The Impact of Social Media on the Development of Social Anxiety: A Systematic Review

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Abstract
Social media addiction and information overload may have an influence on mental health. The purpose of this study is to synthesize the evidence from the last decade in order to improve our understanding of social media and social anxiety. A systematic assessment of the databases Web of Science, Scopus, and PubMed yielded 17 papers that addressed the study objectives set by the PRISMA declaration (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Four topics which were divided into 12 sub-themes emerged from the examination: social media users, social media types, social media use, and the relationship between social media and social anxiety. This study makes three significant contributions. First, an overview of social media and social anxiety research is offered. Second, a systematic review focuses on the role of social media on social anxiety. Finally, based on this systematic study, we did a variable analysis. The findings indicate that the mechanism of social media's influence on social anxiety requires additional investigation. To far, most research have focused on cross-sectional examinations, and additional experimental and longitudinal designs are needed to explain the situation in diverse groups and study potential links and potential mediators between social media and social anxiety.
Keywords：Social Media, Social Anxiety, Impact, Systematic Review, Mental Health

Introduction
As technology and the Internet develop, there are an increasing number of social media websites like Facebook, Twitter, and others, as well as Chinese social media networks like Weibo, WeChat, and Douyin. The number of Internet users in China will reach 1.067 billion in December 2022, up 35.49 million from December 2021, and the penetration rate will reach 75.6% (CNNIC, 2023). It is clear that social media's popularity has expanded its involvement and influence in people's lives. We contend that our study and Mayfield's (2008) definition of social media are complementary. Social media are online forums for networking that provide

users a lot of freedom in how they interact with others. He performed tests that compared in-person and online interactions. The positive impacts of social media on people's physiology and mind originally piqued researchers' curiosity. They view social media as a byproduct of the Internet's growth and a sign of its advancement. The Internet allows people to communicate with others from all over the world, even complete strangers, at any time and from any location without regard to space or time restrictions (Duong, 2020; Sabu, 2023). Social relationships are therefore improved through social media. However, as irrational social media usage and studies proliferate, many experts believe that incorrect social media use will have a negative impact on the public's physical and mental health and lead to the alienation of relationships. It has been established by several academic research that social media significantly affects people's emotions (Madhavi & Leon, 2021). Some studies suggest that social media can be helpful in dealing with emotions, while others suggest it may lead to increased anxiety and stress. However, all of these findings support the idea that social media has a powerful impact on human feelings and emotions (Noor, 2023). When social networking affects emotional health, emotional health suffers. Many users will be forced to disconnect from the real world because they find the virtual world full of fantasy and enjoyment. The more people communicate with each other, the stronger the relationship, and the "more" social media platforms, the stronger the bond (Graciyal, 2021). According to Valentina Boursier (2020), COVID-19 participants who experienced intense loneliness were more likely to experience stress, and their loneliness was associated with binge-using social media. An interaction anxiety scale established by Leary MR (1983) is used to assess the individuals' level of social anxiety. As social media has grown rapidly, it is clear that one of its most significant effects on users is a detrimental influence on emotions. The Internet era has brought a lot of questions about how to deal with the massive volume of information available there, determine if it can accurately separate valuable material from spam, and manage our emotions.

It has also been proposed that, despite their efforts to find social support, socially anxious people have bad social experiences online. Increasingly, the relationship between social media and negative emotions such as anxiety has received particular attention. The frequency with which people utilize social media has been demonstrated to be highly and positively linked with social anxiety (Ailin, 2023). Morrison & Heimberg (2013)'s generalization of social anxiety overlaps with this study in terms of terminology. Social anxiety is a common negative psychological characteristic that people exhibit in real-world or virtual space communication situations. It specifically refers to individuals' irrational fear of others' attention, observation, examination, or evaluation while socializing. Social anxiety was measured with social anxiety scale for social media users compiled by (Alkis, 2017). The scale has good reliability and validity and is highly feasible in the actual measurement process. The Internet's rapid growth has resulted in an online social network for humans, which has become a new heterotopic and immediate social communication tool in current society. Social media, as the entrance point for online social networks, offers technological assistance for users to socialize online (Teng Xiongcheng, 2021). To avoid these anxieties in real situations, people are more likely to use social media for indirect communication, which can alleviate social anxiety to some extent; however, Social media addiction has been found to have a significant impact on social anxiety. Several studies have shown a positive relationship between social media addiction and symptoms of depression and generalized anxiety (Mohammad, 2023). Problematic social media use has been associated with higher levels of depression, anxiety, and stress symptoms (Pu, Peng, 2023). Additionally, social media addiction has been found to affect adolescents'

sadness and social anxiety (Xiuqi, 2023). Overall, these findings highlight the detrimental effects of social media addiction on mental health, including social anxiety.

