



Meta-analysis of the relationship between social media addiction and psychological well-being among university students: A comprehensive review

Begzod K. Khodjaev ^{1*}

 0000-0002-1897-0940

Rasuljon K. Atamuratov ²

 0000-0003-4959-1000

Muslima K. Bozorova ³

 0009-0003-3425-0008

Murodulla K. Ismailov ⁴

 0009-0003-8309-1488

Sarvinoz M. Norboyeva ³

 0009-0005-2161-3919

Nasiba Z. Sayimbetova ⁵

 0009-0001-0209-2266

¹ Department of Pedagogy, National Pedagogical University of Uzbekistan, Tashkent, UZBEKISTAN

² Department of Computational Linguistics and Digital Technologies, Alisher Navoi Tashkent State University of Uzbek Language and Literature, Tashkent, UZBEKISTAN

³ Department of Pedagogy and Social Work, Termez State University, Termez, UZBEKISTAN

⁴ Department of Pedagogy, Termez State Pedagogical Institute, Termez, UZBEKISTAN

⁵ Department of Building and Structure Construction, Karakalpak State University, Nukus, UZBEKISTAN

* Corresponding author: yaxshifarzand@mail.ru

Citation: Khodjaev, B. K., Atamuratov, R. K., Bozorova, M. K., Ismailov, M. K., Norboyeva, S. M., & Sayimbetova, N. Z. (2026). Meta-analysis of the relationship between social media addiction and psychological well-being among university students: A comprehensive review. *Online Journal of Communication and Media Technologies*, 16(3), Article e202642. <https://doi.org/10.30935/ojcm/18954>

ARTICLE INFO

Received: 19 Mar 2026

Accepted: 27 Jun 2026

ABSTRACT

This meta-analysis synthesizes correlational research on the relationship between social media addiction and psychological well-being among university students. A random effects model, using 62 independent studies (total N = 17,800) covering publications from 2017-2026, identified through systematic searches in the *Web of Science*, *Scopus*, and *ProQuest* databases, yielded an overall combined effect size of $r = -0.41$ (95% confidence interval $[-0.47, -0.35]$), indicating a moderate negative association. High heterogeneity ($I^2 = 87.4\%$) demonstrated the feasibility of systematic moderator analyses examining six variables. Therefore, scale of measurement, cultural context, type of social media platform, presence and type of mediating variables, publication type, and publication year were tested as moderators. Mediating variables particularly sleep quality, self-regulation, and critical thinking significantly strengthened the negative association. Cultural context also emerged as a significant moderator. Studies conducted in a Middle Eastern context yielded the largest effect sizes. Publication year showed a significant trend, with effect sizes steadily increasing over time. Publication bias assessments via funnel plot review, Egger test, and trimming and stuffing procedure showed no significant bias. The findings have practical implications for university consulting services and policymakers tasked with developing targeted digital well-being interventions.

Keywords: social media addiction, psychological well-being, university students, meta-analysis, mental health, emerging adults

INTRODUCTION

The widespread integration of social media platforms into daily life has led to significant academic interest in their impact on the psychological health of young adults. University students constitute a particularly important population group in this context, as the transition to higher education coincides with increased social comparison, identity negotiation, and susceptibility to behavioral patterns that can jeopardize mental health outcomes (Arnett, 2000; Twenge & Campbell, 2019). Social media addiction (SMA), characterized by excessive, compulsive interaction with platforms that undermine functional well-being, has emerged as a concept attracting increasing theoretical and applied interest (Alshalawi, 2022; Andreassen et al., 2012; Kuss & Griffiths, 2017).

Despite the increasing body of empirical literature on the issue, the nature and strength of the relationship between psychological well-being and SMA remain inconclusive. Discrepancies in the results may be due to the diversity of the methodology employed, such as the way addiction is measured, the measures of well-being used, cultural sampling frames, and the lack of consideration of the possible mediator effects (Lipsey & Wilson, 2001). A quantitative synthesis of the results through the application of meta-analysis is considered to be an effective way of resolving the discrepancies in the results (Borenstein et al., 2009).

Prior meta-analytic and systematic review works have addressed related constructs were problematic Internet use (Huang et al., 2020; Jiang et al., 2026), screen time (Kwan et al., 2018), and social networking site use broadly (Ansari et al., 2024; Cunningham et al., 2021; Jing et al., 2025; Saiphoo, 2020; Shannon et al., 2022), yet none has concentrated specifically on SMA among university students while simultaneously examining a comprehensive set of theoretically grounded moderators. The present investigation addresses this gap by conducting a systematic meta-analysis that

- (a) estimates the pooled effect size for the SMA-well-being relationship,
- (b) evaluates six moderator variables, and
- (c) examines publication bias through multiple complementary procedures.

THEORETICAL FRAMEWORK

Social Media Addiction

SMA can be described as “a type of behavioral addiction in which individuals use social media services like Facebook, Instagram, Twitter, and TikTok in an excessive and uncontrollable manner, leading to impaired daily functioning” (Stănculescu, 2023). Even though this construct does not include the use and consumption of any type of substance, distinguishing it from substance use and substance use disorders, it includes the classical symptoms of addiction, such as the development of tolerance, withdrawal symptoms, unsuccessful attempts to reduce use, and continued use despite adverse consequences (Peng & Liao, 2023; Shashayeva et al., 2026). Among the theoretical frameworks most frequently used to explain the construct of SMA, the six-component model of addiction proposed by Griffiths (2005) holds a central position in the literature. Griffiths’ (2005) six-component model includes salience, mood modification, tolerance, withdrawal, conflict, and relapse and has frequently been used to assess whether social media use has gained the dimension of addiction (Abiddine et al., 2025; Monacis et al., 2017).

