REVIEW

Depression and anxiety and its association with problematic social media use in the MENA region: a systematic review

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Abstract

Background The use of the social media has increased significantly in recent decades, and research on the impact of problematic social media use on mental health is a relatively new and growing area of study in the Middle East and North Africa (MENA) region. Social media users are prone to developing addictive behaviors and suffering from mental illness, including depression and anxiety. The present paper aims to systematically review the available research examining the association between problematic social media use (PSMU) and depression and anxiety symptoms that was done in the Middle East and North Africa region (MENA region).

Methods The academic databases Web of Science, PubMed, ScienceDirect, and Cochrane were used to conduct a literature search. Problematic social media use and the MENA region and their synonyms were main keywords in the Boolean search strategy. We selected articles based on the following criteria: (i) addressed the relationship between problematic social media use and depression and anxiety; (ii) MENA region population-based studies; and (iii) published in English. There were no age, gender, or educational status restrictions, and there was no time limit for this review. The literature search was conducted in December 2021.

Results The selection criteria led to the retention of 15 articles. The findings of the systematic review demonstrated that most of these studies have found a significant association between problematic social media use and depression and anxiety symptoms. Some studies showed stress, generalized trust, perceived social support, fear of COVID-19, and misunderstanding of COVID-19 mediating the relationship between social media use and depressive and anxiety symptoms.

Conclusions While there is evidence that there is a relationship between PSMU and anxiety and depressive symptoms, longitudinal studies are needed to confirm this relationship.

Keywords Depression, Anxiety, Problematic social media use, MENA region

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Introduction

The use of the internet has increased significantly in recent decades. According to the International Telecommunication Union, there are over 5 billion internet users worldwide [1]. Social networking sites (SNS) are the most popular online platforms among young people [2]. Their widespread availability, whether via smartphone, tablet, or computer, has captivated billions of users worldwide, with many using SNS for large portions of their daily lives [3].

Research investigating the nexus between SNS use and health is a relatively new area of study, and there is currently no consensus among researchers on the definition of problematic SNS use [4]. This phenomenon has been conceptually defined as a non-substance-related disorder, sharing characteristics associated with behavioral addiction [5]. According to Andreassen and Pallesen [6], SNS addiction is defined as an excessive concern regarding social networking sites, driven by a strong motivation to log in or use these platforms excessively. This behavior involves dedicating an extensive amount of time and effort to social networking sites, resulting in impairment of other social activities, educational and/or occupational pursuits, interpersonal relationships, as well as psychological health and well-being. Notably, several psychometric scales have been developed to assess the determinants of social media use and obtain the prevalence rate, such as the Bergen Social Media Addiction Scale (BSMAS) [7], and the Arabic Social Media Addiction Scale (ASMAS) [8]. SNS use has complex links to mental health. SNS is tied to benefits such as reduced loneliness, enhanced social connectivity [9], seamless communication [10], increased life satisfaction [9], and decreased depressive symptoms [4]. However, its impact on academic performance varies, showing positive outcomes in educational use [11] but negative implications in recreational use, potentially leading to academic failures [12]. Despite the positives, adverse effects like relational issues and mental disorders have been reported [13]. Divergent findings on addictive behaviors and mental health problems underline the intricacy of this relationship [14].

Depression is a common mental disorder marked by sadness, low self-esteem, and a loss of pleasure or interest in performing activities [15]. Currently, research on the potential impact of PSMU on depression is expanding, with conflicting findings [16]; some studies have discovered an inverse relationship. Social media, for example, can provide social support and improve life satisfaction, resulting in fewer depressive symptoms [4, 14]. Many studies, conversely, have found that PSMU is associated with depressive symptoms in university students [4] and adolescents [17]. Similar to depression, the influence of

social media on anxiety is also a subject of debate. PSMU is significantly associated with anxiety among adolescents [17], and using multiple platforms correlates with higher anxiety levels [18]. Excessive time on social media, especially among youth, is linked to more severe anxiety symptoms [19]. University students' anxiety levels are positively associated with time spent on social media [20]. Additionally, Facebook addiction is associated with anxiety in high school [21] and university students [22].

The ongoing debate in the literature explores the dual nature of Social Networking Sites (SNS) and their potential impact on mental health. Despite extensive research efforts, significant gaps persist. Nuances such as individual differences, platform-specific usage patterns, and the dynamic nature of social media platforms remain underexplored. Methodological heterogeneity poses a challenge, ranging from disparate study designs to variations in measurement tools. Furthermore, regional differences underscore the need for a nuanced perspective, with cultural and demographic variations influencing outcomes. Recognizing these limitations, our study strategically centers its focus on the Middle East and North Africa (MENA) region. While the global discourse on this subject is rich and diverse, the decision to scrutinize the MENA region stems from its unique socio-cultural landscape. This region is characterized by distinct cultural norms, geopolitical dynamics, and demographic compositions, which can significantly influence the interplay between social media use and mental health outcomes.

To the best of our knowledge, previous systematic reviews have focused on SNS use and mental health symptoms in various countries without taking the MENA region into account. Hence, we aim throughout this paper to conduct a systematic review of the available research on PSMU and depression and anxiety symptoms in the Middle East and North Africa (MENA) region. The specific objectives of this review are to: (i) identify and evaluate studies performed on the correlation between PSMU and depressive and anxiety symptoms; (ii) determine the geographical distribution of these studies and delve into the characteristics of the study participants; (iii) explore what measurement tools have been used to assess problematic social media use and depressive and anxiety symptoms; (iv) explore the prevalence and risk factors of social media use; and (v) search for the mediators of this relationship.

Research questions

The research aims to answer these questions: (1) what is the prevalence of problematic social media use (PSMU) in the MENA region? (2) How are PSMU and mental health outcomes (specifically anxiety and depression) correlated in the context of the MENA region? (3) What

factors mediate the relationship between PSMU and depressive and anxiety symptoms in this region? (4) How effective are the methodologies employed in existing studies investigating PSMU and depressive and anxiety symptoms in the MENA region? (5) What gaps exist in the current literature regarding PSMU and mental health in the MENA region?

Methods

Search strategy

The search for the literature followed a systematic and structured approach adopting the PRISMA guidelines for systematic reviews and meta-analysis [23]. The literature search was conducted in December 2021 in four databases Web of Science, PubMed, ScienceDirect, and Cochrane. The protocol has been registered at the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number: CRD42022266119.