A Systematic Review of Study Questions

The rationale for doing this study is based on the assumption of insufficient attention and literature on the interaction between social media and social anxiety (Ailin, 2023; Fengxia, 2023; Reza, 2022; Teidorlang, 2022). The association between social media use and social anxiety is poorly understood. Previous study has discovered a weak link between social media use and anxiety disorders (Megan, 2023). However, the influence of social media on anxiety symptoms is becoming more well recognized, particularly among young people. As a result, we may aggregate and categorize relevant papers based on social media users, kinds, usage patterns, and the association between social media and social anxiety using this review. Because social anxiety affects 45.7% of the population and is becoming more prevalent year after year. Social anxiety has an impact on people's jobs, studies, and lives. Clearly, social media has played a role in boosting offline social connection and relieving anxiety, but the "antisocial" difficulties created by excessive social media use cannot be overlooked. Because social media is a neutral media technology, we suggest that its use does not always result in social anxiety. The diverse outcomes are influenced by how individuals use social media as a media tool in various ways. We will prosper in the social media age if we utilize social media as our own instrument to preserve and build true social ties; If you disconnect from reality, you'll find yourself becoming more and more apprehensive while using it.

As a result, this systematic review will present a thorough review strategy, explain the dimensions of social media and social anxiety, and emphasize the relationship's unidirectional and bidirectional nature. This can assist future researchers in narrowing their study interests and concerns. This study's construction of an acceptable systematic review was led by two key study questions: (1) What are the characteristics of existing research on the impact of social media on social anxiety based on empirical studies published in the past decade? (2) In what ways does social media affect the development of social anxiety?

Methodology

The approaches utilized to gather articles on social media and social anxiety are detailed in this part in order to determine the relationship between social media and social anxiety. To run systematic reviews, eligibility and exclusion criteria, review process steps (identification, screening, eligibility), and data extraction and analysis, we used a program called Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), which includes resources from database searches (Web of Science, Scopus, and PubMed).

Preferred Reporting Items Systematic Reviews and Meta-Analysis (PRISMA)

According to the PRISMA statement and Caldwell et al (2020), systematic reviews give the highest level of evidence in the evidence pyramid hierarchy. Systematic Reviews employ established search procedures to find and assess all published literature on a certain topic. To reduce bias, a systematic review was done using rigorous research methodologies. As a result, PRISMA enables a comprehensive search of themes or literature relevant to the interaction between social media and social anxiety.

Resources

This study's review procedure was mostly based on three major journal databases: Web of Science (WoS), Scopus, and PubMed. Because this study is in the subject of social sciences, the three data points listed above can be used. To begin, WoS gives (typically over the Internet) access to many databases that contain reference and citation data from academic journals, conference proceedings, and a variety of other literature covering the majority of areas in the social sciences. It covers indexes from 1900 to the current day (Thomson Reuters, 2010; Lee, 2010). Known as the largest accessible citation database. Second, Scopus is the most comprehensive abstract and citation database for peer-reviewed literature, with 22,800 journals from over 5,000 publishers worldwide. Furthermore, the database covers a wide range of topics, including management and social sciences such as economics, psychology, and the arts and humanities. Finally, PubMed is a free search engine and the most popular way to find publications. It provides a sophisticated keyword optimization service (Subject Headings or MeSH) that provided technical support for literature searches using relevant terms for this study.

Eligibility and Exclusion Criteria

Guidance for determining eligibility and exclusion (see Table 1). First, choose just paper journals, leaving out series, novels, book chapters, and conference proceedings. Second, to minimize misunderstanding and translation challenges, the research work concentrates solely on papers produced in English. Third, only studies between 2013 and 2023 (10 years) were undertaken, since this is a fair time to assess the evolution of research and associated publications, as more than 5 years is adequate for a systematic review update (Selçuk, 2019; Pati, 2018; Petticrew, 2008). Fourth, empirical study on social media's influence as an independent variable on social anxiety. Only social anxiety was included in the dependent variable. Except for review studies and structural equation studies, the data of the object of analysis should be complete and transferable.

Endnote literature management software was used to screen and exclude literature. Two researchers independently screened all literature. Filter documents layer by layer through the three steps of document title, document abstract and full text reading. Literatures such as duplications, randomized controlled trial studies, literature reviews, conference papers, protocols and communications were initially excluded. According to the inclusion criteria, the literature that did not meet the inclusion criteria was further excluded. Read the full text of the remaining documents to determine the inclusion results. The literature results of independent screening were compared by two researchers, and if they were the same, they were finally included, and if they were different, they were discussed and resolved by the third researcher.

Table 1
The inclusion and exclusion criteria

Criterion	Eligibility	Exclusion
Literature type	Journal (research articles)	Journals (systematic review), book series, book, chapter in book, conference proceeding
Language	English	Non-English
Time line	Between 2013 and 2023	< 2013
Variable	Social media （IV） Social anxiety （DV）	Incomplete data

Systematic Review Process

In this study, a literature search was performed in three electronic databases, Web of Science, Scopus and PubMed, from 2013 to 2023. The specific retrieval strategies are shown in Table 2.