Further theoretical perspectives that could be of significant explanatory value include the uses and gratifications theory and the social comparison theory. According to the uses and gratifications theory, social media sites are actively chosen to fulfill certain psychological needs, which include social interaction, information seeking, entertainment, and self-expression or identity portrayal. When the desire to satisfy these needs reaches the point of seeking excessive gratification, the prerequisites for the formation of addictive tendencies have been met (Pellegrino et al., 2022). According to the social comparison theory, social media sites have been found to be particularly conducive to upward social comparisons, wherein the user continuously compares themselves with the ideal self-portrayal of others, leading to low self-esteem and

impacting their psychological well-being negatively (Hawi & Samaha, 2017). Moreover, the construct of fear of missing out (FoMO), which refers to the apprehension of missing rewarding experiences that others have, has also been recognized to be of significant importance to the construct of SMA and has been found to have significant associations with anxiety and depressive symptoms (Swar & Hameed, 2017; Wang et al., 2025; Zhu et al., 2023).

Young adults in university life are a highly vulnerable group to SMA. During this stage, the process of emerging adulthood, in which the development of identity, peer relationship consolidation, and the achievement of autonomy occur simultaneously, is in effect. Being a member of the digital native generation, university students use social media not only as a means of communication but also intensively as a means to construct social identity, to share knowledge, and to acquire social support (Simsek et al., 2019; Tran et al., 2023). Several research findings have consistently shown that the amount of time devoted to social media usage is related to negative consequences such as poor academic performance, sleep problems, and psychological health problems in university students (Alnjadat et al., 2019; Aslan & Polat, 2024; Duc, 2026; Nannim et al., 2023; Taoufiq et al., 2026). Regarding the assessment tools, several scales were also developed in addition to the Bergen social media addiction scale (BSMAS), such as the problematic social media use scale and the Bergen Facebook addiction scale. However, the different theories on which the scales were based have led to inconsistencies in the research findings.

Psychological Well-Being in the Context of University Students

There are two approaches to the concept of psychological well-being that can be seen in the literature; the hedonic and the eudaimonic approach. The hedonic approach considers the conceptualization of well-being as having a combination of positive and negative affect with life satisfaction. The eudaimonic approach sees the conceptualization of well-being as the actualization of individual potential, the search for meaning and the search for growth (Sujarwoto et al., 2023). The subjective perspective of well-being can be considered a combination of both the hedonic and the eudaimonic standpoints. The main constructs of psychological well-being in the literature are life satisfaction, happiness, low depression and anxiety and positive feelings about self (Zhu et al., 2023). For the purposes of this meta-analysis, psychological well-being is operationalized broadly to encompass both positive indicators (life satisfaction, flourishing, and subjective happiness) and negative mental health indicators (depression, anxiety, and loneliness), consistent with a comprehensive psychosocial adjustment framework (Sujarwoto et al., 2023). This inclusive operationalization enables a wider evidence base but also introduces conceptual heterogeneity, addressed as a limitation.

Several individual and environmental factors that impact the psychological states of university students have been found to possess a determinative role, with academic stress, adjustment issues, social support, sleep quality, and self-regulatory skills being some of the most prominent ones. The COVID-19 pandemic has added complexity to the aforementioned factors, as the stress, anxiety, and depression levels of university students during the period were found to be substantially higher (Aslan & Çınar, 2023; Boniel-Nissim & Alt, 2022; Sujarwoto et al., 2023). On the other hand, the usage of social media was also found to have increased substantially during the period, while the social media sites not only provided an opportunity for the students for social connectivity and seeking support, they also provided an opportunity for the development of problematic usage patterns, as the usage was found to be negatively related with life satisfaction and positively with loneliness during the period, as revealed by the studies conducted during the COVID-19 pandemic period (Boniel-Nissim & Alt, 2022; Thygesen et al., 2022).

Among the factors that influence psychological well-being, the quality of sleep emerges as a particularly relevant mediating factor. The negative effects of late-night social media usage on the quantity and quality of sleep contribute to the development of depressive symptoms, increased anxiety, and the deterioration of psychological well-being (Pirdehghan et al., 2021; Wong et al., 2020; Zhu et al., 2023). Che et al. (2025) found that SMA acts as a main mediator in the relationship between physical exercise and sleep quality, while Zhang et al. (2023) found that emotional disturbance and sleep quality act as serial mediators in the negative effect of SMA on executive functioning. Overall, the results highlight the importance of sleep quality as a factor in the relationship between SMA and psychological well-being. Furthermore, the self-regulatory deficiency model proposes that SMA and psychological well-being are two outcomes that share a common predictor in the form of self-regulatory deficiency. That is, as the capacity to exert control over one's own thoughts and

behaviors diminishes, the risk of SMA and psychological well-being problems increases in tandem (Peng & Liao, 2023).

The Relationship Between Social Media Addiction and Psychological Well-Being

Research on the relationship between SMA and psychological well-being has generally pointed to the existence of a negative relationship, though the effect size has varied widely. Huang's (2022) meta-analysis on the relationship between problematic social media use and psychological well-being pointed to the existence of a negative relationship, though the effect size varied widely. Similarly, Cunningham et al.'s (2021) meta-analysis on the relationship between social media use and depressive symptoms pointed to the existence of a negative relationship, though the effect size varied widely. Jing et al.'s (2025) systematic review and meta-analysis on the relationship between SMA and psychological well-being variables such as anxiety, depression, FoMO, loneliness, and self-esteem pointed to the existence of a positive relationship, though the effect size varied widely. Shannon et al.'s (2022) systematic review and meta-analysis on the relationship between problematic social media use and psychological well-being among adolescents and young adults pointed to the existence of a positive relationship, though the effect size varied widely.

There are several theoretical mechanisms that have been suggested to explain the negative impact of SMA on psychological well-being. Loneliness is one of the most studied mediator in this relationship. Marttila et al. (2021) have proved that problematic social media use is related to increased levels of loneliness over time, which in turn has a negative impact on life satisfaction. Gong et al. (2021) have proved that loneliness and unsatisfied interpersonal needs are serial multiple mediators in the relationship between social networking site addiction and depression. Perceived social support is another key determinant in the relationship between SMA and psychological well-being. Cai et al. (2026) have proved that the relationship between SMA and the mental well-being of university students is mediated by social support and psychological resilience. Ostic et al. (2021) have suggested a mediated model in which the relationship between social media use and psychological well-being is mediated through indirect mechanisms.