The Boolean search method was used, with keywords linked together using AND, OR, and NOT. The following keywords are associated with problematic social media use and the MENA region. The search equation used was as follows: ("social media addiction" OR "social media dependence" OR "problematic social media use" OR "social media disorder" OR "pathological social networks sites use" OR "social network sites addiction" OR "social network sites dependence" OR "problematic social network sites use" OR "facebook addiction" OR "facebook dependence" OR "excessive facebook use" OR "problematic facebook use" OR "compulsive facebook use") AND (Algeria OR algerian OR "Saudi Arabia" OR saudi OR Palestine OR palestinian OR Bahrain OR bahraini OR Djibouti OR djiboutian OR Ethiopia OR ethiopian OR "United Arab Emirates" OR emarati OR Egypt OR egyptian OR Qatar OR qatari OR Iraq OR iraqi OR Israel OR israeli OR iran OR iranian OR persian OR Jordan OR jordanian OR Kuwait OR kuwaiti OR Lebanon OR lebanese OR Libya OR libyan OR Morocco OR moroccan OR Mauritania OR mauritanian OR Oman OR omani OR Syria OR syrian OR Sudan OR sudanese OR Tunisia OR tunisian OR Yemen OR yemenite OR MENA OR "middle east" OR "north africa" OR "arab world").

After completing the electronic database search, we assessed the titles and abstracts of the identified articles to determine their suitability for inclusion in the review.

Inclusion and exclusion criteria

We only included studies that addressed the relationship between problematic social media use and mental health, specifically depression and anxiety. We also selected articles based on the following criteria: (1) quantitative observational studies (cross-sectional, case–control,

and cohort studies); (2) studies conducted solely within the MENA region were included, while those conducted outside this region, even if involving MENA populations, were excluded; and (3) English-language publication of a full-text article. On the other hand, qualitative and experimental studies were excluded. There were no age, gender, or educational status restrictions, and there was no time limit for this review.

Data extraction

Data extraction for eligible studies was conducted and verified independently by two authors (SA and SB) using a standard form on Microsoft Excel. Relevant details were extracted from each study, included study design, publication date, study authors, country of the study, sample size, measurement tools used, and demographic data of the study population, the scores and duration of social media use, as well as anxiety and depression scores. Discrepancies in the extracted data were resolved through discussion with another independent author (BZ).

Quality assessment

The quality of included studies was determined using the National Institute of Health Quality Assessment Tool for Observational Cohort and Cross-sectional Studies [24]. This assessment covered participants' selection, data collection, confounding variables, and exposure and outcome variables. Two authors independently rated study quality and differences in ratings were resolved via discussion between the two authors and a third author where necessary. The quality of each study was rated as 0 for poor (0–4 out of 14 questions), i for fair (5–10 out of 14 questions), or ii for good (11–14 out of 14 questions), after answering a series of 14 questions. No studies were excluded based on their quality assessments.

Data analysis and publication bias

The size of the correlation effect was determined by correlation coefficient *r*. The statistical heterogeneity was examined using the *I*-squared test (I^2) and the Cochrane *Q* test [25], with *Q* reported as a measure of heterogeneity (with *p* value < 0.05 indicating a high level of heterogeneity) and I^2 used to measure the proportion of total variability due to between-study heterogeneity [26]. Based on the Cochrane guidelines, I^2 values represented moderate (30–60%), substantial (50–90%), and considerable (75–100%) heterogeneity [27]. The publication bias was assessed by visual examination inspection of the funnel plot and by conducting Egger's and Begg's tests [28]. Publication bias was declared if the funnel plot was asymmetrical or if the result of Egger's and Begg's tests was statistically significant ($p < 0.05$) [28, 29]. All

statistical analyses were performed using Comprehensive Meta-Analysis Software version 4 (CMA 4.0).

Results

The search strategy identified 1710 published (Fig. 1). After removing the duplicates, 957 papers remained. These papers were then screened based on the titles and abstracts to determine whether they met the inclusion criteria, resulting in 46 relevant studies. At this stage, the full texts of these studies were screened to confirm whether the inclusion and exclusion criteria

were met, resulting in 31 studies being excluded. The remaining 15 studies were included.

Quality assessment

Table 1 shows the results of the 14-item checklist criteria used to evaluate the selected research. The objectives, variables, and measures were all clearly described in each study. After calculating the quality assessment ratings, most studies were of fair quality.
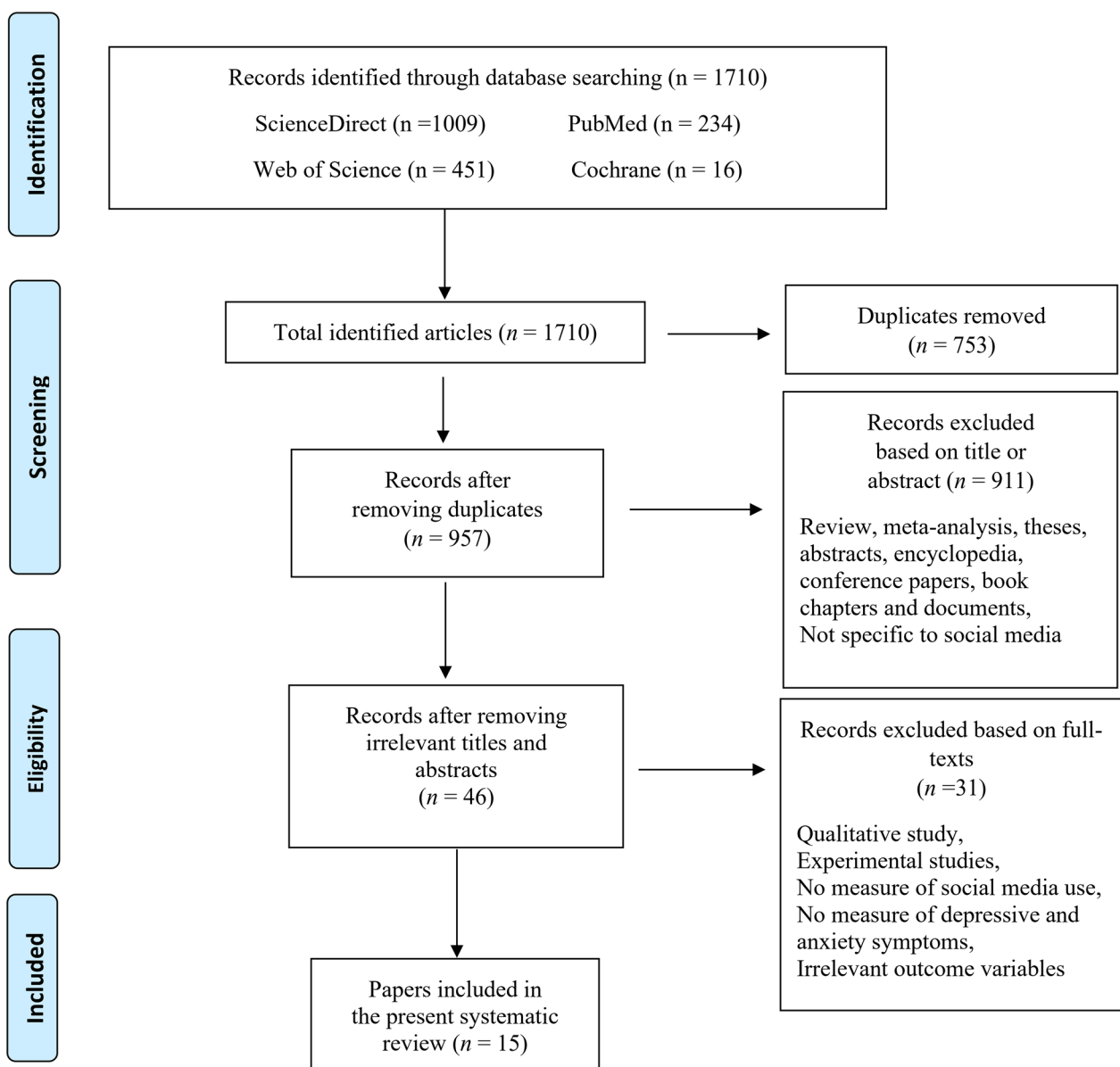