The search strategy was built around the PICO tool
(P) Population/Patient: General population
(I) Intervention/Indicator: Social media
(C) Comparator/Control: Other social media/solutions
(O) Outcome: Social anxiety

Electronic databases yielded a total of 8,083 records. Following the removal of duplicates, the titles and abstracts of the remaining documents were examined, and 18 documents were eliminated once again. The remaining 18 literatures were examined in full, and 17 were removed again (for reasons such as randomized controlled trials, inadequate data, conference papers, and failure to fulfill the inclusion criteria), and the remaining 17 literatures were eventually included in this study (see Figure 1).

Table 2
The search string used for the systematic review process

| Database	Key words used
Web of science	(TS=(social media) OR TS=(Media, Social) OR TS=(Social Medium) OR TS=(Twitter Messaging) OR TS=(Messaging, Twitter) OR TS=(Web 2.0) OR TS=(2.0s, Web) OR TS=(Web 2.0s)) AND (TS=(anxiety) OR TS=(Angst) OR TS=(Social Anxiety) OR TS=(Anxieties, Social) OR TS=(Anxiety, Social) OR TS=(Social Anxieties) OR TS=(Hypervigilance) OR TS=(Nervousness) OR TS=(Anxiousness))
Scopus	((TITLE (social AND media) OR TITLE (social AND medium))) AND ((TITLE (anxiety) OR TITLE (social AND anxiety)))
PubMed	((social media[MeSH Terms]) OR (Media, Social[MeSH Terms]) OR (Social Medium[MeSH Terms]) OR (Twitter Messaging[MeSH Terms]) OR (Messaging, Twitter[MeSH Terms]) OR (Web 2.0[MeSH Terms]) OR (2.0s, Web[MeSH Terms]) OR (Web 2.0s[MeSH Terms])) AND ((anxiety[MeSH Terms]) OR (Angst[MeSH Terms]) OR (Social Anxiety[MeSH Terms]) OR (Anxieties, Social[MeSH Terms]) OR (Anxiety, Social[MeSH Terms]) OR (Social Anxieties[MeSH Terms]) OR (Hypervigilance[MeSH Terms]) OR (Nervousness[MeSH Terms]) OR (Anxiousness[MeSH Terms]))
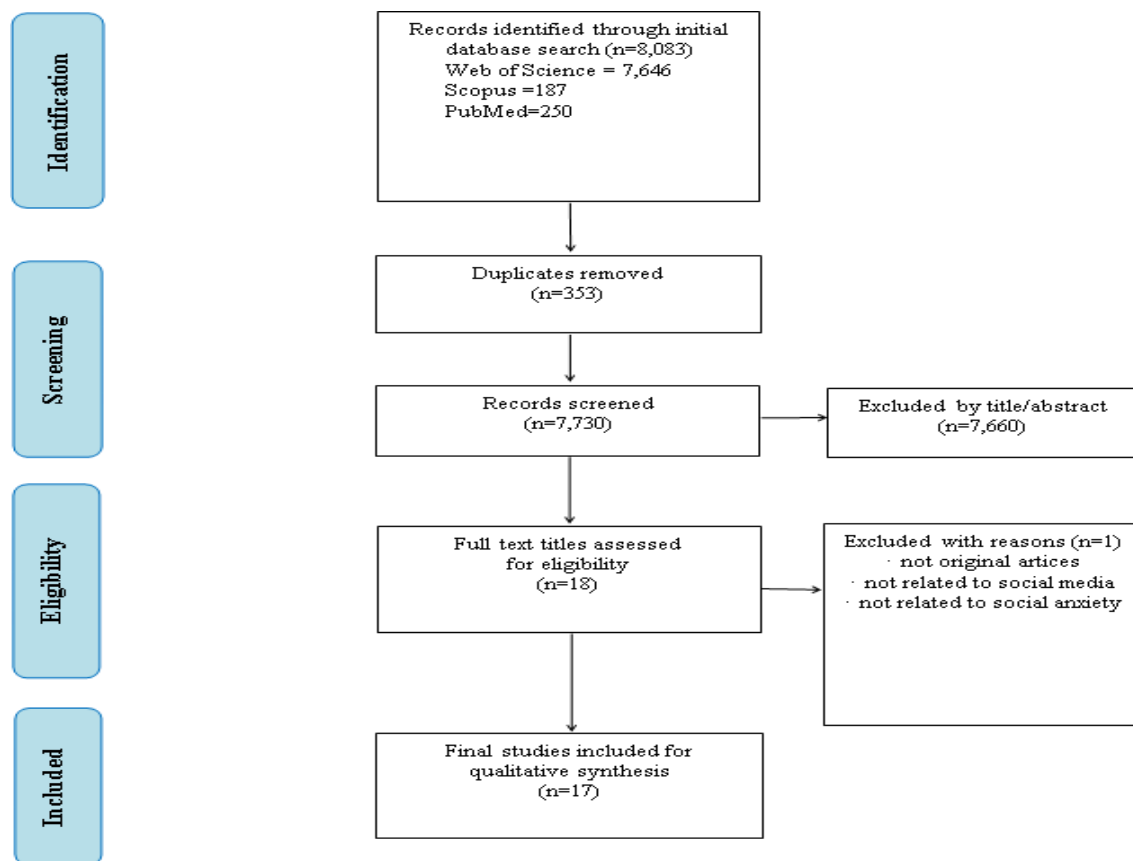
Figure 1. Flow diagram of literature selection