Among the most investigated psychological consequences of SMA, depression and anxiety have been reported to be the most common. Cui et al. (2023) have demonstrated that various latent profiles of problematic social media use are related to depression and stress levels. Foroughi et al. (2022) have investigated the relationship between Instagram addiction and academic performance, social anxiety, depression, and life satisfaction, and the results have demonstrated that Instagram addiction is considered to be a significant predictor of social anxiety and depression. Jasso-Medrano and López-Rosales (2018) have demonstrated the significant relationship between social media use addiction and depression and suicidal ideation. Feng et al. (2025) have investigated the relationship between SMA and mental health and academic burnout among Chinese university students using the network analysis method and have demonstrated the significant relationship between these factors. Shannon et al. (2024) have demonstrated the strengthening relationship between problematic social media use and adverse mental health outcomes.

The moderating effects of such variables as platform types, cultural contexts, and publication types are also of critical importance in this relationship. It is assumed that various types of social media platforms have different effects on the psychological well-being of their users due to their qualitative differences in the psychological processes to which they expose their users. Visual-type social media platforms like Instagram and TikTok have been assumed to have impacts on psychological well-being through body image and upward social comparison mechanisms, whereas the impacts of text-type social media platforms like Twitter may be different (Kasmani, 2021). From the cultural perspective, it has been suggested that the relationship between social media and psychological well-being may be mediated differently in collectivist cultural contexts than in individualist cultural contexts (Kim et al., 2023; Thomas et al., 2022).

Research Gaps and Significance of the Study

A perusal of the available literature reveals that the pace of research on the relationship between SMA and psychological well-being among university students has gained momentum significantly in the recent past. Nevertheless, the overwhelming majority of the primary studies have been conducted on the Western and individualistic cultural groups, while the number of primary studies on diverse cultural groups has been meager, raising serious concerns pertaining to the generalization of the results obtained (Sujarwoto et al.,

2023; Thomas et al., 2022). Moreover, the available meta-analytical reviews on the relationship between SMA and psychological well-being have been conducted under broad categorizations of the topic, without delving sufficiently into the role of diverse measurement tools and mediating factors on the relationship between the two constructs (Cunningham et al., 2021; Huang, 2022; Shannon et al., 2022). Though the role of mediating factors like sleep quality, self-regulation, and loneliness has been addressed to a certain extent, there is a lack of a comprehensive meta-analytical review on the subject to compare the mediating role of these factors on the relationship between SMA and psychological well-being (Che et al., 2025; Zhang et al., 2023; Zhu et al., 2023). The moderating effect of the nature of the platform is still an under-explored topic of the literature; systematic studies that compare the differential effect of the following platforms on psychological well-being—Instagram, TikTok, Twitter, and Facebook—are extremely scarce. Lastly, the lack of meta-analytical studies that explore the effect of the nature of the publication and the year of publication on the results creates an important degree of uncertainty with respect to the role of publication biases on the overall body of knowledge available on this topic.

The purpose of the current meta-analysis is to offer a comprehensive synthesis of the literature, which has the potential to fill the identified gaps in the literature, contributing to the field theoretically as well as in its practical application. From a theoretical perspective, the purpose of the current meta-analysis is to offer a synthesis of the findings obtained from various cultural contexts, different types of platforms, as well as different types of measurement instruments, in order to determine the effect of SMA on psychological well-being with precision. In this way, the inconsistencies identified in the literature will be explained, and a more robust base of theory will be offered to the field of research in the future. From a practical perspective, the findings of the current meta-analysis have the potential to be used as a base of evidence by university psychological counseling services, as well as by mental health policy makers and educational policy makers. Identifying which student groups are most exposed to the adverse effects of SMA, and under what conditions, will directly inform the development of protective and preventive intervention programs. In particular, the identification of modifiable mediating variables such as sleep quality, self-regulation, and loneliness will provide practical guidance for the design of intervention programs targeting these mechanisms.

- H1:** SMA is significantly and negatively associated with psychological well-being among university students.
- H2:** Measurement scale type moderates the magnitude of the SMA-well-being association.
- H3:** Cultural context exerts a significant moderating influence on the observed relationship.
- H4:** Social media platform type moderates the strength of the addiction – well-being link.
- H5:** The presence of mediating variables (e.g., sleep quality, self-regulation, and critical thinking) significantly moderates the effect size.
- H6:** Publication type does not significantly moderate the relationship.
- H7:** Publication year moderates effect size magnitude, reflecting temporal shifts in social media use patterns and research methodology.

METHOD

Research Design

A quantitative meta-analytic framework was adopted to synthesize findings from correlational studies examining the SMA – psychological well-being relationship. This approach enables the computation of aggregate, precision-weighted effect estimates from multiple independent investigations and permits systematic examination of between-study variance through moderator analyses (Bektas et al., 2015; Borenstein et al., 2009; Cooper et al., 2019).

Literature Search Strategy

Comprehensive searches were carried out across three international scholarly databases, such as *Web of Science*, *Scopus*, and *ProQuest* with no temporal restriction in the initial search parameters, though the final sample was bounded to studies published from 2017 through January 2026 after applying eligibility criteria.

