19 were included. Seven studies (36.8%) used frequency-based measures of social media use (eg, time spent, frequency checking), 10 (52.6%) used risk-based measures (eg, social media addiction or disorder, Facebook intrusion, etc), and 2 (10.5%) used both frequency and risk-based measures. Most studies ($n=12$, 63%) reported positive association(s) between social media use and mental health concerns. Many studies reported that the results differed by gender ($n=11$, 58%) with positive associations more common among females. Quality of report scores ranged from 32 to 43 total points (44 maximum).

Conclusions: Future studies should consider both frequency and risk-based social media measures to develop a balanced understanding of adolescent social media use.

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INTRODUCTION

Mood disorders, specifically depression and anxiety, are the most prevalent mental illnesses among adolescents. By 14 years of age, half of all mental health conditions have already manifested in symptoms.¹ Among adolescents who are 10 to 14 years of age, 1.4% experience symptoms of depression and 4.4% experience symptoms of anxiety.² Among adolescents who are 15 to 19 years of age, these illnesses are more prevalent, with 2.8% of adolescents experiencing depression and 4.6% experiencing anxiety.² These mental health conditions can lead to severe consequences, such as suicide—the second leading cause of death for adolescents in the United States.³ It is crucial to understand the influences of adolescent mental health conditions in order to guide prevention.

Social media use is one of several hypotheses that may explain the observed uptick in prevalence of depression and anxiety in adolescents.⁴ About 45% of teens report going online nearly constantly.⁵ Prior systematic reviews have

reported that for adolescents, social media use correlates with harmful psychiatric outcomes, specifically with increasing symptoms of depression and anxiety.^{6,7} In addition to the research on social media use posing a negative influence on mental health, research also supports associations between social media use and mental health benefits.⁸⁻¹⁰ For example, 1 study found that people with mental illnesses benefited from using social media through greater social connectedness, providing personal empowerment and hope.¹⁰

To better understand the relationship between social media use and adolescent mental health, systematic reviews have been completed to summarize findings.¹¹⁻¹³ One review of studies examining social media use and depression in adolescents reported that 2 randomized control studies provided evidence to support a causal relationship between young adults reducing their social media use and declines in depression scores.⁶ In contrast, a review on digital technology (eg, online communication and social media use) and adolescent mental health observed that the associations between digital technology use and adolescents' mental health were inconsistent and that additional studies are needed to support cause and effect conclusions.¹⁴ The inconsistency between reviews shows that the impact of social media use on adolescent mental health remains unclear.

To gain a more comprehensive understanding of the relationship between social media and mental health, researchers have included a focus on broader conditions, like psychological distress. Although several studies and analyses have focused on specific Diagnostic and Statistical Manual of Mental Disorders (DSM-5) conditions like anxiety and depression, others have taken a more comprehensive approach by incorporating psychological distress.¹⁵⁻¹⁹ This term refers to temporary and treatable mood disturbances, including anxiety and depression.²⁰ Therefore, exploring both clinically defined mental disorders such as anxiety and depression, as well as the broader concept of psychological distress, is crucial.

A review by Keles et al¹¹ explored diagnostic criteria for depression and anxiety as well as the broader construct of psychological distress. This study aimed to review studies observing the relationship between social media use and depression, anxiety, or psychological distress among adolescents. The Keles review assessed studies through 2018. However, since the review, social media users worldwide increased 9% to 3.484 billion in 2019.²¹ This increase may impact the relationship between social media use and mental health. Therefore, this study aimed to reexamine this relationship.

In addition to the gap in systematic reviews since 2019, previous reviews have yet to evaluate how demographic variables, such as gender, race, and socioeconomic status, may affect this association. Social media use may have unique effects on the mental health of different subgroups of adolescents. A past systematic review on demographic characteristics and mental health found inconsistent results regarding the important roles of demographics in mental health.²² Thus, investigating the demographics across studies focused on mental health and social media can shed light on the multiplicative effects of gender, race, and socioeconomic status. The moderation of demographic variables may explain the inconclusive associations between social media use and adolescent mental health and can help to guide future interventions. The purpose of this study was to examine the characteristics of recent studies of social media use and depression, anxiety, and psycho-

logical distress in adolescents, including the way in which social media use, association, and demographic characteristics (such as gender, race, and socioeconomic status) are reported.

METHODS

This systematic review followed the guidance of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).²³ The protocol for this review was registered with the International Prospective Register of Systematic Reviews (Prospero; CRD42021237729). This study was exempt from institutional review board approval because no human subjects were involved.

Eligibility Criteria

Eligibility criteria were based on the previous systematic review by Keles et al to further investigate and build upon their findings.¹¹ Eligible studies included participants with mean age of 13 to 18 years old; an exposure variable that measured social media use (studies solely measuring exposure to the internet more generally, cyberbullying or cyber-victimization, or non-social media internet activities were excluded); and an outcome variable of depression, anxiety, or psychological distress assessed by validated instruments. (Outcomes of substance misuse, eating disorders, well-being, life satisfaction, self-esteem, body image problems, externalizing, loneliness or stress were excluded.) Eligible studies were also empirical, observational, and published from 2018 through June 2020 in peer-reviewed journals with full text available in English. If longitudinal papers reported on 2 or more groups of participants, only the results of the group that met eligibility criteria were examined.