Data Abstraction and Analysis

The 17 articles were assessed and reviewed, focusing on specific studies that responded to the questions formulated. To expand literature coverage, manual searches were performed in Google Scholar. These searches were also supplemented by examining the reference sections of past journal articles on the topic of social media and social anxiety. For unpublished literature, we performed manual searches in OpenGrey, a European database containing doctoral theses and conference proceedings, and ProQuest Dissertations &Theses. In addition, requests for unpublished, dissertation, unreviewed and news data have been emailed to individual researchers in the field of social media and social anxiety. Finally, we classified the papers based on author, year of publication, country, aims, methods (study design, sample, female, mean age) and findings, and the characteristics of the included studies are shown in Table 3.

Table 3
Characteristics of the studies included

No.	Author/Year/Country	Study objective	Methodology	Findings
1	Heather Cleland Woods et al. （2016） Scottish	To examine how social media use is related to anxiety among Scottish adolescents.	**Study design**=QN cross sectional **Sample （N）** = 467 **Female （%）** = — **Mean Age**= 11-17	The study primarily found that social media use was associated with higher levels of anxiety in teens. In particular, emotional engagement with social media is an important factor that deserves further study.
2	Anna Vannucci et al. （2017） US	To examine the impact of time spent using social media on anxiety symptoms and severity in emerging adults.	**Study design**=QN cross sectional **Sample （N）** = 563 **Female （%）** = 50.2 **Mean Age**= 18-22	Studies have shown that the more time spent using social media, the more pronounced the symptoms of personality anxiety. Greater daily social media use was significantly associated with the likelihood that participants would score above the clinical cutoff for anxiety severity (indicating a possible anxiety disorder).
3	Vanessa Apaolaza et al. （2018） —	To test the relationship between social anxiety, compulsive mobile SNS use, and stress in the context of using the mobile social media application WhatsApp.	**Study design**=QN cross sectional **Sample （N）** =346 **Female （%）** = 51.7 **Mean Age**= 18.73	The main finding is that social anxiety moderates the beneficial effects of mindfulness on compulsive mobile SNS use. Mindfulness reduces stress from compulsive mobile SNS use mediated by self-esteem and social anxiety.

4	Önder Baltacı et al. （2019） Turkey	To explore how college students' levels of social anxiety explain their levels of social media addiction.	**Study design**=QN cross sectional **Sample （N）** = 312 **Female （%） =** 53 **Mean Age=** university students	The main finding was that there was a positive relationship between students' levels of social media addiction and their levels of social anxiety and loneliness.
5	Emily Baker et al. （2019） —	To explore the correlation between social media use and its impact on anxiety through quantitative and qualitative data.	**Study design**=QN&QL cross sectional **Sample （N）** =98 **Female （%） =** — **Mean Age=** 18-21	Study 1 revealed no significant correlation between social media use and anxiety. Study 2 showed students awareness of addiction-like behavior and identified protective and risk factors for social media.
6	Valentina Boursier et al. （2020） Italy	To examine whether people who overuse social media during forced isolation due to the COVID-19 pandemic are more likely to feel anxious, and whether their anxiety leads to excessive social media use.	**Study design**=QN online survey **Sample （N）** = 715 **Female （%） =** 71.5 **Mean Age=** 18-72	Studies have concluded that excessive social media use increased anxiety levels. Isolation during the COVID-19 pandemic reinforced the individuals' sense of loneliness, leading to increased use of social media and further increasing anxiety.

7	M. Drouin et al. （2020） US	To explore the association between social media and technology use and anxiety.	**Study design=**QN cross sectional **Sample （N）** = 260 **Female （%） =** — **Mean Age=** parents&their children	Studies have found that higher levels of anxiety are linked to increased technology use and social media connections.
8	Olivia J. Erliksson et al. （2020） Sweden	To develop the Swedish version of the Social Anxiety Scale for Social Media Users (SAS SMU) and discuss the association between different uses of social media and social anxiety.	**Study design=**QN cross sectional **Sample （N）** = 333 **Female （%） =** 71.2 **Mean Age=** 29	Research confirms that higher levels of social anxiety are associated with passive and active use and longer hours of social media use.
9	Md. Tanvir Hossain et al. （2020） Bangladesh	Assessing the effect of social media exposure on social anxiety among Bangladeshi people during the COVID-19 pandemic.	**Study design=**QN cross sectional **Sample （N）** = 880 **Female （%） =** — **Mean Age=** adults	The study demonstrated that social anxiety is related to social media, as more than one-third of participants always use social media to get the latest information. Social media misinformation may contribute to anxiety symptoms. The findings add that the odds of social anxiety are highly correlated with time spent on social media and the trend of increased social media use.