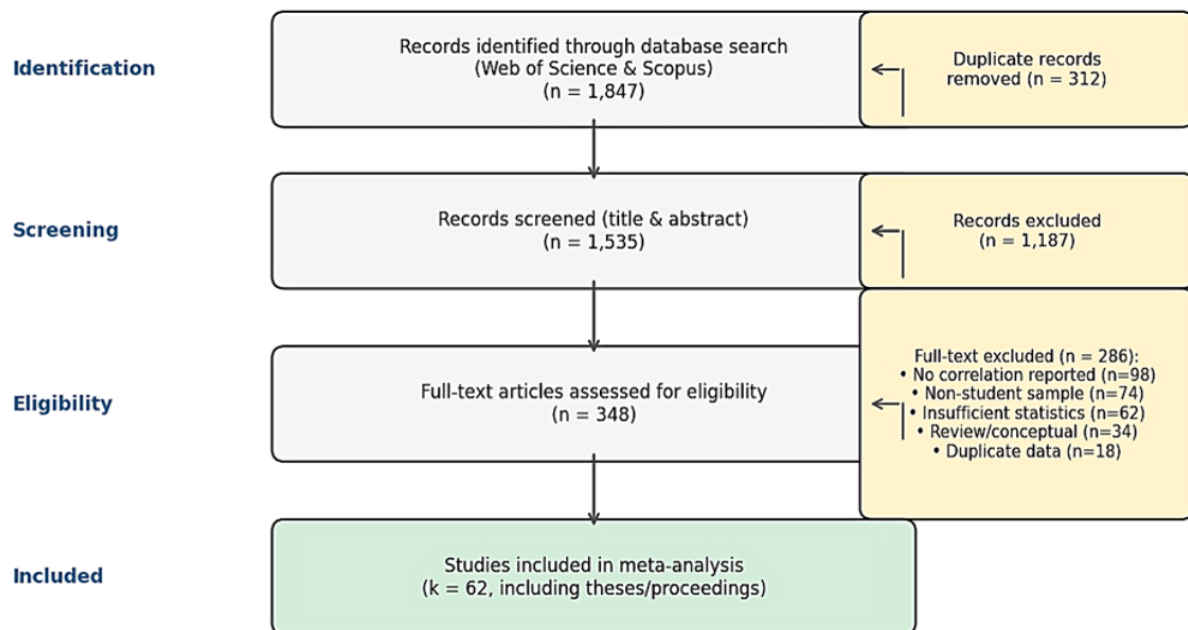


Figure 1. PRISMA-style flow diagram depicting the systematic literature search and study selection process (the authors' own elaboration)

The widespread adoption of standardized SMA measures (e.g., BSMAS and social media addiction scale [SMAS]) in peer-reviewed research occurred predominantly from 2017 onward. Boolean combinations of the following keyword clusters guided the search: (*social media addiction OR problematic social media use OR social networking site addiction*) AND (*psychological well-being OR mental health OR subjective well-being OR life satisfaction OR depression OR anxiety*) AND (*university students OR college students OR undergraduate OR emerging adults*). Supplementary searches were conducted in ProQuest Dissertations & Theses Global and selected conference proceedings databases to reduce potential publication bias.

Eligibility Criteria

Studies were considered for inclusion if they satisfied all of the following conditions:

- employed a correlational research design with a university or college student sample;
- examined the association between a validated measure of SMA or problematic social media use and at least one psychological well-being indicator;
- reported sufficient quantitative data—correlation coefficients, r values, R^2 values, or statistics convertible to r —alongside sample sizes; and
- were available in English.

Studies were excluded if they

- relied exclusively on experimental or intervention designs without correlational data,
- sampled non-student populations only,
- examined general Internet use or smartphone addiction without differentiating social media platforms, or
- did not provide extractable effect size information (**Figure 1**).

Appendix A shows the fixed effects, correlations and confidence intervals (CIs) of the included studies.

Coding Procedure

The data extraction and study coding process was completed by two researchers utilizing a standardized coding protocol developed a priori. Inter-rater reliability was assessed via Cohen's (1988) kappa statistic for all categorical moderator variables. Results showed $\kappa = .83$ to $\kappa = .92$, indicating excellent agreement (Landis

Table 1. Descriptive profile of studies included in the meta-analytic review

Variable	Category	k	Percentage (%)
Publication year	2017-2018	6	10.0
	2019-2020	4	6.7
	2021-2022	21	33.3
	2023-2026	31	51.7
Measurement scale	BSMAS	21	33.9
	SMAS	15	24.2
	SMAS-6	12	19.4
	Other/mixed	14	22.6
Cultural context	East Asian	18	29.0
	Western	22	35.5
	Middle Eastern	10	16.1
	South/Southeast Asian	8	12.9
	Mixed/other	4	8.4
Social media platform	Multi-platform	31	50.0
	Instagram	12	19.4
	Facebook	8	12.9
	TikTok/short-video	5	9.7
	Other	6	11.7
Mediating variable	No mediator	38	61.3
	Sleep quality	8	12.9
	Self-regulation	7	11.3
	Critical thinking	5	9.7
	Other mediators	4	8.1
Publication type	Journal article	48	77.4
	Thesis (ProQuest)	7	11.3
	Conference proceedings	7	11.3

Note. k: Number of studies; N: Total sample size; Percentages may not sum to 100 due to rounding; & Studies classified under "mixed/other" for cultural context include cross-national or multicultural samples not assignable to a single region

& Koch, 1977). All discrepancies were addressed via structured discussion and/or third-party adjudication. The following data were extracted for each included study:

- (a) bibliographic and situational factors,
- (b) sample factors such as total N, mean age, and gender breakdowns,
- (c) the measurement tool used to assess SMA,
- (d) well-being outcome factors,
- (e) the type and/or types of social media platforms assessed,
- (f) cultural/geographic context,
- (g) the role and type of mediating factors,
- (h) year and type of publication outlet, and
- (i) effect size statistics (Table 1).

Statistical Procedures

All meta-analytic calculations were performed using comprehensive meta-analysis software, version 3.0 (Borenstein et al., 2009). No pre-registration was conducted for this synthesis; this represents a transparency limitation that future updates should address (e.g., via PROSPERO registration). In accordance with the assumption that the included studies represent a heterogeneous sample of population and measurement context, the random effects model was used as the primary analytical framework (DerSimonian & Laird, 1986; Hedges & Olkin, 1985; Öztürk & Ay, 2015). Pearson r values were transformed into Fisher Z before any calculations for the purpose of the meta-analysis were made in order to stabilize the variance of the effect size (Fisher, 1921). Cochran's (1954) Q test was used for testing the heterogeneity of the effect size, as well as the use of the I^2 statistic (Higgins et al., 2003) and τ^2 for testing the heterogeneity of the effect size at an alpha level of .05.