Fig. 1 PRISMA flow diagram illustrating the screening process of papers

Table 1 Quality assessment of selected studies

Study	Was the research question or objective in this paper clearly stated?	Was the study population clearly specified and defined?	Was the participation rate of eligible persons at least 50%?	Were all the subjects selected or recruited from the same or similar populations?	Was a sample size justification, power description, or variance and effect estimates provided?	For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	For exposures that can vary in amount or level, did the study examine different levels of the exposure?	Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Was the exposure(s) assessed more than once over time?	Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Were the outcome assessors blinded to the exposure status of participants?	Was loss to follow-up after baseline 20% or less?	Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	Quality
Lin et al. (2021) [30]	✓	✓	NR	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Lin et al. (2020) [31]	✓	✗	NR	✓	✗	✓	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Lin et al. (2017) [7]	✓	✓	✓	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Alimoradi et al. (2019) [32]	✓	✓	✓	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Pirouz, Farahnaz [33]	✓	✓	NR	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✗	Fair
Dagher et al. (2021) [34]	✓	✓	✓	✓	✓	✗	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Barbar et al. (2020) [35]	✓	✓	NR	✓	✓	✗	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Malaeb et al. (2020) [36]	✓	✗	✓	✓	✓	✗	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Fekih-Romdhane et al. (2021) [37]	✓	✓	✓	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✓	Fair
Hela Ghali et al. (2019) [38]	✓	✓	✓	✓	✓	✗	✗	NA	✓	✗	✓	NA	NA	✗	Fair
Nazzal, Zaher et al. (2018) [39]	✓	✓	✓	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✗	Fair

Table 1 (continued)

Study	Was the research question or objective in this paper clearly stated?	Was the study population clearly specified and defined?	Was the participation rate of eligible persons at least 50%?	Were all the subjects selected or recruited from the same or similar populations?	Was a sample size justification, power description, or variance and effect estimates provided?	For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	For exposures that can vary in amount or level, did the study examine different levels of the exposure?	Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Was the exposure(s) assessed more than once over time?	Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	Were the outcome assessors blinded to the exposure status of participants?	Was loss to follow-up after baseline 20% or less?	Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	Quality
Louragli et al. (2019) [40]	✓	✓	NR	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✗	Fair
Malakeh et al. (2021) [41]	✓	✓	✓	✓	✓	✗	✗	NA	✓	✗	✓	NA	NA	✗	Fair
Rend Al Saigh et al. (2021) [42]	✓	✓	NR	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✗	Fair
Nadine Zeeni et al. (2018) [43]	✓	✗	NR	✓	✗	✗	✗	NA	✓	✗	✓	NA	NA	✗	Poor

NA not applicable, *NR* not reported; ✓, yes; ✗, no

Sample characteristics

A total of 15 studies met the inclusion criteria, belonged to several different countries across the MENA region: five studies were conducted in Iran, four were conducted in Lebanon, Tunisia ($n=2$), Morocco ($n=1$), Jordan ($n=1$), Palestinian territory ($n=1$) and the United Arab Emirate ($n=1$). The studies were published between 2016 and 2021.

The number of participants in each study ranged from 105 to 2676. Their average age ranged from 15.23 to 36.57 years. Most studies were conducted on adults, whereas four studies concentrated solely on adolescents (aged 12–19 years). The majority of studies had gender-mixed samples; however, one study focused solely on women (Table 2).

PSMU measurement tools

PSMU was measured variously across studies. Most studies ($n=12/15$) assessed problematic social media use in its entirety, with three studies focusing specifically on problematic Facebook use. All studies used self-report scales to determine the level of social media addiction. The Bergen Facebook Addiction Scale (BFAS) was the most commonly used measure to assess problematic Facebook use. A modified version of the Bergen Facebook Addiction Scale (Bergen Social Media Addiction Scale—BSMAS) was often used to assess problematic social media use by replacing the word Facebook with social media (Table 3).

Prevalence and risk factors of social media usage

Only three studies [7, 35, 36] reported the prevalence of social media addiction, with an estimated prevalence varied between 22.4 and 23.7 percent. Therefore, the impact of socio-demographic factors on the prevalence of PSMU is unclear. Two studies provided gender differences data on SNS [7, 43], and the highest prevalence of social media addiction was found among males in Chung-Ying Lin et al. [7]. The results of Nadine Zeeni et al. [43] on the association between gender and PSMU were not significant nor mentioned in other studies included in the current systematic review. Regarding marital status, one study [35] found that single people had a higher PSMU score than married people (8.94 vs. 6.26, $p<0.001$). The number of children ($B=2.41$) was significantly related to higher PSMU in the same study, whereas older age and higher alcohol dependence were significantly related to lower PSMU [35]. Three studies indicated an association between social media addiction and time spent on social media or frequency of visits to social media ($0.286<r<0.583$) [7, 35, 37].

Problematic social media use and depressive symptoms

Most studies ($n=13/15$) focused on symptoms of depression as measured by a variety of psychometric scales, including the Hospital Anxiety and Depression Scale (HADS), the Hamilton Depression Rating Scale (HDRS), and the Depression Anxiety Stress Scale (DASS).