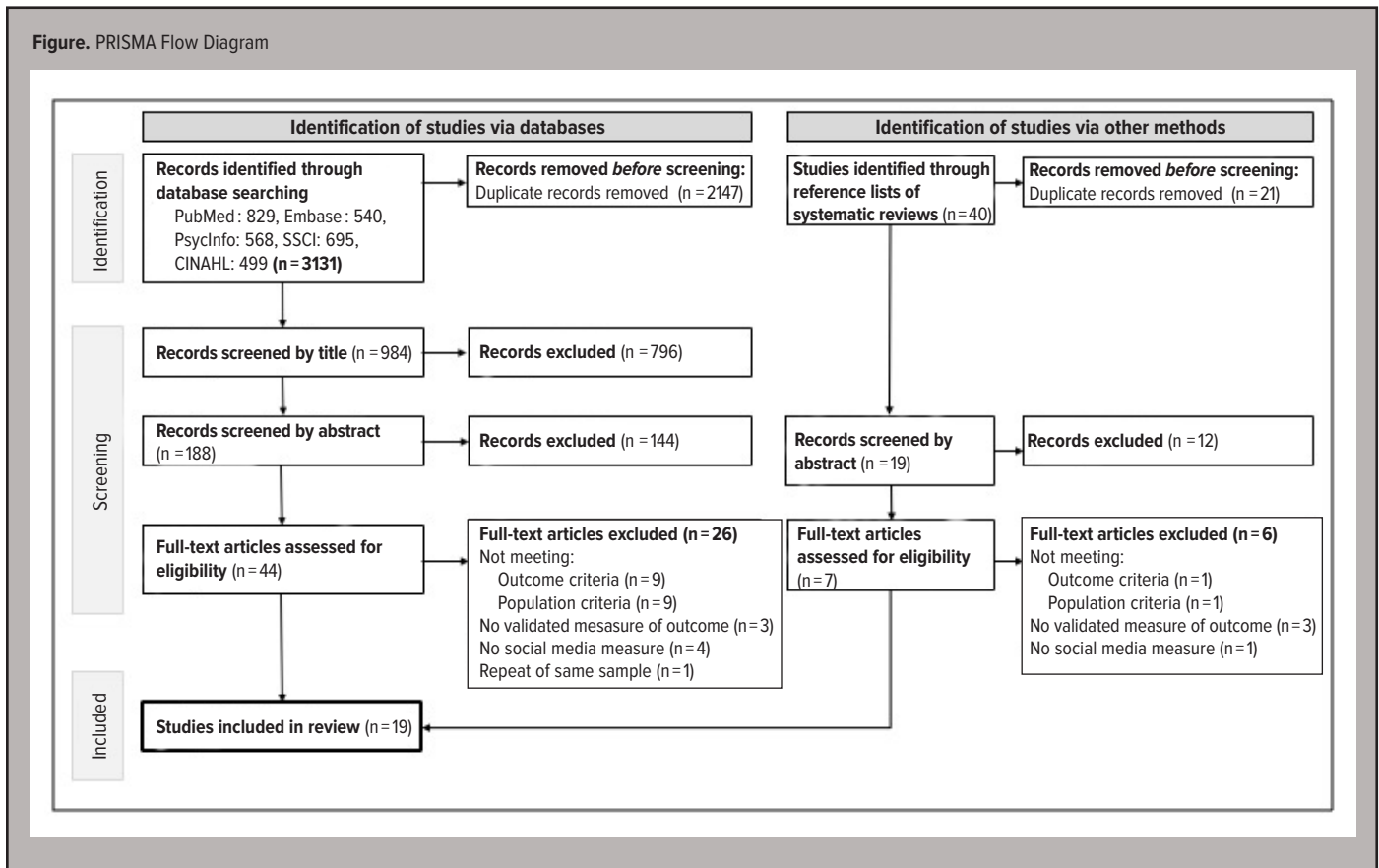
Search Strategy

The databases PubMed (via NCBI), Embase (via Elsevier), PsycINFO (via OVID), Cumulative Index to Nursing and Allied Health (CINAHL via EBSCO) and Social Sciences Citation Index (SSCI via Web of Science) were systematically searched on June 30, 2020. Filters applied to the search results included publication 2018 through June 2020 with full text available in English. The following search terms were used to describe adolescents: adolescent, teen, youth, young, juvenile, high school student, secondary school student, middle school student. The following terms were used to describe the exposure social media variable: social media, social network, Facebook, Instagram, Twitter, Snapchat, TikTok, YouTube. The following terms were used to describe the mental health outcome variable: mental health, mental disorder, mood disorder, affective disorder, depression, depressive, anxiety, anxious, psychological stress, psychological wellbeing, psychological well-being, psychological distress, bipolar, neurotic, agoraphobia, cyclothymic, dysthymia. Additionally, reference lists of systematic reviews were hand-searched to identify additional papers. (See Appendix for search strategies by database.)

Screening

All papers from the automated database searches were collated

Figure. PRISMA Flow Diagram



using the EndNote Online reference management software (Clarivate, Philadelphia, Pennsylvania). After duplicates were deleted, 3 reviewers (QA, AJ, MS) independently completed a screening conducted by reviewing title and abstract using the aforementioned eligibility criteria, documenting reasons for exclusion. To ensure accurate inclusion or exclusion of articles, QA and AJ, or MS and AJ, compared excluded articles to confirm agreement. Finally, 2 reviewers (QA, AJ) independently screened the remaining papers by reviewing full text and again documented exclusion reason and compared to confirm agreement. Article eligibility discrepancies were resolved by an additional reviewer (MM). The background and training of the reviewers are as follows: AJ, a research specialist, trained QA and MS (undergraduate students) on how to screen data. MM is the lab principal investigator.