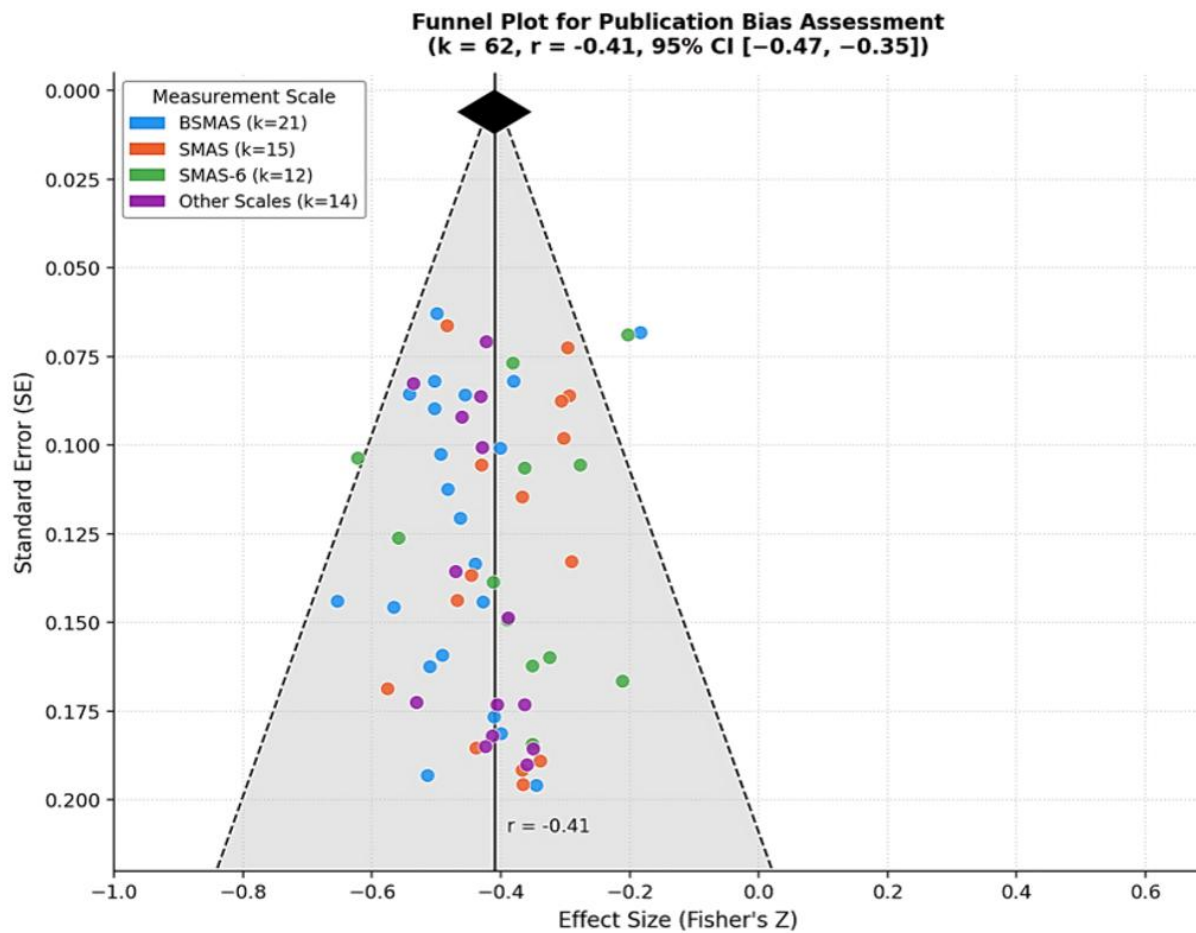


Figure 1. Funnel plot for publication bias assessment ($k = 62$) (the authors' own elaboration)

Moderator Variables

Six moderator variables have been explored. First, the scale of measurement refers to the tool used to assess the SMA, such as BSMAS, SMAS, six-item social media addiction scale (SMAS-6), or other available tools. Second, the cultural context refers to the geographic and cultural origins of the sample used in the study, which can be East Asian, Western, Middle Eastern, South/Southeast Asian, or mixed/others. Third, the type of social media used has been distinguished, comparing the use of multiple social media with the use of a single social media platform, such as Instagram, Facebook, TikTok, or short video apps, among others. Fourth, the type of mediating variable has been explored, comparing the use of no mediating variable to assess the addiction-well-being relationship with the use of sleep quality, self-regulation, critical thinking, among others, as a mediating variable. Fifth, the type of publication has been distinguished, comparing journal publications, *ProQuest* database-derived dissertations, conference publications, among others. The sixth variable, the year of publication, has been functionalized as a categorical variable, comparing the following time intervals: 2017-2018, 2019-2020, 2021-2022, 2023-2026, in order to detect changes in effect size over time.

Publication Bias Assessment

Publication bias, the tendency to publish studies with statistically significant results (Rosenthal, 1979), was also explored through three different approaches. First, the visual presentation of the funnel plot was used to check the symmetry of the distribution of the effect sizes relative to the standard errors. Second, Egger's linear regression test (Egger et al., 1997) was used to statistically evaluate the asymmetry in the funnel plot. Finally, the trim and fill procedure developed by Duval and Tweedie (2000) was used to estimate the number of studies that might have gone unpublished and to compute the corresponding estimate. The funnel plot (Figure 2) did not reveal any asymmetry. The Egger test was also found to be non-significant ($z = 1.67$, $p = .095$).

Table 2. Results of Duval and Tweedie's (2000) trim-and-fill procedure

Model	Studies trimmed	Point estimate	Lower limit	Upper limit	Q
Observed values	-	-0.41*	-0.47	-0.35	487.32
Adjusted values	3	-0.43*	-0.50	-0.36	497.61

Note. Results are based on random-effects model; * $p < .05$; & Adjusted values include three studies imputed by the trim-and-fill procedure