Significant associations between problematic social media use and depressive symptoms ($0.129<r<0.45$) were observed in eleven of these studies [7, 30–32, 35–39, 41, 42]. The two remaining studies found negative associations between problematic social media use and depressive symptoms [34, 43].

Problematic social media use and anxiety symptoms

Most studies ($n=13/15$) focused on anxiety symptoms which were examined by a variety of measures, such as the Hospital Anxiety and Depression Scale (HADS), the Hamilton Depression Rating Scale (HDRS), the Hamilton Anxiety Scale (HAM-A), the Depression Anxiety Stress Scale (DASS), and the Beck Anxiety Inventory. Significant associations between problematic social media use and anxiety symptoms ($0.167<r<0.385$) were observed in ten of these studies [7, 30–32, 34–36, 39–41]. The three remaining studies reported negative associations between problematic social media use and anxiety symptoms [33, 38, 43].

Mediating factors in the relationship between PSMU and depression and anxiety

Unpacking the intricate web of mediating factors within the relationship between problematic social media use (PSMU) and mental health outcomes reveals a nuanced landscape. Stress emerges as a central player in this dynamic in the study by Malaeb et al. (2020). The incessant exposure to stressors, whether originating from the online realm or external pressures, propels individuals towards social media as a coping mechanism. However, this refuge can morph into a source of additional stress, as the digital sphere becomes a breeding ground for social comparison and information overload, ultimately amplifying anxiety and depressive symptoms. Beyond stress, Lin et al. (2021) found an indirect effect between problematic social media use and depressive and anxiety symptoms, through generalized trust and perceived social support. Excessive use of social media can erode the overall trust in online interactions and impact how individuals perceive the support they receive from their online connections. This complex interplay creates a pathway through which problematic social media use contributes to mental health challenges. Moreover, fear of COVID-19 and COVID-19 misunderstanding emerges as a significant mediating this relationship [31].

Table 2 Characteristics of selected studies

Study	Design	Country	Sample size/ (Female)	Participants (Mean age ± SD)	Educational status of participants	Dep. and Anx. assessment tool	PSMU assessment tool	Results with PSMU	Effect sizes
Lin et al. (2021) [30]	Cross-sectional study	Iran	1073/ (57.2%)	Adults (36.57 ± 10.21)	Educational year: (Mean = 9.87, SD = 4.68)	HADS	BSMAS	Positive and significant association with anxiety and depression	Depression $r = 0.195$ Anxiety $r = 0.170$
Lin et al. (2020) [31]	Cross-sectional study	Iran	1078/ (41.7%)	Adults (26.24 ± 7.41)	Able to read and write (0.2%); Primary (0.9%); Secondary (9.9%); Diplom (9.25%); College and above (79.9%)	HADS	BSMAS	Positive and significant association with psychological distress	Psychological distress $r = 0.377$
Lin et al. (2017) [7]	Cross-sectional study	Iran	2676/ (43.5%)	Adolescents (15.54 ± 1.21)	High school students	DASS	BSMAS	Positive and significant association with anxiety and depression	Anxiety $r = 0.167$ Depression $r = 0.214$
Alimoradi et al. (2019) [32]	Longitudinal study	Iran	938/ (100%)	Iranian women (36.5 ± 6.8)	Educational year: (Mean = 11.7, SD = 4.8)	HADS	BSMAS	Positive and significant association with anxiety and depression	Anxiety $r = 0.29$ Depression $r = 0.45$
Pirouz, Farahnaz (2016) [33]	Cross-sectional study	Iran	345/ (NR)	University students	University students	BAI-1996	SMQ	Negative association with anxiety	Anxiety $r = -0.55$
Dagher et al. (2021) [34]	Cross-sectional study	Lebanon	466/ (61.8%)	Community population (27.29 ± 11.46)	Illiterate 1.8% Primary 3.7% Complementary 7.0% Secondary 20.8% University 66.7%	HDRS HAM-A	SMUD	Positive and significant association with anxiety and no significant association with depression	Anxiety $\beta = 0.2025$ Depression $p = 0.528$
Barbar et al. (2020) [35]	Cross-sectional study	Lebanon	466/ (61.8%)	Adults (27.29 ± 11.46)	Illiterate 1.8% Primary 3.7% Complementary 7.0% Secondary 20.8% University 66.7%	HDRS HAM-A	SMD	Positive and significant association with anxiety and depression	Anxiety $r = 0.279$, $B = 0.20$ Depression $r = 0.181$
Malaeb et al. (2020) [36]	Cross-sectional study	Lebanon	466/ (61.8%)	Adults (27.29 ± 11.46)	Illiterate 1.8% Primary 3.7% Complementary 7.0% Secondary 20.8% University 66.7%	HDRS HAM-A	Severity of dependence to social media	Positive and significant association with anxiety and depression	Anxiety $r = 0.178$ Depression $r = 0.129$

Table 2 (continued)

Study	Design	Country	Sample size/ (Female)	Participants (Mean age ± SD)	Educational status of participants	Dep. and Anx. assessment tool	PSMU assessment tool	Results with PSMU	Effect sizes
Fekih-Romdhane et al. (2021) [37]	Cross-sectional study	Tunisia	1007/ (64.6%)	University students (21.9 ± 2.4)	University students	HDRS HAM-A	ASMAS	Positive and significant association with depressive dimensions of CAPE	Depressive dimensions of CAPE (r = 0.176, r = 0.165)
Hela Ghali et al. (2019) [38]	Cross-sectional study	Tunisia	1399/ (60.5%)	School students (17.02 ± 1.51)	School students	NR	Brief version derived from the BFAS	Positive and significant association with depression and no significant association with anxiety	Depression p < 0.0001 Anxiety p = 0.121
Nazzal, Zaher et al. (2018) [39]	Cross-sectional study	Palestine	938/ (61.9%)	University students (19.74 ± 1.33)	University students	DASS	FIS	Positive and significant association with depression and anxiety	Depression r = 0.33 Anxiety r = 0.21
Louragli et al. (2019) [40]	Cross-sectional study	Morocco	541/ (55.1%)	Middle and high school students (15.24 ± 0.06)	Middle and high school students	GAD-7	BFAS	Positive and significant association with anxiety	Anxiety r = 0.244
Malakeh et al. (2021) [41]	descriptive correlational design	Jordan	510/ (68.6%)	University students (21.38 ± 2.12)	University students: Freshman 8.4% Sophomore 17.3% Junior 30.2% Senior 44.1%	SCL-25	ASMAS	Positive and significant association with depression and anxiety	Depression r = 0.393 Anxiety r = 0.385
Rend Al Saigh et al. (2021) [42]	Cross-sectional study	United Arab Emirates	105/ (73.3%)	University students (19.88 ± 2.10)	66.7% of pharmacy students and 68.6% of other university students	PHQ-9	BSMAS	Positive and significant association with depression	Depression B = 0.5
Nadine Zeeni et al. (2018) [43]	Cross-sectional study	Lebanon	244/ (63.9%)	University students (18.10 ± 0.64)	University students	DASS-21	MTUAS	Negative association with depression and anxiety	Depression r = −0.11 Anxiety r = −0.07