10	Andras N. Zsido et al.（2020）Hungary	To show the direct and indirect effects of social anxiety and self-esteem on problematic social networking site use.	**Study design**=QN cross sectional **Sample （N）= 215** **Female （%）= 61.4** **Mean Age= 33.81**	Research suggests that reduced social anxiety may lead people to prefer computer-mediated communication over face-to-face communication. Indirect pathways may highlight relevant differences between problematic Internet use motivations and problematic social networking site use motivations.
11	Yan Jiang（2021）China	To explore the mediating and moderating roles of psychological capital and academic burnout between problematic social media use and anxiety among college students during COVID-19.	**Study design**=QN cross sectional **Sample （N）= 3123** **Female （%）= 50.2** **Mean Age=** university students	Problematic social media use among college students predicts their anxiety levels. Psychological capital is the mediating variable and academic burnout is the moderating variable.
12	Nor Shafrin Ahmad et al.（2021）Malaysia	To examine the role of social media and counseling support in reducing anxiety among Malaysians due to the Covid-19 pandemic.	**Study design**=QN online survey **Sample （N）= 8375** **Female （%）= 63.16** **Mean Age=** various age groups	86.6% of respondents felt anxious due to the Covid-19 pandemic. 94% of respondents use social media such as Facebook, Instagram and Twitter to gather information and follow the latest developments through TV and press conferences.

			adolescents: 13-24 adults: 25-60	
13	Nicholas P. Hutchins et al. （2021） —	To examine the relationship between online social interaction and social anxiety, online social interaction, and well-being.	**Study design=**QN cross sectional **Sample （N）** = 109 **Female （%） =** — **Mean Age=** adults	The findings are that people with social anxiety disorder may prefer online social interactions and use the Internet as an avoidance strategy.
14	Andras N. Zsido et al. （2021） —	To investigate the extent to which maladaptive cognitive emotion regulation strategies moderate the relationship between social anxiety, problematic social networking (SNS) sites, and smartphone use (PSU).	**Study design=**QN cross sectional **Sample （N）** = 499 **Female （%） =** 47.9 **Mean Age=** 33.11	The study found a significant direct relationship between social anxiety and problems with social network use.

15	<u>Julia Brailovskaia</u> et al.（2021）Spain	To investigate the extent of social media use as a source of information on COVID-19 and its relationship to anxiety.	**Study design=**QN cross sectional **Sample （N）** = 221 **Female （%） =** — **Mean Age=** university students	The main result was that 52.5% of participants indicated frequent use of social media as a source of information on COVID-19. Social media use was significantly and positively associated with anxiety and pandemic burden.
16	Evon M. Abu-Taieh et al.（2022）Jordan	To test whether behavioral intentions to use social media affect parent-child anxiety and depression.	**Study design=**QN web survey **Sample （N）** = 857 **Female （%） =** — **Mean Age=** parents	Research has found that behavioral intentions to use social media (social networking) can lead to parent-child anxiety and depression.
17	Sen-Chi Yu（2022）China	To examine the relationship between social media use (SMU), anxiety, and coping strategies.	**Study design=**QN cross sectional **Sample （N）** = 1150 **Female （%） =** 67.2 **Mean Age=** 34.71	Active social media use (ASMU) was the only type of social media use (SMU) that significantly predicted anxiety.

Note: QN: Quantitative; QL: Qualitative

Result and Discussion
The review produced four themes and twelve subthemes connected to the research topic. Table 2 illustrates the four themes: social media user groups (three subthemes), social media types (three subthemes), social media usage (three subthemes), and the association between social media and social anxiety (three subthemes).

We included 17 observational studies including QN and QL, all using questionnaires, with a total of 18,523 participants. A total of six studies focused on the relationship between social media and social anxiety in the context of Asian countries (Önder Baltacı, 2019; Hossain, 2020; Jiang, 2021; Ahmad, 2021; Abu-Taieh, 2022; Sen-Chi Yu, 2022). Meanwhile, there are five studies in European countries, distributed in Scotland, Italy, Sweden, Hungary and Spain (Heather Cleland Woods et al., 2016; Boursier et al., 2020; Erliksson et al., 2020; Zsido et al., 2020; Brailovskaia et al., 2021). Two studies from the United States illustrate the impact of social media on social anxiety (Vannucci et al., 2017; Drouin et al., 2020). There are also 4

unspecified areas (Apaolaza et al., 2018; Baker et al., 2019; Hutchins et al., 2021;. Zsido et al., 2021).