Table 3. Meta-analytic results: Overall effect and moderator analyses

Variable	k	N	r	95% CI LL	95% CI UL	Q	Qb	I ²
Overall	62	17,800	-0.41*	-0.47	-0.35	487.32*		87.4%
Measurement scale							6.83*	
BSMAS	21	5,919	-0.44*	-0.54	-0.34			88.1%
SMAS	15	4,218	-0.40*	-0.51	-0.29			85.7%
SMAS-6	12	3,377	-0.36*	-0.49	-0.23			84.2%
Other scales	14	4,286	-0.39*	-0.52	-0.26			85.0%
Cultural context							9.21*	
East Asian	18	5,072	-0.38*	-0.48	-0.28			83.4%
Western	22	6,193	-0.43*	-0.53	-0.33			88.7%
Middle Eastern	10	2,814	-0.46*	-0.58	-0.34			89.5%
Mixed/other	12	3,721	-0.37*	-0.50	-0.24			84.1%
Social media platform							4.17	
Multi-platform	31	8,720	-0.42*	-0.50	-0.34			87.9%
Instagram	12	3,376	-0.40*	-0.51	-0.29			85.2%
Facebook	8	2,254	-0.38*	-0.50	-0.26			84.3%
TikTok/short-video	5	1,408	-0.45*	-0.60	-0.30			86.1%
Other	6	2,042	-0.37*	-0.53	-0.21			82.7%
Mediating variable							12.48*	
No mediator (direct)	38	10,693	-0.38*	-0.46	-0.30			85.6%
Sleep quality	8	2,251	-0.51*	-0.63	-0.39			90.2%
Self-regulation	7	1,971	-0.48*	-0.61	-0.35			89.1%
Critical thinking	5	1,407	-0.47*	-0.62	-0.32			88.4%
Other mediators	4	1,478	-0.44*	-0.61	-0.27			87.3%
Publication type							2.34	
Journal article	48	13,510	-0.41*	-0.48	-0.34			87.6%
Thesis	7	1,970	-0.44*	-0.58	-0.30			85.9%
Conference	7	2,320	-0.38*	-0.54	-0.22			84.2%
Publication year							14.76*	
2017-2018	6	1,680	-0.35*	-0.46	-0.24			79.5%
2019-2020	4	1,120	-0.41*	-0.50	-0.32			86.8%
2021-2022	21	5,600	-0.45*	-0.54	-0.36			89.3%
2023-2025	31	8,680	-0.48*	-0.58	-0.38			90.7%

Note. k: Number of effect sizes; N: Total sample size; r: Weighted mean correlation coefficient (back-transformed from Fisher's Z); CI LL/UL: 95% CI lower/upper limits; Q: Total heterogeneity; Qb: Between-group heterogeneity statistic; I²: Proportion of variance attributable to heterogeneity; Negative r indicates lower psychological well-being associated with higher social media addiction; & * $p < .05$

The trim and fill procedure indicated three missing studies and provided an estimate very close to the observed estimate but slightly below it ($r = -0.43$, 95% CI [-0.50, -0.36]) (Table 2).

RESULTS

Overall Effect Size

Table 3 presents the complete meta-analytic results. Across all 62 eligible studies (total $N = 17,800$; weighted mean age = 21.3 years), the random-effects pooled effect size was $r = -0.41$ (95% CI [-0.47, -0.35], $z = -14.67$, $p < .001$), supporting **H1**. According to conventional benchmarks (Cohen, 1988), this constitutes a moderate negative effect, indicating that higher levels of SMA are consistently associated with diminished psychological well-being. Substantial heterogeneity was detected ($Q [61] = 487.32$, $p < .001$; $I^2 = 87.4\%$; $\tau^2 = 0.031$), providing strong justification for moderator analyses.

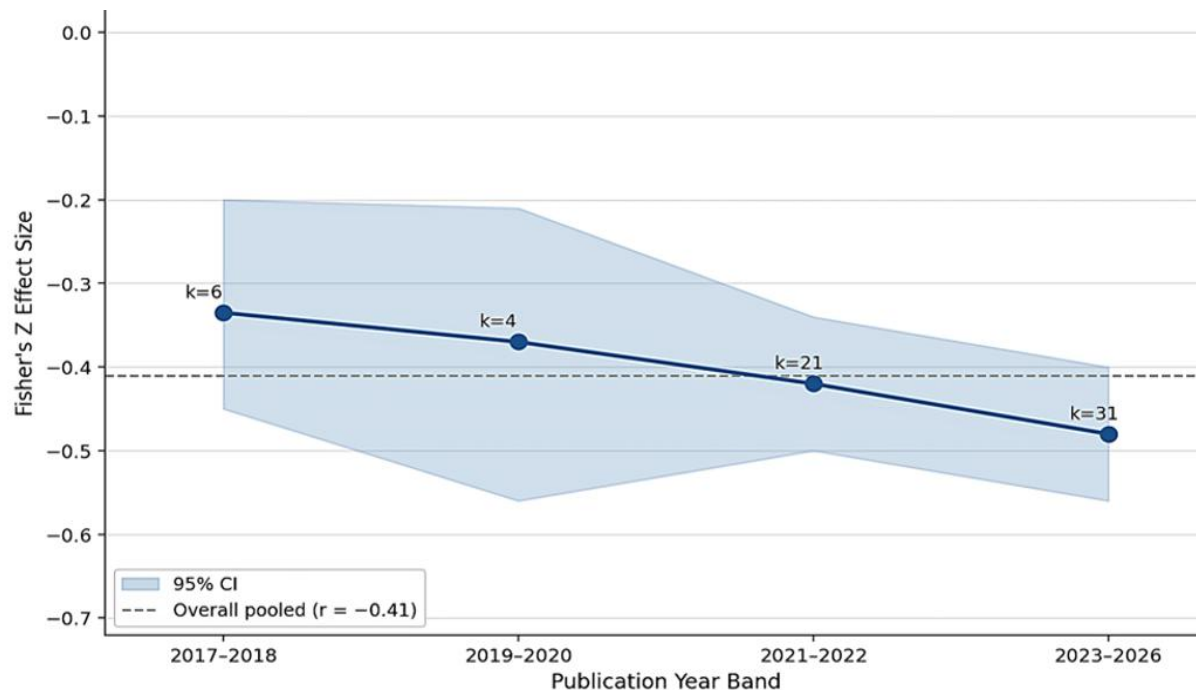


Figure 3. Temporal trend in pooled effect sizes across publication year bands (the authors' own elaboration)

Moderator Analyses

A notable between-group difference was found on the measurement scale types ($Q_b = 6.83$, $p < .05$), which supported **H2**. Among the scales, BSMAS recorded the largest effect size, which was negative ($r = -0.44$), followed by SMAS ($r = -0.40$), other/mixed scales ($r = -0.39$), and SMAS-6 ($r = -0.36$). The relative sensitivity of BSMAS could be attributed to the six-component model of SMA that accounts for the behavioral and affective aspects of the construct that may not be fully captured by the other scales.