Dep depression *Anx* anxiety, *Y* year, *HADS* Hospital Anxiety and Depression Scale, *BSMAS* Bergen Social Media Addiction Scale, *DASS* Depression Anxiety and Depression Scale, *BAI-1996* Beck Anxiety Inventory (1996), *SMQ* Social Media Questionnaire, *HDRS* Hamilton Depression Rating Scale, *HAM-A* Hamilton Anxiety Scale, *SMUD* Social Media Use Disorder Scale, *SMD* Social Media Disorder Scale, *CAPE* Community Assessment of Psychic Experiences, *ASMAS* Arabic Social Media Addiction Scale, *BFAS* Bergen Facebook Addiction Scale, *DASS* Depression Anxiety Stress Scales, *FIS* Facebook Intensity Scale, *GAD-7* Generalised Anxiety Disorder, *SCL-25* Symptom Checklist-25, *PHQ-9* Patient Health Questionnaire-9, *MTUAS* Media and Technology Usage and Attitudes Scale, *SD* standard deviations, *r* correlation coefficient, *B* unstandardized regression coefficient, *β* standardized regression coefficient, *p* p value, *NR* not reported

Table 3 Description of measurement tools used to assess PSMU

Measurement tools	Authors (year and country of study)	Score	Psychometric properties
BFAS (6 items)	- Developed and validated in English by Andreassen et al. [44] (2012, Norway) - Validated in Arabic by Louragli et al. [40] (2019, Morocco)	From 1 (very rarely) to 5 (very often)	- For English version: (a = 0.83) (RMSEA = 0.046, CFI = 0.99) ($\chi2/df$ = 1.84, p > 0.05) - For Arabic version: (a = 0, 788)
BSMAS (6 items) adapted from the BFAS	- Developed and validated in English by Andreassen et al. [45] (2016, Norway) - Validated in Persian by Lin et al. [7] (2017, Iran)	From 1 (very rarely) to 5 (very often)	- For English version: (a = 0.88) - For Persian version: (a = 0.86) (AVE = 0.51; CR = 0.86); (CFI = 0.993; TLI = 0.989; RMSEA = 0.057; SRMR = 0.039)
ASMAS (14 items) adapted from the Young's IAT	- Developed and validated in Arabic by Jamal Al-Menayes [8] (2015, Kuwait)	From 1 (strongly disagree) to 5 (all actually agree)	- Cronbach's alpha (a = 0.82)
SMQ, (10 items)	- Developed and validated in Persian by Farahnaz Pirouz [33] (2016, Iran)	From 0 (Not at all) to 6 (To a large extent)	- Cronbach's alpha (a = 0.86)
SMUD (27 items)	- Developed and validated in Arabic by Barbar et al. [35] (2020, Lebanon)	–	- Cronbach's alpha (a = 0.847)
FIS (6 items)	- Developed and validated in English by Ellison et al. [46] (2007, United States) - Validated in Arabic by Nazzal et al. [39] (2018, Palestine)	From 1 (strongly disagree) to 5 (strongly agree)	- For English version: (a = 0.83) - For Arabic version: (a = 0, 78)

BFAS Bergen Facebook Addiction, *BSMAS* Bergen Social Media Addiction Scale, *ASMAS* Arabic Social Media Addiction Scale, *SMQ* Social Media Questionnaire, *SMUD* Social Media Use Disorder Scale, *FIS* Facebook Intensity Scale, *a* Cronbach's alpha, *RMSEA* root mean square error of approximation, *CFI* Comparative Fit Index, *χ2* Chi-square test, *df* degrees of freedom, *p* p value, *CR* composite reliability, *AVE* average variance extracted, *TLI* Tucker–Lewis Index, *SRMR* standardized root mean square residual

In times of uncertainty, individuals turn to social media platforms for information and connection. However, the implications are dual-fold, with the quality and quantity of pandemic-related information on social media influencing anxiety and depression levels. Moreover, the role of COVID-19 misunderstanding as a mediating factor introduces a unique dimension to the discourse. Misinterpretation of information gleaned from social media may contribute to distorted perceptions, adding an additional layer of anxiety and depression.

Heterogeneity measures
A random-effects analysis of 15 studies (n = 12,252) showed a moderately statistically significant positive correlation between PSMU and depression and anxiety symptoms (r = 0.212; 95% confidence interval: [0.146, 0.276]; p < 0.001). High heterogeneity existed in our results (I^2 = 95.751%, p < 0.001; Q = 494.206, df = 21, p < 0.001) (Fig. 2).

Contributing factors to heterogeneity
The substantial heterogeneity observed in our analysis (I^2 = 95.751%, p < 0.001) necessitates a thorough exploration of potential contributing factors. Methodological dissimilarities among the studies are evident, including variations in inclusion criteria. This methodological heterogeneity could potentially account for the observed diversity in study designs. Additionally, the populations under investigation exhibit notable heterogeneity in demographic characteristics. The nuanced interplay of these diverse factors across studies may well be a major source of the observed heterogeneity. Furthermore, the utilization of a spectrum of instruments for the assessment of social media addiction and mental health outcomes may contribute to the observed variability.

Publication bias
The publication bias was assessed using funnel plot visualization and more objectively by Egger's and Begg's tests. The funnel plot showed a symmetrical distribution that indicated no evidence of publication bias (Fig. 3). This was supported by the results of Egger's and Begg's tests, which indicated no evidence of publication bias, (Egger, p = 0.81; Begg, p = 0.55).