Data Extraction

Key information relevant to the research question was systematically extracted by 2 reviewers (QA, AJ), and discrepancies were resolved by an additional reviewer (MM). Descriptive data variables extracted included citation, study design, country where study took place, total participants, age of participants. Key study variables extracted included measurement of social media use, measurement of outcome variable, associations between variables, and demographic information. Measure of social media use included measures of both quantity and quality. Measurement of outcome

variable indicated the validated measurement tool used to measure depression, anxiety, or psychological distress. Association indicated whether social media usage had a positive, negative, mixed, or null association with symptoms of mental health outcome variable. Demographic information included socioeconomic status, race, gender, and gender report format (binary vs full gender spectrum). Acceptable proxies to measure socioeconomic status included family income, ZIP code, education, and access to internet.

Quality Review

Our quality review tool was derived from the Strengthening the Report of Observation Studies in Epidemiology (STROBE) tool.²⁴ The quality review tool consists of 22 items assessing the quality of study design, data collection, and analysis of each study. A study could score a maximum of 2 points for each item if the criteria were completely met, 1 point if the criteria were partially met, and 0 points if criteria were not met. There were 44 total possible points. Two investigators scored each article, and discrepancies were resolved by consensus.

RESULTS

The literature search yielded 3131 articles from 5 databases. After 2147 duplicates were removed, screening on title excluded 796 of the 984 unique papers. The remaining 188 articles were screened on abstract, with 144 removed, leaving 44 papers. Additionally, hand-searching the references of 14 systematic reviews on social

media and mental health identified another 40 papers, of which 21 were duplicates. Next, 12 of these articles were eliminated based on abstract, and 7 were retained for full-text screening. Thus, a total of 51 articles were retained for full-text screening. Full text-screening excluded 32 more articles, for a total sample of 19. The PRISMA flowchart (Figure) provides further detail on search results and reasons for exclusion.

Study Characteristics

This systematic review resulted in 19 studies that met inclusion criteria. Table 1 provides data extracted from each study in the final sample. Included studies had sample sizes ranging from 249 to 154981 participants. Most studies used a cross-sectional design ($n = 13$, 68.4%). The most common outcome variable measured was depression ($n = 13$, 68.4%).

Measurement of Social Media

The most used measures for social media use were time spent on social media ($n = 7$, 36.8%), the Bergen Social Media Addiction Scale ($n = 4$, 21.1%), and the Facebook Intrusion Questionnaire ($n = 2$, 10.1%). Other methods of measuring social media use included intense social media use,¹⁵ Bergen Facebook Addiction scale,²⁵ frequency of use,¹⁹ screen-based sedentary behavior,²⁶ social media aggression and victimization,²⁷ and social media disorder scale.²⁸ In summary, 7 studies (36.8%) used frequency-based measures of social media use (eg, time spent, frequency checking), 10 (52.6%) studies used risk-based measures (eg, social media addiction or disorder, problematic or maladaptive social media use, Facebook intrusion, etc), and 2 studies (10.5%) used both frequency and risk-based measures.

Time spent on social media was the most prevalent single social media measure and was used by 7 of the 19 studies to measure social media use. This method of measurement involved time-use diaries,²⁹ self-report,^{18,30,31} Likert scales,^{32,33} and by indicating time spent on Facebook versus highly visual media (platforms focused on sharing visual content, such as Instagram and Snapchat).¹⁷

In addition to frequency-based measures of social media, risk-based measures also were used. For example, the Bergen Social Media Addiction Scale (BSMAS) was used by 4 of the 19 studies to measure social media use. The BSMAS is a self-reported 6-item survey used to measure at-risk social media addiction. One example survey question is: “You spend a lot of time thinking about social media or planning how to use it.”³⁴

In addition, the Facebook Intrusion Questionnaire (FIQ) was used by 2 of the 19 studies to measure social media use. For example, the first item is “I often think about Facebook when I am not using it.”³⁵ The FIQ includes 8 items to be rated on a 7-point scale—where 1 is strongly disagree and 7 is strongly agree. The higher the FIQ score, the higher Facebook intrusion. High Facebook intrusion is “characterized by an excessive attachment to Facebook, which interferes with day-to-day activities and with relationship functioning.”³⁵

Associations

Of the 19 included studies, 12 reported finding a positive association between social media use and the outcome variable (depression, anxiety, or psychological distress). Of studies measuring depression, 58.3% reported positive association, and of studies measuring psychological distress, 60.0% reported positive association. The 1 study that measured anxiety reported a positive association.²⁵ Additionally, the only included study to measure both depression and anxiety reported a positive association for both variables.²⁷ For example, 1 study analyzed both between-person and within-person social media use and found a positive correlation between time spent on social media and depressive symptoms for both.³⁰ Additionally, initial social media use levels, increased problematic social media use (PSMU), and social networking site addiction were positively associated with depressive symptoms.^{36,37} Furthermore, when comparing use reported by adolescents versus their use as reported by their parents, reporting of social media aggression from both sources was correlated with anxiety and depressive symptoms.²⁷