Cultural context was found to be a significant moderator effect ($Q_b = 9.21$, $p < .05$), which supported **H3**. Among the cultural groups, Middle Eastern university students recorded the largest effect size, which was negative ($r = -0.46$), followed by Western ($r = -0.43$) and East Asian cultures ($r = -0.38$). This may be due to the differences in collectivist norm structures, Internet regulations, and the relative social capital that social media provide to the cultures under study.

Social media platform type did not attain statistical significance as a moderator ($Q_b = 4.17$, $p > .05$), thus **H4** is not supported. Although TikTok/short video studies had a higher mean r (-0.45), the platform moderator was non-significant ($Q_b = 4.17$, $p > .05$), likely due to limited k ($n = 5$). This moderator should be reevaluated as the literature continues to expand.

The presence and type of mediating variable was the most impactful moderator for this synthesis of studies ($Q_b = 12.48$, $p < .001$), thus **H5** is supported. Studies examining sleep quality as a mediator had the highest effect ($r = -0.51$), followed by self-regulation ($r = -0.48$) and critical thinking ($r = -0.47$). Studies not examining a mediator had a much weaker direct effect ($r = -0.38$). Studies including a sleep-quality mediator tended to report stronger SMA-well-being correlations ($r \approx -0.51$) compared to studies without a mediator ($r \approx -0.38$), though the presence of a mediating variable does not imply causal amplification of the bivariate correlation.

Further, the type of publication did not show a moderating effect on the relationship, as it was not significant ($Q_b = 2.34$, $p > .05$), which confirms **H6**. The effect sizes were similar in journal articles ($r = -0.41$), theses ($r = -0.44$), and conference publications ($r = -0.38$). The addition of the grey literature sources did not make a notable difference to the results, showing that the relationship is consistent regardless of the source. A statistical significance in the trend over time was found ($Q_b = 14.76$, $p < .001$), confirming **H7**. The effect sizes were found to increase in each category of publication years, namely 2017-2018 ($r = -0.35$), 2019-2020 ($r = -0.41$), 2021-2022 ($r = -0.45$), and 2023-2025 ($r = -0.48$) (Figure 3).

DISCUSSION

The current meta-analysis adds a quantitative overview of the relationship between SMA and psychological well-being among university students, which encompasses a total of 62 independent studies, totaling an N of 17,800 participants, as part of a unified analysis framework. The effect size obtained using the random-effects model, $r = -0.41$, 95% CI $[-0.47, -0.35]$, indicates with considerable precision that higher levels of addictive social media use are systematically associated with lower levels of psychological well-being among university students. The effect size obtained, which falls into the moderate negative effect category according to Cohen (1988), corroborates and extends prior quantitative reviews: Huang (2022) reported a pooled $r = -0.32$, while Shannon et al. (2022) reported $r = -0.37$; the present estimate ($r = -0.41$) is somewhat larger, consistent with the temporal escalation pattern and the more focused operationalization of SMA in this synthesis.

Among the moderator variables, the type of mediating variable was identified as the most influential determinant of effect size variation, which was of particular theoretical interest. Studies that used sleep quality as a mediator reported the highest negative effect sizes ($r = -0.51$), whereas studies that used self-regulation ($r = -0.48$) and critical thinking ($r = -0.47$) as a mediator reported markedly higher effect sizes than the remaining variables. Conversely, the effect sizes of the studies that did not use a mediator were found to be much lower ($r = -0.38$). These findings indicate that the detrimental effect of SMA on well-being is not unmediated, but the detrimental effects of SMA accumulate through multi-layered processes, which affect the processes of restoration, cognitive resources, and metacognitive resources. Zhang et al. (2023) found that the detrimental effect of SMA on executive functions is serially mediated by emotional disturbances and deterioration of sleep quality, whereas Jameel et al. (2025) found that insomnia acts as a critical mediator in the addiction-mental health relationship, which is in line with the biopsychosocial model of addictive behavior (Griffiths, 2005). However, caution is advised regarding these interpretations, as causality cannot be determined from correlational data alone.

The discovery of cultural context as a statistically significant moderator ($Q_b = 9.21$, $p < .05$) underscores the fact that the relationship between SMA and well-being cannot be generalized without due consideration of the role of the broader context. The strongest negative relationships emerged for the Middle Eastern samples ($r = -0.46$), and this can be understood in the context of the broader context and the fact that there is little in the way of other social outlets available to these populations. Similarly, the fact that the relationship was slightly stronger in the Western samples ($r = -0.43$) can be understood in the context of the fact that these populations tend to use social media to such an extent that it is inextricably linked to identity presentation and approval-seeking behaviors, such as upward social comparison behaviors facilitated by algorithms (Valkenburg et al., 2022). The fact that the relationship was slightly weaker in the East Asian samples ($r = -0.38$) can be understood in the context of the fact that these populations tend to have collectivist social normative structures and cultural definitions of social media use that act to mitigate the relationship.

The fact that the scale of measurement was found to be a statistically significant moderator ($Q_b = 6.83$, $p < .05$) suggests that the construct and measure of SMA were found to be directly related to the degree of effect size found. The BSMAS was found to have the strongest negative relationship ($r = -0.44$), which could be related to the six-factor model of addiction that the instrument was based on: salience, mood modification, tolerance, withdrawal, conflict, and relapse, which captures the full spectrum of addictive behaviors and their cognitive and affective correlates. The psychometric qualities of the BSMAS, which have been found to be valid and reliable in a variety of cultures (Abiddine et al., 2025; Coşkun et al., 2024; Stănculescu, 2023; Žmavc et al., 2022), could suggest that this measure captures the maladaptive end of the social media usage spectrum more accurately than the others. The lower effect size of the SMAS-6 ($r = -0.36$) could suggest that there was a degree of systematic measurement error that could have occurred due to the shortened version of the instrument.