Discussion
Prevalence of PSMU
In examining the prevalence of problematic social media use (PSMU) within the Middle East and North Africa (MENA) region, our systematic review encountered a notable scarcity of reported prevalence data. Out of the 15 studies included, only three provided explicit figures on PSMU prevalence. These findings revealed a prevalence range between 22.4 and 23.7% [7, 35, 36] within the MENA region. Comparing these figures to a broader global context, our review aligns with meta-analytic insights derived from 495 articles across 64 countries [47]. In this larger context, the estimated prevalence of
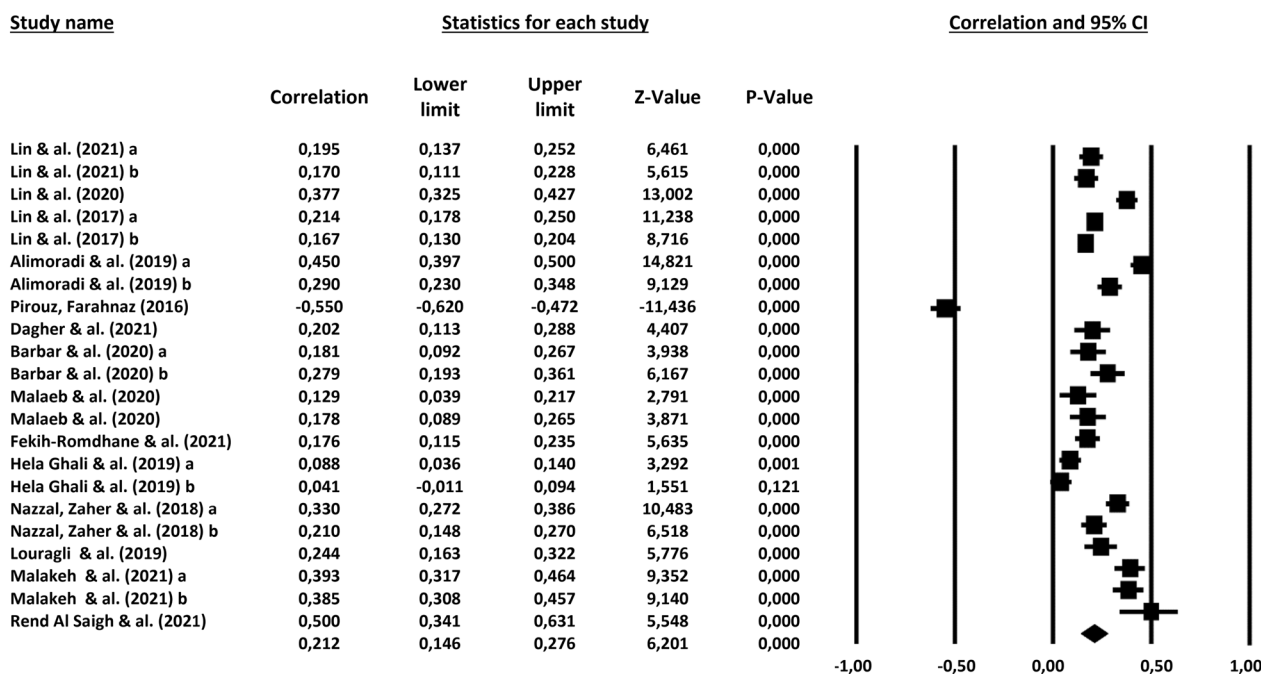
Study name	Statistics for each study					Correlation and 95% CI
	Correlation	Lower limit	Upper limit	Z-Value	P-Value	
Lin & al. (2021) a	0,195	0,137	0,252	6,461	0,000	
Lin & al. (2021) b	0,170	0,111	0,228	5,615	0,000	
Lin & al. (2020)	0,377	0,325	0,427	13,002	0,000	
Lin & al. (2017) a	0,214	0,178	0,250	11,238	0,000	
Lin & al. (2017) b	0,167	0,130	0,204	8,716	0,000	
Alimoradi & al. (2019) a	0,450	0,397	0,500	14,821	0,000	
Alimoradi & al. (2019) b	0,290	0,230	0,348	9,129	0,000	
Pirouz, Farahnaz (2016)	-0,550	-0,620	-0,472	-11,436	0,000	
Dagher & al. (2021)	0,202	0,113	0,288	4,407	0,000	
Barbar & al. (2020) a	0,181	0,092	0,267	3,938	0,000	
Barbar & al. (2020) b	0,279	0,193	0,361	6,167	0,000	
Malaeb & al. (2020)	0,129	0,039	0,217	2,791	0,000	
Malaeb & al. (2020)	0,178	0,089	0,265	3,871	0,000	
Fekih-Romdhane & al. (2021)	0,176	0,115	0,235	5,635	0,000	
Hela Ghali & al. (2019) a	0,088	0,036	0,140	3,292	0,001	
Hela Ghali & al. (2019) b	0,041	-0,011	0,094	1,551	0,121	
Nazzal, Zaher & al. (2018) a	0,330	0,272	0,386	10,483	0,000	
Nazzal, Zaher & al. (2018) b	0,210	0,148	0,270	6,518	0,000	
Louragli & al. (2019)	0,244	0,163	0,322	5,776	0,000	
Malakeh & al. (2021) a	0,393	0,317	0,464	9,352	0,000	
Malakeh & al. (2021) b	0,385	0,308	0,457	9,140	0,000	
Rend Al Saigh & al. (2021)	0,500	0,341	0,631	5,548	0,000	
	0,212	0,146	0,276	6,201	0,000	

Fig. 2 Forest plot of correlation for association between PSMU and depression and anxiety symptoms
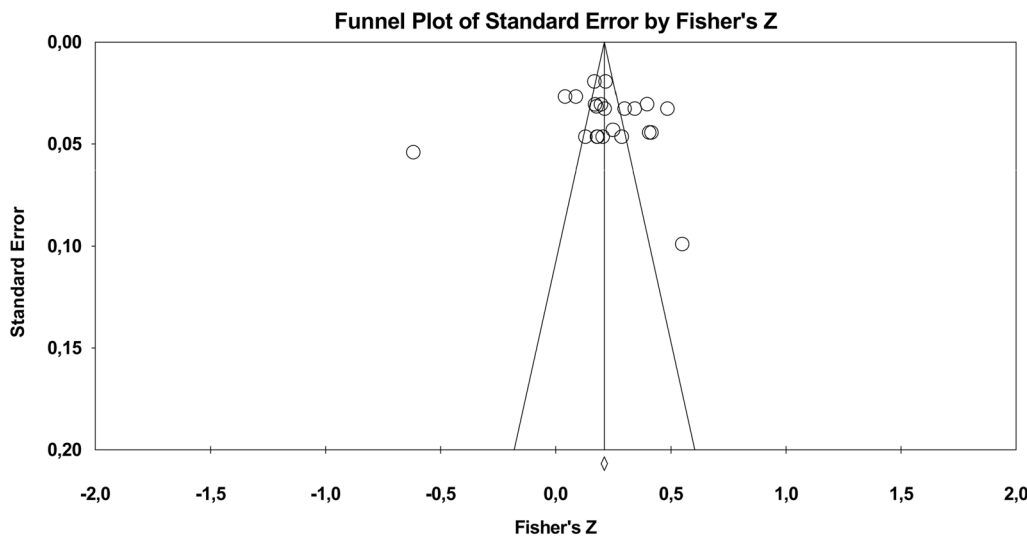
Fig. 3 Funnel plot of correlation for association between PSMU and depression and anxiety