Of the 19 included studies, 6 studies reported mixed findings regarding associations between social media use and the outcome variable. For example, when measuring multiple types of social media use, 1 study found that time spent on social media and maladaptive social media use were positively associated with depressive symptoms; however, the intensity of social media use had no significant association with depressive symptoms.³³ Moreover, highly visual social media users, such as users of Snapchat and Instagram, reported greater internalizing symptoms of depression and anxiety compared to nonusers; however, there were no significant associations between Facebook users and nonusers.¹⁷ Participants in a longitudinal study with a higher initial PSMU had significantly higher depressive symptoms, and the path from initial depressive symptoms to the change in PSMU was significant.³⁶ However, the intercept of PSMU predicted the trajectory of depressive symptoms—indicating participants with greater initial PSMU had no greater increase in depressive symptoms across time compared to those with a lower baseline PSMU.³⁶

Notably, 1 study reported results in a different manner that was neither positive nor negative while using an exposure variable of social media and an outcome variable of psychological distress—meeting inclusion criteria. The study used latent profile analysis to identify psychopathological risk in various adolescent age groups.³⁸ None of the studies in this systematic review reported a negative association between social media use and the outcome variable.

Associations also were observed for the 3 most common social media use measurements. First, out of the 7 studies that used time spent to measure social media use, 4 found results with a positive association. For example, it was reported that time spent on social media was significantly associated with depressive symp-

Table 1. Characteristics and Findings of Studies Examining the Relationship Between Social Media Use and Mental Health Conditions

Citation	Study Design	Country	Sample Size	Social Media	Outcome	Association	Conclusions
Anjum et al, 2019 ²⁶	Cross-sectional	Bangladesh	311	Yes/no to use of social media, SBSB	PHQ-9 measured depression	Mixed	Use of social media and >2 hours of screen-based sedentary behaviors daily were significantly associated with depressive symptoms
Barry et al, 2019 ²⁷	Cross-sectional	United States	428	Social media aggression and victimization	DSM-5 checklist measured anxiety and depression	Positive	Adolescent- and parent-reported social media aggression were correlated with anxiety and depressive symptoms
Barthorpe et al, 2020 ²⁹	Cross-sectional	United Kingdom	4032	Time spent on social media	SMFQ measured depression	Mixed	In females, time spent on social media was associated with depressive symptoms, little evidence for an association in males
Boer et al, 2020 ¹⁵	Cross-sectional	29 countries	154 981	Intense social media usage and PSMU	4-item subscale from the HBSC symptom checklist measured psychological distress	Mixed	In some countries, intense users reported more frequent psychological complaints than nonintense users. In all countries, problematic social media users reported more psychological complaints
Boers et al, 2019 ³⁰	Longitudinal	Canada	3826	Time spent on social media	BSI measured depression	Positive	Time spent on social media was associated with depressive symptoms
Cerniglia et al, 2019 ³⁸	Cross-sectional	Italy	643	BSMAS	Symptom Checklist-90-R measured depression, anxiety, and psychopathology symptoms	N/A	Profile that differed in psychological risk showed similar scores in technology-based addictions
Coyne et al, 2019 ³²	Longitudinal	United States	457	Time spent on social media	CES-D measured depression	Positive	Users with low social media use that increased quickly and then returned to baseline levels and low social media use that increased gradually were associated with higher levels of depressive symptoms than users with steady social media use over time
Fabris et al, 2020 ¹⁶	Cross-sectional	Italy	472	BSMAS	Emotional symptoms subscale of SDQ measured emotional symptoms	Positive	Social media addiction was associated with emotional symptoms
Hawes et al, 2020 ³³	Cross-sectional	Australia	763	Time spent on social media, intensity of social media use, and maladaptive social media use	SMFQ measured depression	Mixed	Time spent on social media and maladaptive social media use were associated with depressive symptoms. Intensity of social media use was not associated with depressive symptoms
Kelly et al, 2018 ³¹	Cross-sectional	United Kingdom	10 904	Time spent on social media	SMFQ measured depression	Positive	Time spent on social media was associated with higher depressive symptoms scores
Louragli et al, 2019 ²⁵	Cross-sectional	Morocco	541	BFAS	GAD-7 measured anxiety	Positive	High Facebook addiction was linked with a state of severe anxiety
Marengo et al, 2018 ¹⁷	Cross-sectional	Italy	523	Time spent on social media	Italian self-rated version of SDQ measured internalizing symptoms	Mixed	Users who spent more than 2 hours/day on highly visual social media were associated with higher internalizing symptoms scores vs nonusers. There were no significant differences between FB users and nonusers
Przepiorka and Blachnio, 2020 ⁴⁰	Cross-sectional	Poland	426	FIQ	CES-D measured depression	Positive	Depression was a positive predictor of FB intrusion
Raudsepp, 2019 ³⁹	Longitudinal	Estonia	249	BSMAS	CES-D measured depression	Positive	Initial PSMU predicted change in depressive symptoms. Increase in PSMU was associated with increase in depressive symptoms
Raudsepp and Kais, 2019 ³⁶	Longitudinal	Estonia	397	BSMAS	CES-D measured depression	Mixed	Baseline PMSU was associated with baseline depressive symptoms. Changes in PMSU were related to changes in depressive symptoms. Baseline PMSU did not predict depressive symptom changes longitudinally
Riehm et al, 2019 ¹⁸	Longitudinal	United States	6595	Time spent on social media	GAIN-SS measured internalizing symptoms	Positive	Use of social media for >3 hours per day vs no use was associated with internalizing problems