In contrast, 17 of the studies utilized only quantitative methods, while one used combined both qualitative and quantitative methods. In terms of publication year, one research was published in each of the years 2016, 2017, and 2018, for a total of three. In 2019, two studies were published, while five studies were published in 2020. In 2021, five studies were published, while two studies were published in 2022. There were no publications in the years 2013, 2014, 2015, or 2023. According to the study findings, studies investigating the association between social media and social

Table 4
The findings

No	Author/Year/Country	SM user groups			SM types			SM usage			SM & SA relationship		
		A	Y	A	SMS	SN	MSM	PU	AC	P	O	T	M
1	Heather Cleland Woods et al.;2016;Scottish	✓			✓						✓		✓
2	Anna Vannucci et al.;2017;US		✓		✓			✓			✓		
3	Vanessa Apaolaza et al.;2018;—		✓				✓			✓	✓		
4	Önder Baltacı et al.;2019;Turkey		✓					✓				✓	
5	Emily Baker et al.;2019;—		✓		✓			✓			✓		
6	Valentina Boursier et al.;2020;Italy		✓	✓				✓			✓		✓
7	M.Drouin et al.; 2020;US	✓		✓					✓			✓	
8	Olivia J. Erliksson et al.;2020;Sweden			✓				✓	✓	✓	✓		
9	Md. Tanvir Hossain et al.;2020;Bangladesh			✓							✓		
10	Andras N. Zsido et al.;2020;Hungary			✓		✓		✓				✓	
11	Yan Jiang；2021;China		✓				✓				✓		✓
12	Nor Shafrin Ahmad et al.;2021;Malaysia			✓	✓						✓		
13	Nicholas P.Hutchins et al.;2021;—			✓				✓			✓		
14	Andras N. Zsido et al.;2021;—			✓		✓		✓				✓	
15	Julia Brailovskaia et al.;2021;Spain		✓					✓			✓		
16	Evon M. Abu-Taieh et al.;2022;Jordan			✓		✓					✓		
17	Sen-Chi Yu;2022;China			✓					✓	✓	✓		

SM user groups	SM types	SM usage	SM & SA relationship
SM=Social Media	SMS=Social Media Site	PU=Problematic usage	SA=Social Anxiety
AO=Adolescents	SNS=Social Networks	AU=Active usage	O=One-way relationship
YA=Young adults	MSM=Mobile Social Media	PA=Passive usage	T=Two-way relationship
AD=Adults		M=Mediate/ moderate	

anxiety is still restricted and insufficient. A probable explanation for the shortage of these studies is because the impacts of social media differ depending on time and place, and study evidence changes

with time. The study conducted between 2013 and 2015 may have certain limitations, such as a lack of data or time to adequately assess the influence of social media on social anxiety. Furthermore, if scholars' interest in this area grows, additional study may be performed in the coming years. Furthermore, the impact of social media is a complicated issue that necessitates the study of several elements, such as individual characteristics, usage patterns, the growth of social media platforms, and so on. As a result, some scholars may have explored the indirect relationship between social media and social anxiety between 2013 and 2015,

introducing mediating variables and moderating variables, and no longer simply studied the direct relationship between the two.

The impact of social media on social anxiety
After categorizing 17 articles, four areas of social media were identified as factors influencing social anxiety. They are social media user groups, social media types, social media use, and the relationship between social media and social anxiety.

Social media user groups and social anxiety
The 17 included studies all mentioned social media user groups. Two of which investigated adolescents (11-17 years old), seven studies targeted young adults (18-30 years old), and ten studies explored in adults (over 30 years old). Two studies covered more than one group, such as Valentina Boursier et al (2020) focused on young adults and adult groups (18-72 years); Drouin et al (2020) examined parental perceptions of the impact of own and children's use of social media on social anxiety, with survey respondents including adolescents and adults (Table 4).

Although there are currently only two articles examining the impact of adolescent social media use on social anxiety. The results all show a positive correlation between social media use and social anxiety in adolescents. Adolescents who use social media more have higher levels of social anxiety (Glover & Fritsch, 2018; Cauberghe et al., 2021; Shannon et al., 2022). And older adolescents tend to use social media more and experience higher levels of social anxiety than younger adolescents (Mazalin & Moore, 2004; Agosto & Abbas, 2017; Thorisdottir, 2020; Mougharbel et al., 2023). We found that studies on younger groups, such as children（under 11years old）, do exist (Zhubandykov, 2023; Susanty et al., 2020; Ersoy, 2019; Glover & Fritsch, 2018). But the number of articles is very small and did not specifically focus on the relationship between social media and social anxiety. Possible reasons are that there are some challenges and ethical considerations in conducting such studies, which may result in relatively few studies. Research involving the behavior and privacy of children often requires strict ethical review and oversight. Researchers must ensure that their studies have adequate protections for children's participation and privacy, which may require additional resources and time. Recruiting children to participate in research can be more complicated because researchers need parental or guardian consent, and children may not fully understand the nature of the research. In addition, interviewing children may require special skills and methods.