PSMU in upper-middle income regions mirrored our findings, standing at 21.26%. Intriguingly, the meta-analysis exposed substantial variations in PSMU prevalence across different global regions. For instance, South-East Asia exhibited a notably higher prevalence at 59.36%, while lower-middle income regions reported a prevalence of 63.83%. In contrast, high-income regions showed a relatively lower prevalence of 16.12%, and the Americas demonstrated the lowest prevalence at 11.66% [47].

PSMU and mental health

Emerging research on the correlation between problematic social media use (PSMU) and mental health issues, particularly within MENA countries, has spurred the present systematic review. In our investigation, we delved into 15 studies meeting the predefined inclusion criteria, aiming to unravel the associations between social media use and symptoms of depression and anxiety. Of the 15 studies, there was a positive association between PSMU

and anxiety (in 10 studies), and depression (in 11 studies), as evidenced by various global studies [4, 18–22, 48, 49]. Notably, the observed relationship generally exhibited small-to-medium bivariate effect sizes, ranging from 0.129 to 0.45 in depression studies and ranging from 0.167 to 0.385 in anxiety studies. However, it is crucial to approach these findings with caution, considering the small-to-medium effect sizes and the overall fair to poor quality of the included studies. A more nuanced analysis of effect sizes across various study contexts unveils intriguing insights. Specifically, studies conducted in high-stress environments, such as academic settings, consistently demonstrated higher effect sizes [39, 41, 42]. This suggests a potential amplification of the association between PSMU and depressive and anxiety symptoms under stress-inducing conditions. This observation aligns with the findings of Malaeb et al.'s (2020) study, which emphasizes stress as a mediator in the relationship between PSMU and depressive and anxiety symptoms.

The association between PSMU and depression may be explicable by the neglect of essential life aspects among individuals engrossed in excessive social media use. The significant increase in time spent on Social Networking Sites (SNS) may lead to reduced face-to-face social interactions, disrupted sleep patterns, and diminished physical activity [50], all contributing to the manifestation of depressive symptoms. Despite enabling easy interaction with a broader audience, online relations through SNS are considered of lesser quality than everyday face-to-face communication and are associated with a higher level of loneliness [51]. Additionally, increased PSMU may influence how individuals perceive their online experiences, engaging in self-comparison with the idealized images of others, resulting in a negative self-image and depression [52]. Several hypotheses have been proposed to explain the effect of SNS use on anxiety symptoms. Over-reliance on social networking sites, for instance, has been associated with decreased creativity [53] and underestimation of intellectual ability [54]. Excessive SNS use is also time-consuming since it deprives people of ordinary group experiences with their peers, turning them into lonely, isolated, and anxious individuals [55]. Furthermore, some research suggests that people who suffer from anxiety prefer online communication because they have difficulty communicating face-to-face [52].

In the MENA region, social media usage is intricately woven into the cultural fabric, where family bonds and cultural expectations play a pivotal role. The emphasis on family unity not only shapes individuals' online narratives, but also fosters a trend of presenting positive aspects to strengthen familial ties. Cultural norms, particularly those of modesty, further influence the digital landscape, creating an environment ripe for social comparisons and potential impacts on self-esteem. Moreover, the region's cultural nuances introduce unique considerations for online interactions, as users navigate the delicate balance between preserving cultural dignity and expressing their individuality. For the MENA diaspora, social media serves as a vital bridge for maintaining connections with family and cultural roots, accompanied by the challenge of harmonizing these online relationships with the imperative of local integration. This intricate interplay of family dynamics, cultural norms, and the dual nature of online connections adds layers of complexity to the relationship between social media use and mental health in the MENA region.

Another possible psychopathology in the relationship between PSMU and psychological distress, according to Elhai et al. [55] was fear of missing out (FOMO). Regularly checking social media, for example, can contribute to FOMO anxiety, which can exacerbate further compulsions to check SNS [56]. Another study revealed that being assigned to multiple social media platforms simultaneously and attempting to keep up with them all can cause anxiety [57], which aggravates the fear of missing out and eventually provokes more anxiety.

It is worth noting that the relationship between SNS use and mental health symptoms is not linear, which opens the door to a nuanced exploration of the myriad factors that contribute to this intricate dynamic [58]. It is crucial to recognize that individuals' experiences with social media are multifaceted, shaped by a complex interplay of psychological, social, and environmental factors. For instance, the nature and content of social media interactions play a pivotal role [59]. One person, for instance, can spend a significant amount of time each day watching entertaining videos, while another may opt for discussing politics with other users. Both individuals will be assessed in the same way because they spent the same time using the SNS. Admittedly, the way the SNS is administered can have various effects on an individual's life [48]. Positive and supportive engagements may contribute to enhanced well-being, while negative interactions or exposure to harmful content could have adverse effects [60]. The quantity and quality of online connections, the purpose and context of social media use, and individual differences in coping mechanisms all add layers of complexity to this relationship [16, 61]. Moreover, studies have highlighted the impact of social comparison mechanisms, where individuals may perceive idealized images on social media, leading to feelings of inadequacy or dissatisfaction [62]. The role of self-esteem, personality traits, and pre-existing mental health conditions also intertwines with social media use, influencing how individuals respond to online experiences [63, 64].