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Table 1 continued. Characteristics and Findings of Studies Examining the Relationship Between Social Media Use and Mental Health Conditions

Citation	Study Design	Country	Sample Size	Social Media	Outcome	Association	Conclusions
Viner et al, 2019 ¹⁹	Longitudinal	England	12 866	Frequency of checking social media accounts	GHQ measured psychological distress	Positive	Frequent social media use was associated with psychological distress
Wartberg et al, 2018 ²⁸	Cross-sectional	Germany	1001	SMDS	DesTeen measured depression	Positive	More PSMU was associated with depressive symptoms
Wang et al, 2018 ³⁷	Cross-sectional	China	365	Adapted FIQ	CES-D measured depression	Positive	Social networking sites addiction was associated with depressive symptoms

Abbreviations: SBSB, Screen Based Sedentary Behavior; PHQ-9, Patient Health Questionnaire-9; DSM-5, Diagnostic and Statistical Mental Disorders; SMFQ, Short Mood and Feelings Questionnaire; PSMU, problematic social media use; HBSC, Health Behavior in School-aged Children; BSI, Brief Symptoms Inventory; BSMAS, Bergen Social Media Addiction Scale; CES-D, Center for Epidemiologic Studies Depression Scale; SDQ, Strength and Difficulties Questionnaire; BFAS, Bergen Facebook Addiction Scale; GAD-7, Generalized Anxiety Disorder-7; FB, Facebook; FIQ, Facebook Intrusion Questionnaire; GAIN-SS, Global Appraisal of Individual Needs Short Screener, GHQ, General Health Questionnaire; SMDS, Social Media Disorder Scale; DesTeen, Validated Depression Screener for Teenagers.

toms.³³ The other 3 studies that used time spent on social media as a method of measurement found mixed results with a combination of positive and null results—no studies found a negative association. Second, out of the 4 studies that used the BSMAS to measure social media use, 2 studies found a positive association between the BSMAS score and depression or psychological distress.^{16,39} An additional study reported a mixed association between social media use measured with the BSMAS and depression.³⁶ Lastly, both studies that used the FIQ to measure social media use reported that social media addiction (measured using the FIQ) was positively associated with depression.^{19,40}

Demographics

All 19 studies included in this systematic review measured gender; 11 studies presented results stratified by gender. All studies reported gender as a categorical variable, reporting gender as female, male, or chose not to say. Of the 11 studies that reported results stratified by gender, 3 studies found no statistically significant differences between genders,^{18,25,32} and 5 studies found evidence for positive associations between adolescent females' social media use and depression, anxiety, or psychological distress. For example, in 1 study, increased time spent on social media was associated with a greater number of depressive symptoms for females, but an association was not found for males.²⁹ For females, greater daily hours of social media use were associated with an increase in depressive symptom scores and in clinically relevant symptoms. However, for males, higher depressive symptoms scores were found only when 3 or more hours of daily social media use were reported.³¹ When the study only included a sample of adolescent females, there was a positive association for social media use and depressive symptoms.³⁶

Of the 19 included studies, 6 measured race. Race was most often reported as a descriptive result. For example, a study included a descriptive result stating the percentage of participants that were White and the percentage that were non-White.²⁹ Other studies included percentages of participants that were White, Black,

Asian, Hispanic, Native American, and an option for "other."²⁷ Of the 6 studies that measured race, none stratified by race. However, 2 of the 6 measuring race reported that race was controlled for.^{18,31} In addition, 1 study conducted in Italy reported that race was the same among all participants.³⁸

Of the 19 included studies, 9 reported details regarding socioeconomic status. Of those 9 studies, 2 included analyses involved socioeconomic status as a predictor. In 1 study, those who reported lower socioeconomic status showed more severe symptoms of depression. However, the relationship between socioeconomic status and social media use was not observed.³⁰ In another study, adolescents living in lower income and 1-parent households were more likely to use social media for 5 or more hours daily,³¹ but the study did not assess the association between social media use and depression, anxiety, or psychological distress. No studies stratified results by socioeconomic status.

Quality Review

Study designs included cross-sectional (n=13, 68.4%) and longitudinal (n=6, 31.6%). The quality review scores for each study ranged from 32 to 43 total points out of a possible 44 points. The average quality review score was 37.79 (SD=2.22) total points. See Table 2 for quality review results.

The quality review criterion met most frequently (19 studies fully met these criteria) included explaining the background and rationale, stating study objectives, clearly defining all variables, and discussing the generalizability. The quality review criterion met least frequently was describing efforts to address sources of bias (11 studies fully met this criterion). Additionally, reporting numbers of participants at each stage with reason for nonparticipation (14 studies partially met this criterion, 5 studies fully met this criterion) and giving characteristics of study participants (10 studies partially met this criterion, 7 studies fully met this criterion) were items that occurred less frequently than the other items.