Another group that has been highlighted are adults. Fifteen of the 17 studies included both young adults and adults. It can be seen that adults over 18 years old are the main group using social media. On the one hand, most research shows that adults social media use can have a range of effects on social anxiety, and these effects can vary based on individual differences, usage patterns, and social media platforms. However, the research results are relatively consistent, and there is a significant positive relationship between social media use and social anxiety in adults (Dobrean et al., 2016; Vannucci & Primack et al., 2017; Boursier et al., 2020). Hossain et al (2020) clearly stated that the odds of social anxiety are highly correlated with the time spent on social media and the increasing trend of social media use. On the other hand, the use of social media is crucial to the lives of young adults, but studies have shown that the impact of social media use on psychological adjustment is unclear (SharonM, 2021). However, given the ubiquity of social media among young people and their high risk of social anxiety, there is a positive association between social media use and anxiety (Sewall et al.,

2022). Heather Cleland Woods et al (2016) found that there is a certain relationship between young people's social media use and social anxiety, but this is not a simple cause-and-effect relationship, but a complex interactive process. Social media often triggers social anxiety among young people through some media (Ayar et al., 2018; Dogan & Çolak, 2016). While social media provides a platform for social interaction, it can also contain negative interactions such as cyberbullying or unkind comments directed at someone. Such negative experiences can lead to social anxiety and depression (Shehab et al., 2023). As many as 90% of young people now use social media, up from just 12.5% in 2005. Additionally, more than a quarter of college students report spending at least six hours per week on social media, up from just 18.9 percent in 2007. Collectively, these trends indicate that social media plays an integral role in the daily lives and culture of young people, especially college students (Bettmann et al., 2021). It can be inferred that social anxiety among college students due to the use of social media is a common phenomenon, which is of great significance for future academic research.

Social media types and social anxiety
The results of this study also found that a total of nine studies focused on the type of social media. While the impact of social media on social anxiety is an area of active research, there have been some studies showing that different types of social media have different effects on social anxiety. Based on the summary, this study divides this topic into three sub-categories. Topics namely social media sites, social networks and mobile social media. Four studies show that social media site can significantly influence social anxiety. Three studies mentioned a positive correlation between levels of social anxiety and social networks. Additionally, there are two studies describing the impact of mobile social media on social anxiety.

According to certain research (Heather Cleland Woods et al., 2016, Vannucci et al., 2017; Baker et al., 2019; Ahmad et al., 2021) social anxiety differs depending on the social media site used. According to Heather Cleland Woods et al (2016), regular Facebook use was linked to higher levels of social anxiety. Users frequently view others' crafted happy moments on the platform, which might make them feel anxious. In addition, Baker (2019) unmistakably noted that Instagram use is connected to reduced self-esteem, which results in social anxiety, citing study by Vannucci (2017) and others. This might be as a result of the fact that Instagram photographs are frequently professionally manipulated and filtered to offer an apparently ideal image. Choi et al (2014) observed that this benefit does not motivate members to take part in cooperative activities, despite the fact that knowledge and skills increase board functioning on collaborative performance. According to a poll of Malaysians, social media is a crucial source for Malaysians to access the most recent information. For social anxiety treatment, they made use of a self-made social networking platform. It is evident that social media platforms have a significant impact on how anxious people feel in society (Ahmad et al., 2021).

In terms of social networking, Apaolaza et al (2018) found that social networking and social media use may negatively affect social interactions among excessive users. In addition, studies have also found that factors related to social anxiety may cause problems in the use of social networks (Zsido et al., 2021). Abu-Taieh et al (2022) highlighted that individuals with high social anxiety prefer computer-mediated communication over face-to-face communication. Simultaneously, he also explored the behavioral intentions of using social

media to affect parents' social anxiety, which is related to the social anxiety of their offspring. It should be emphasized that some studies have looked at the effect of social networks on anxiety, not social anxiety. Twitter use was less associated with social comparisons and feelings of anxiety. This may be because Twitter is more focused on information dissemination and discussion, and controversy and malicious comments may cause users to feel nervous and anxious (Tara et al., 2020; David et al., 2019; Kiichi et al., 2019). Conversely, users on TikTok may be more prone to anxiety, as these platforms' emphasis on entertaining and creative content may lead users to try to bring out their best self (Richard et al & Christian et al., 2021).

In addition, mobile social media is an important factor for social anxiety. Apaolaza et al (2018) proposed a mechanism for the impact of compulsive use of social media on social anxiety. Jiang (2021) further explored how problematic social media use among college students predicted their anxiety levels during the COVID-19 outbreak. He analyzed that adult who spend more energy and time on mobile social media have higher levels of social anxiety.