Limitations and needs for future research

Overall, the current systematic review highlights several shortfalls in the research on the relationship between SNS use, symptoms of depression, and anxiety. First, recognizing the limitation posed by the cross-sectional nature of the included studies, it is essential to highlight the challenge in establishing clear causal relationships. Cross-sectional designs, offering a snapshot at a specific moment, make it intricate to decipher the directional causality between problematic social media use (PSMU) and mental health outcomes. The associations identified may involve a bidirectional relationship, where mental health influences social media use, and conversely, social media use impacts mental health. For instance, individuals experiencing heightened stress or depressive symptoms may resort to increased social media use as a coping mechanism, while excessive PSMU might contribute to elevated stress levels and depressive symptoms. To delve deeper into this complex interplay and provide more conclusive insights, the necessity of longitudinal research becomes evident. Longitudinal studies, conducted over an extended period, offer a dynamic perspective by tracking changes in PSMU and mental health outcomes over time. This temporal dimension is crucial for unraveling the causal pathways and discerning the temporal sequence of events. For instance, such studies could shed light on whether increased PSMU precedes the onset of mental health issues or if deteriorating mental health leads to heightened social media engagement. This nuanced approach holds the promise of not only enhancing our understanding of the evolving relationship between PSMU and mental health, but also guiding the development of targeted interventions and preventive strategies. Second, while the majority of studies in the review approached problematic social media use (PSMU) from a broad perspective, with only three studies specifically delving into problematic Facebook use, it is imperative to recognize the rich tapestry of social media platforms and their potential distinct impacts on mental health. Each platform comes with its unique set of features, user interactions, and content dynamics, contributing to a diverse landscape of online experiences. For instance, Facebook, with its emphasis on social connections and diverse content sharing, may have distinct implications compared to visually centric platforms like Instagram or short-form content platforms like Tik-Tok. The visual nature of Instagram, revolving around images and curated lifestyles, might foster a different set of social comparisons and identity perceptions. On the other hand, the rapid content consumption on platforms like TikTok may introduce novel challenges in attention and time management.

Exploring these platform-specific nuances is crucial for a comprehensive understanding of the relationship between PSMU and mental health. It allows us to unravel whether the observed associations are uniform across platforms or if certain platforms pose unique challenges or benefits. This insight is not only relevant for academic discourse, but also holds practical implications for tailored interventions and platform-specific guidelines to promote healthier social media use. As we navigate the evolving landscape of social media, such distinctions become pivotal in crafting nuanced strategies for mitigating the potential adverse effects on mental well-being. Finally, it is worth mentioning that only a few countries in the MENA region have investigated the relationship between PSMU and mental health in non-representative samples; henceforth, these findings cannot be generalized to the entire MENA region's population. Cultural nuances, for instance, play a pivotal role in shaping individuals' attitudes towards social media, the perception of mental health, and the expression of psychological distress. Socioeconomic factors, varying widely across the region, can influence access to technology, educational opportunities, and the prevalence of stressors that may intersect with social media use. Regional disparities, whether urban–rural divides or differences between countries, introduce additional layers of complexity.

Recognizing these nuances highlights the need for future research endeavors to adopt a more granular approach. Studies that incorporate representative samples from diverse cultural, socioeconomic, and regional contexts can unravel the intricacies of how PSMU intersects with mental health across different segments of the population. This not only enhances the external validity of the findings but also facilitates the development of targeted interventions that resonate with the unique dynamics of specific subpopulations within the MENA region. As we chart the course for future investigations, embracing this diversity becomes paramount for a more holistic understanding of the interplay between social media use and mental well-being in the MENA context.

Conclusion

This systematic review sheds light on the relationship between PSMU and mental health problems, specifically anxiety and depression. The estimated prevalence of PSMU falls within the range of 22.4 to 23.7%, aligning with global trends. Notably, the observed associations between PSMU and depressive symptoms exhibit effect sizes ranging from 0.129 to 0.45, while the relationship between PSMU and anxiety symptoms shows effect sizes ranging from 0.167 to 0.385. However, it is essential to acknowledge the limitation in establishing clear causality. The cross-sectional nature of the included studies limits

our ability to definitively determine the direction of influence. Recognizing this limitation, it becomes imperative to advocate for future research endeavors, especially longitudinal studies, which can unravel the temporal dynamics of the relationship. Understanding whether excessive social media use precedes or follows mental health issues is pivotal for developing targeted interventions and preventive measures. As previously stated, there could be various factors influencing this relationship. How a person uses SNS must be considered to explain its relationship to mental health symptoms. Admittedly, SNS could be used to users' advantage to the greatest extent possible and can even become dangerous if not used consciously. Consequently, it is critical to use such tools wisely. SNS use, thus, necessitates concerted efforts and the implementation of necessary measures to ensure people's mental and physical safety. Individuals should proactively manage their time on social media, setting daily limits and periodically assessing their mental well-being in relation to usage. Diversifying offline activities is encouraged to counterbalance the potential negative impacts. For parents, fostering open communication with their children about social media usage is crucial, along with advocating for digital literacy education in schools. Policymakers are urged to support educational policies that embed digital skills and healthy social media use. Additionally, reinforcing psychological support services in educational institutions can address the growing mental health needs associated with social media use. Educators can contribute by organizing awareness workshops and integrating modules on mental health and responsible social media use into the educational programs. Additionally, interactive workshops for students, parents, and teachers could be developed, covering both the positive and negative impacts of social media. These workshops might involve open discussions, case studies, and simulations to enhance understanding. Concurrently, creating dedicated online resources, such as practical guides and informative videos based on recent research, would be essential. These resources could be easily accessible to educational communities, providing tangible guidance for healthy and mindful social media use.

In conclusion, this systematic review highlights the imperative of addressing the intricate relationship between problematic social media use (PSMU) and mental health challenges, specifically anxiety and depression, prevalent in the MENA region. As we move forward, it is essential to transcend mere acknowledgment of these associations and proactively engage in measures that foster digital literacy and responsible social media use, particularly among the youth. Furthermore, a compelling call to action would be an urging for the regional implementation of these programs, tailored to the specific cultural nuances of the MENA region. By doing so, we lay the groundwork for a digital culture that values mental health, resilience, and flourishing.

Abbreviations

ASMAS	Arabic Social Media Addiction Scale
BFAS	Bergen Facebook Addiction Scale
BSMAS	Bergen Social Media Addiction Scale
CAPE	Community Assessment of Psychic Experiences
DASS	Depression Anxiety Stress Scale
FOMO	Fear of Missing Out
FIS	The Facebook Intensity Scale
HAM-A	Hamilton Anxiety Scale
HDRS	Hamilton Depression Rating Scale
HADS	Hospital Anxiety and Depression Scale
MTUAS	Media and Technology Usage and Attitudes Scale
MENA	Middle East and North Africa
PHQ-9	Patient health questionnaire-9
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PSMU	Problematic social media use
GAD-7	Questionnaire About General Trouble Anxiety
SMUD	Social Media Use Disorder Scale
SNS	Social Networking Sites
SD	Standard deviations
SCL-25	Symptom checklist-25

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare that they have no competing interests.

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