Table 2. Studies by Quality Review Scoring

Item	Studies by Quality Review Scoring (Source)			Total Score ^a
	0	1	2	
Study designed with a commonly used term in the title or abstract and informative summary of study in abstract		Barry 2019, Fabris 2020, Hawes 2020, Marengo 2018, Przepiorka and Blachino 2019	Anjum 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Kelly 2019, Louragli 2019, Raudsepp and Kais 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	33
Explain background and rationale			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
State specific objectives and hypotheses			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Present key elements of study design	Barry 2019, Fabris 2020, Hawes 2020, Przepiorka and Blachino 2019	Barthorpe 2020, Boer 2020, Coyne 2019, Viner 2019	Anjum 2019, Boers 2019, Cerniglia 2019, Kelly 2019, Louragli 2019, Marengo 2018, Raudsepp and Kais 2019	26
Describe setting, location, and relevant dates		Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Przepiorka and Blachino 2019	Boers 2019, Cerniglia 2019, Louragli 2019, Marengo 2018, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	29
Report participant eligibility criteria and sources of selected participants		Barthorpe 2020, Cerniglia 2019, Fabris, 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp 2019, Viner 2019, Wang 2018, Wartberg 2018	Anjum 2019, Bary 2019, Boer 2020, Boers 2019, Coyne 2019, Raudsepp and Kais 2019, Riehm 2019	26
Define all outcomes, exposures, predictors, confounders, and effect modifiers			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Give source of data and details of assessment for each variable		Anjum 2019, Barthorpe 2020, Boers 2019, Riehm 2019, Viner 2019	Barry 2019, Boer 2020, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Wang 2018, Wartberg 2018	33
Describe efforts to address sources of bias	Boer 2020, Cerniglia 2019, Fabris 2020, Hawes 2020, Louragli 2019, Przepiorka and Blachino 2019, Raudsepp 2019, Wartberg 2018		Anjum 2019, Barry 2019, Barthorpe 2020, Boers 2019, Coyne 2019, Kelly 2019, Marengo 2018, Raudsepp and Kais 2019, Riehm 2019, Viner 2019, Wang 2018	22
Explain how study size was arrived at		Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Kelly 2019, Louragli 2019, Przepiorka and Blachino 2019, Viner 2019, Wang 2018, Wartberg 2018	Anjum 2019, Barry 2019, Hawes 2020, Marengo 2018, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019	26
Explain how quantitative variables were handled			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Describe all statistical methods			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38

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Table 2 continued. Studies by Quality Review Scoring

Item	Studies by Quality Review Scoring (Source)			Total score
	0	1	2	
Report numbers of participants at each stage, give reason of nonparticipation		Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Przepiorka and Blachino 2019, Viner 2019, Wang 2018, Wartberg 2018	Anjum 2019, Marengo 2018, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019	24
Give characteristics of study participants	Cerniglia 2019, Fabris 2020	Barthorpe 2020, Boers 2019, Coyne 2019, Hawes 2020, Kelly 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Viner 2019	Anjum 2019, Barry 2019, Boer 2020, Louragli 2019, Riehm 2019, Wang 2018, Wartberg 2018	24
Report numbers of outcome events or summary measures			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Give unadjusted estimates and report category boundaries			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Report other analyses done			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Summarize key results with reference to the study objectives			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Discuss limitation, taking into account sources of bias and their magnitude and direction	Louragli 2019	Anjum 2019, Barry 2019, Boer 2020, Boers 2019, Cerniglia 2019, Fabris 2020, Raudsepp 2019	Barthorpe 2020, Coyne 2019, Hawes 2020, Kelly 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	29
Give a cautious overall interpretation of results			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Discuss generalizability of study results			Anjum 2019, Barry 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Louragli 2019, Marengo 2018, Przepiorka and Blachino 2019, Raudsepp and Kais 2019, Raudsepp 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	38
Give the source of funding	Barry 2019, Louragli 2019, Marengo 2018, Raudsepp and Kais 2019, Raudsepp 2019		Anjum 2019, Barthorpe 2020, Boer 2020, Boers 2019, Cerniglia 2019, Coyne 2019, Fabris 2020, Hawes 2020, Kelly 2019, Przepiorka and Blachino 2019, Riehm 2019, Viner 2019, Wang 2018, Wartberg 2018	28

^aTotal score out of 38 maximum points.

Note: Citations for studies are listed in Table 1.

DISCUSSION

This systematic review examined the characteristics of recent studies that reported associations between social media use and outcome variables of depression, anxiety, and psychological distress. Of the studies included, most reported a positive association between social media use and depression, anxiety, or psychological distress. This review shows that few studies have examined a relationship between social media use and mental health across demographic groups.

Our first finding was that many measures of social media use were used and associations between use and mental health outcomes tended to differ based on type of measure. Although only 2 studies used the FIQ, which measures excessive attachment to social media (Facebook), they both found positive associations.^{37,40} In contrast, the 7 studies using participants' time spent on social media—a more general measurement of use—found both mixed^{17,29,33} and positive^{18,30,31} associations. These findings suggest

that characteristics of risk-based social media use measures may be more associated with mental health symptoms compared to frequency-based measures.

Our second finding was that measurements of social media use reflected a trend toward understanding risky use, with over half of the studies measuring solely risk-based use. For example, the BSMAS is designed to measure social media addiction.³⁴ Other examples of social media measures in this review that measured risk-based use include social media aggression,²⁷ maladaptive social media use,³³ and a social media use disorder scale.²⁸ It is important to consider that none of the social media use measurements utilized by studies in this systematic review were measuring positive social media use or healthy social media use. For example, studies utilizing methods that measure a benefit to mental health, such as peer interaction on social media, may show associations with better mental health outcomes.¹⁰ This is a possible explanation for why none of the included studies reported a negative association between social media use and depression, anxiety, or psychological distress. In summary, previous research has shown that risky ways of using social media tend to be associated with poorer mental health outcomes, but more work is needed to examine positive social media use and associations with adolescent mental health.