Social media usage and social anxiety
There were three subthemes under social media usage, nine studies under the problematic usage subtheme, and three studies each subtheme between active usage and passive usage.

Problematic social media usage was highlighted to determine the degree to which social anxiety was produced (Zsido et al & Hutchins et al., 2021). Study results show that the extent of social media usage, including duration and frequency, increases anxiety levels (Boursier et al., 2020; Brailovskaia et al., 2021). Excessive usage, that is, the longer you use social media, the more severe the tendency to social anxiety (Vannucci et al., 2017; Erliksson et al., 2020; Zsido et al., 2020). Further research by Baker et al (2019) showed that there was no significant correlation between social media usage and anxiety, but the observational analysis of the correlation table showed that there was a relationship between the time of use and the number of platforms used. An Italian online survey suggests that excessive use of social media can increase levels of social anxiety. Ioannidis et al (2018) examine problematic Internet use as a multifaceted issue related to gender. Female adolescents tend to use social networking sites more than males (Barker, 2009; Heather Cleland Woods et al., 2016). Social media addiction is a growing problem in modern society (Worsley et al., 2018). Baltacı et al (2019) confirmed that students'level of social media addiction is positively related to their levels of social anxiety and loneliness. Wong et al (2020) examined the relationship between the severity of Internet gaming disorder, the severity of social media use problems, and psychological distress. According to these findings, the social media addiction variable was significantly predictive of social anxiety. Active social media usage is associated with social anxiety (Drouin et al., 2020; Erliksson et al., 2020; Sen-Chi Yu, 2022). The longer the average social media usage time, the higher the correlation coefficient between passive use and active usage (Drouin et al., 2020; Erliksson et al., 2020). Sen-Chi Yu's (2022) study found that active usage is related to negative emotions, and only active usage of social media can significantly predict social anxiety.

The counterpart to active social media usage is passive usage. Apaolaza et al (2018) found that the benefits of passive social media usage may be due to increased awareness of current experiences, making social media users less likely to experience negative beliefs or critical thinking, which is associated with higher social anxiety. Erliksson et al (2020) also found that

there is a significant positive correlation between social anxiety and different usages of social media, and a significant positive correlation between passive, active and total usage. Passive usage was the only significant predictor of social anxiety. However, Yu (2022) proposed different insights, and only active social media usage significantly predicted anxiety. Passive usage and social media usage time did not predict anxiety. The reason may be that individuals with unmet basic needs may rely on active use to satisfy their needs for relatedness, competence, and autonomy.

Relationship between social media and social anxiety
The fourth theme is the relationship between social media and social anxiety, involving three sub-themes. There are seventeen studies on the subtheme of one-way relationships. Previous research has found a one-way relationship between social media and social anxiety. Affected by the inclusion criteria, the research conclusions are highly consistent, and the seventeen included documents all confirm that social media significantly predicts social anxiety levels. There are two studies on the sub-theme of two-way relationships. Several studies have found a positive correlation between social media use and social anxiety (Baltacı et al., 2019; Drouin et al., 2020). Previous research on the association between social media use and anxiety disorders has shown weak associations, but the underlying two-way relationship remains poorly understood (Megan et al., 2023). In addition, there are some studies that consider the role of mediating or moderating variables, a total of three studies. Valentina Boursier et al (2020) tested the potential mediating effect of the relationship between excessive usage of social media and social anxiety and verified the two mediating variables of uncertainty and social distance. Jiang (2021) further mediation analysis showed that psychological capital mediated the relationship between problematic social media usage and social anxiety. Furthermore, academic burnout had a moderating effect between problematic social media use and social anxiety. Subsequently, Heather Cleland Woods et al (2016) measured the mediating role of emotional investment in social media. Those teens who were more emotionally invested on social media had higher levels of social anxiety. However, the association between these two variables is complex and not yet fully understood. Overall, the relationship between social media and social anxiety is multifaceted and requires further research.

Conclusion
This systematic review emphasizes existing research trends on comprehending themes such as social media and social anxiety that have been published in the last decade. Following a thorough review of the available literature, the overall findings revealed that research was still lacking. First, seventeen research employed a self-report technique, asking individuals if social media impacted them. It's important to note that these impacts might be altered by other factors, such as personality. As a result, further study should be conducted to collect data from numerous viewpoints in order to more properly disclose the association between social media and social anxiety in various circumstances. Second, all research use a cross-sectional design to investigate the mechanism of social media's effect on social anxiety. Longitudinal designs should be used in future studies to establish a causal association between social media and social anxiety. Finally, past study has demonstrated that social media might predict social anxiety favorably. Furthermore, there is a complicated two-way impact connection between the two, and possible mediator and moderating variables should be investigated further. The majority of existing research, however, employ evaluation questionnaires, and the beneficial benefits of social media on social anxiety have not been

investigated. Further study should focus on the multifaceted and complete impact of social media on social anxiety.

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