Our third finding revealed that none of the studies included in our review examined race or socioeconomic status as stratifying variables, and there were limited results concerning gender. These demographic variables are important to examine because current research suggests that specific groups may be at a higher risk of developing mental illness due to various factors that could impede access to health care or jeopardize overall health.⁴¹ First, the included studies only presented gender stratified results for “female” and “male” participants. Prior research and evidence for best practice points towards the necessity for future research to include a full gender spectrum, inclusive of transgender and nonbinary participants.⁴² Sexual orientation is another important topic to consider. Sexual orientation in relation to mental health may be an important stratification to explore, as current research shows that lesbian, gay, bisexual, transgender, and questioning (LGBTQ) individuals experience higher rates of mental illness.^{43,44} In addition, because increased racial and ethnic discrimination has been positively associated with symptoms of depression,⁴⁵ race and experiences with racism are also important factors to examine when observing the impact of social media use and mental health of adolescents. This finding is supported by our quality review, which found that a common issue across studies was a lack of describing participant demographics. Finally, because prior research shows that the many life stressors of adolescents with a lower socioeconomic status put them more at risk for mental illness,⁴⁶ it is also important to investigate how socioeconomic status may play a role in the effect of social media use on mental health in adolescents. Overall, future studies should measure the afore-

mentioned variables to better understand how they may moderate the relationship between social media use and mental health in adolescents.

Furthermore, the review highlighted that certain demographic characteristics were not represented consistently across the final articles. This omission limits the generalizability of the findings and underscores the necessity for more inclusive research practices. Addressing these gaps in future research is crucial to understanding the nuanced ways in which social media use may affect different demographic groups.

This study has limitations to consider. It is important to note the possibility of publication bias in this review, given that unpublished work was not included. The lack of null findings observed may reflect this bias. Furthermore, other mental health outcomes, such as self-esteem, general well-being, and happiness, were not included in the study. Examining these other mental health outcomes might provide more thorough understanding about the nuances of the association between social media use and well-being.

Moreover, a self-reported measure of social media use was not used as an exclusion criterion. New research raises concerns about the validity of findings that use self-reported measures of social media use. A meta-analysis described that self-reported social media use was infrequently a precise representation of logged social media use.⁴⁷ However, self-reported screen time is useful to understand the interpretations of social media impacts overall. Moreover, the associations observed could be affected by use of risk-based versus screen time or other measurement types.

Additionally, this systematic review did not explore the relationship between substance use measures and social media use. Past research has found that problematic social media and internet use has been associated with higher odds of consuming substances.⁴⁸ Importantly, this association can confound the association between social media use and mental illness.

Lastly, it is important to consider the rapidly changing nature of social media platforms. Many of the studies included in this review focused on platforms such as Facebook. According to a survey by Pew Research Center in 2023, US adolescents age 13 to 17 years old using Facebook has decreased from 71% in 2014-2015 to 33% in 2023, while Snapchat use, which is a more visually oriented platform, has increased from 41% in 2014-2015 to 60% in 2023.⁴⁹ This shift in social media usage patterns may influence the nature of associations between social media use and mental health outcomes. Future research should account for the impact of more visually oriented platforms to provide a current and comprehensive understanding of the association between social media and adolescent mental health.

CONCLUSIONS

This systematic review examined the characteristics of studies that assessed the relationship between social media use and

mental health outcomes of depression, anxiety, and psychological distress. Because many social media and mental health studies included in this review were framed around a risk-centered model, future reviews and media reports should consider and report whether the social media measurement they are observing focuses on problematic use or other specific features of use. Moreover, future studies should consider using both a risk-based social media use measure and a benefit-based social media use measure to examine social media use holistically and seek to optimize study quality. Overall, research in this field must focus on a wider spectrum of social media interactions, including those that may have potential benefits. Additionally, clinicians should ask their adolescent patients more specific questions about their social media use to gauge characteristics such as maladaptive or addictive use instead of solely how much time they use social media. Lastly, because a limited number of studies observed results stratified by demographic variables, it is important for future studies to investigate how demographics may moderate the relationship between social media use and adolescent mental health.

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Appendix: Supplemental materials available at www.wmjonline.org

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Supplemental Table. Search Strategies by Database

PubMed	<p>((((((((((adolescent[MeSH Terms]) OR (adolescen*[Text Word])) OR (teen*[Text Word])) OR (youth*[Text Word])) OR (young*[Text Word])) OR (juvenile[Text Word])) OR ("high school student*[Text Word])) OR ("secondary school student*[Text Word])) OR ("middle school student"[Text Word]) AND ((journalarticle[Filter]) AND (english[Filter]))) AND (((((((((((social networking[MeSH Terms]) OR ("social network*[Text Word])) OR (social media[MeSH Terms])) OR ("social media"[Text Word])) OR (facebook[Text Word])) OR (instagram[Text Word])) OR (twitter[Text Word])) OR (snapchat[Text Word])) OR (tiktok[Text Word])) OR (youtube[Text Word]) AND ((journalarticle[Filter]) AND (english[Filter])) AND ((journalarticle[Filter]) AND (english[Filter]))) AND (((((((((((((((((((((((((((mental health[MeSH Terms]) OR ("mental health"[Text Word])) OR (mental disorders[MeSH Terms])) OR ("mental disorder*[Text Word])) OR (mood disorder[MeSH Terms])) OR ("mood disorder*[Text Word])) OR (anxiety[MeSH Terms])) OR (anxiety disorder[MeSH Terms])) OR (anxiety[Text Word])) OR (depressive disorder[MeSH Terms])) OR (depression[Text Word])) OR (depressive[Text Word])) OR (affective symptoms[MeSH Terms])) OR (stress, psychological[MeSH Terms])) OR ("psychological stress"[Text Word])) OR ("psychological wellbeing"[Text Word])) OR ("psychological well being"[Text Word])) OR ("psychological distress"[Text Word])) OR ("affective disorder*[Text Word])) OR (bipolar[Text Word])) OR (neurotic[Text Word])) OR (agoraphob*[Text Word])) OR (cyclothymic[Text Word])) OR (dysthym*[Text Word])) OR (anxious[Text Word]) AND ((journalarticle[Filter]) AND (english[Filter])) AND ((journalarticle[Filter]) AND (english[Filter]))))</p>
Embase	<p>(TITLE-ABS-KEY ("mental health" OR "mental disorder*" OR "mood disorder*" OR "anxiet*" OR depression OR depressive OR "affective symptom*" OR "psychological stress" OR "psychological wellbeing" OR "psychological well being" OR "psychological distress" OR "affective disorder*" OR bipolar OR neurotic OR agoraphob* OR cyclothymic OR dysthym* OR anxious) AND (TITLE-ABS-KEY ("social network*" OR "social media" OR facebook OR instagram OR twitter OR snapchat OR tiktok OR youtube)) AND (TITLE-ABS-KEY (adolescen* OR teen* OR youth* OR young* OR juvenile* OR "high school student*" OR "secondary school student*" OR "middle school student*")) AND INDEX (embase) AND (LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018)) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English")))</p>

<p>PsycINFO</p>	<p>(((((DE "Mental Health") OR (DE "Mental Disorders"))) OR (DE "Affective Disorders" OR DE "Disruptive Mood Dysregulation Disorder" OR DE "Major Depression" OR DE "Seasonal Affective Disorder")) OR (DE "Anxiety" OR DE "Anxiety Sensitivity" OR DE "Computer Anxiety" OR DE "Health Anxiety" OR DE "Mathematics Anxiety" OR DE "Performance Anxiety" OR DE "Social Anxiety" OR DE "Speech Anxiety" OR DE "Test Anxiety")) OR (DE "Anxiety Disorders" OR DE "Castration Anxiety" OR DE "Death Anxiety" OR DE "Generalized Anxiety Disorder" OR DE "Obsessive Compulsive Disorder" OR DE "Panic Attack" OR DE "Panic Disorder" OR DE "Phobias" OR DE "Separation Anxiety Disorder" OR DE "Trichotillomania")) OR (DE "Major Depression" OR DE "Anaclitic Depression" OR DE "Dysthymic Disorder" OR DE "Endogenous Depression" OR DE "Late Life Depression" OR DE "Postpartum Depression" OR DE "Reactive Depression" OR DE "Recurrent Depression" OR DE "Treatment Resistant Depression")) OR (DE "Emotional Disturbances")) OR (DE "Psychological Stress") OR "mental health" OR "mental disorder*" OR "mood disorder*" OR anxiet* OR depression OR depressive OR "psychological stress" OR "psychological wellbeing" OR "psychological well being" OR "psychological distress" OR "affective disorder*" OR bipolar OR neurotic OR agoraphob* OR cyclothymic OR dysthim* OR anxious AND (DE "Social Networks" OR DE "Online Social Networks") OR (DE "Social Media" OR DE "Online Social Networks") or "social network*" OR "social media" OR facebook OR instagram OR twitter OR snapchat OR tiktok OR youtube AND adolescen* OR teen* OR youth* OR young* OR juvenile OR "high school student*" OR "secondary school student*" OR "middle school student*" ACADEMIC JOURNALS, ENGLISH</p>
<p>CINAHL</p>	<p>(MH "Mental Health") OR (MH "Mental Disorders") OR (MH "Affective Disorders+") OR (MH "Anxiety Disorders+") OR (MH "Depression+") OR (MH "Affective Symptoms+") OR (MH "Stress, Psychological") OR "mental health" OR "mental disorder*" OR "mood disorder*" OR anxiet* OR depression OR depressive OR "psychological stress" OR "psychological wellbeing" OR "psychological well being" OR "psychological distress" OR "affective disorder*" OR bipolar OR neurotic OR agoraphob* OR cyclothym* OR dysthim* OR anxious AND (MH "Social Networking+") OR (MH "Social Media+") OR "social network*" OR facebook OR instagram OR twitter OR snapchat OR tiktok OR youtube OR "social media" AND MH "adolescence" OR adolescen* OR teen* OR youth* OR young* OR juvenile OR "high school student*" OR "secondary school student*" OR "middle school student"</p>
<p>SSCI</p>	<p>TS = ("mental health" OR "mental disorder*" OR "mood disorder*" OR "anxiet*" OR depression OR depressive OR "affective symptom*" OR "psychological stress" OR "psychological wellbeing" OR "psychological well being" OR "psychological distress" OR "affective disorder*" OR bipolar OR neurotic OR agoraphob* OR cyclothymic OR dysthim* OR anxious) AND TS = ("social network*" OR "social media" OR facebook OR instagram OR twitter OR snapchat OR tiktok OR youtube) AND TS = (adolescen* OR teen* OR youth* OR young* OR juvenile* OR "high school student*" OR "secondary school student*" OR "middle school student*") , ENGLISH, ARTICLE, REVIEW</p>

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