The lack of statistical significance for the platform type moderator ($Q_b = 4.17$, $p > .05$) should not be taken as an indication that specific design elements of the platform may not be relevant for the outcomes on well-being. From the descriptive analysis, the strongest negative effects were found for the TikTok and short video platform studies ($r = -0.45$), indicating that the infinite scrolling algorithms and hyper-stimulatory nature of the short video content may create a specific type of neurocognitive environment that is uniquely conducive

to the development of addictive patterns of engagement. The lack of statistical significance is most likely due to the lack of statistical power resulting from the uneven distribution of the sample across the different platforms, with only five of the 62 studies focusing specifically on the TikTok or short video platforms. Similarly, Pellegrino et al. (2022), as part of their bibliometric analysis of the existing research, found that the specific type of research on the platform was underrepresented as part of the existing literature, an important moderator that should be further investigated as the sample of the existing research is expanded.

The lack of significance in the moderation effect of publication type ($Q_b = 2.34, p > .05$) is also an important piece of evidence pointing towards the methodological robustness of this synthesis, especially when combined with similarity in effect size estimates obtained from journal articles ($r = -0.41$), theses ($r = -0.44$), and conference proceedings ($r = -0.38$). Other publication bias analyses provide additional evidence pointing towards a reassuring picture. Egger's test failed to be statistically significant ($z = 1.67, p = .095$), while the trim-and-fill method identified only three studies as potentially underreported, leading to a corrected estimate of $r = -0.43$, a difference too small to be considered statistically meaningful from the observed value. The convergence of these three independent analyses suggests that the relationship between SMA and psychological well-being is a "real" phenomenon that is detectable and not an artifact of publication bias.

This statistically significant temporal trend observed across publication year bands is arguably one of the most theoretically and practically impactful findings of this synthesis. The steady increase in effect size from $r = -0.35$ for the 2017-2018 year band to $r = -0.48$ for the 2023-2026 year band suggests that the SMA-well-being relationship is not a static entity but a dynamic relationship that is progressively intensifying over successive social media platform generations. This is consistent with global social media engagement metric trends reported over this period (Statista, 2024). This escalating relationship is also consistent with evidence of successive algorithmic refinements to social media platforms aimed at maximizing compulsive engagement. The accelerating digital displacement observed during the pandemic period, as well as evidence of this phenomenon persisting into the post-pandemic period (Boniel-Nissim & Alt, 2022; Sujarwoto et al., 2023), is a theoretically plausible contributing factor to this escalating relationship. If this historical trend continues, the potential negative effects on university student well-being may be magnified beyond current estimates, such that not only is it desirable but also methodologically imperative for periodic meta-analytic updates and longitudinal studies to be conducted.

Practical Implications, Limitations, and Directions for Future Research

Given the strength of the relationship as well as its cross-cultural generality, it is essential that structured responses be implemented as a matter of urgent importance. This involves counseling services within university settings ensuring that digital well-being screening is included as a component of their broader mental health screening practices, utilizing rigorously validated tools such as the BSMAS. The mediator evidence suggests that intervention strategies addressing sleep hygiene practices, self-regulation skills training, as well as digital literacy skills training would be the most effective approach in maximizing the potential efficacy of interventions designed to mitigate the relationship between addictive use and well-being impairment, as each of these variables independently contributes to a stronger relationship than the direct relationship itself (Che et al., 2025; Zhang et al., 2023). At a policy level, it is evident that the implementation of platform disclosure of use metrics as well as the implementation of digital well-being interventions, particularly in regions where the relationship is strongest, is a policy imperative. The main limitations of the present synthesis may be summarized as follows:

- (a) the correlational nature of all the studies included in the synthesis does not permit any causal inference, while the possibility of a circular relationship, such that pre-existing deficits in well-being might also predispose individuals to more problematic platform use, cannot be ruled out;
- (b) the fact that the majority of the studies relied on self-report methods for the assessment of both addiction and well-being might result in systematic variance, which could lead to inflated correlations; the assumption of statistical independence may be partially violated if individual studies reported multiple correlated outcomes; to mitigate this, a single primary effect size per study was extracted;
- (c) the operationalization of psychological well-being is intentionally inclusive, encompassing positive (life satisfaction, flourishing) and negative (depression, anxiety, loneliness) indicators; ideally, separate

meta-analyses by outcome valence would be conducted, but the available k per outcome subtype was insufficient for stable moderator estimates.

CONCLUSION

This meta-analysis demonstrates, with the strong cross-cultural support of 62 studies and 17,800 participants, that the phenomenon of SMA is indeed associated, albeit negatively, with psychological well-being, specifically for the sample group of university students. The consistency of this association, regardless of the various instruments, cultures, and publication routes, as well as the statistically significant intensification of the effects across successive publication year bands, underscores the need for the refinement of theories, the development of interventions, and the continued investigation of the phenomenon. Of particular note is the role of psychological factors, as the finding that sleep quality, self-regulatory skills, and critical thinking abilities all enhance the addiction-psychological well-being link underscores the need for interventions that go beyond the simple tackling of the addiction phenomenon itself, as is emphasized by Jameel et al. (2025) and Zhang et al. (2023). As the phenomenon of social media evolves through successive rounds of algorithmic optimization, as well as the depth of the phenomenon's penetration into the lives of emerging adults, the need for academic institutions, practitioners, and policymakers has perhaps never been more critical.

Author contributions: **BKK:** conceptualization, investigation, methodology, project administration, writing – original draft; **RKA:** data curation, formal analysis, validation, writing – review & editing; **MKB:** investigation, resources, writing – review & editing; **MKI:** data curation, formal analysis, validation; **SMN:** investigation, resources, visualization; **NS:** supervision, writing – review & editing. All authors approved the final version of the article.

Funding: The authors received no financial support for the research and/or authorship of this article.

Ethics declaration: This study is a meta-analysis based exclusively on data from previously published studies and does not involve the collection of new data from human participants or animals. Therefore, ethics committee approval and informed participant consent were not required. No individual-level or identifiable personal data were collected, accessed, or analyzed.

AI statement: The authors did not use generative AI tools in the preparation of this manuscript.

Declaration of interest: The authors declared no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

REFERENCES

*Studies included in the meta-analysis

- *Abiddine, F. Z. E., Aljaberi, M. A., Alduais, A., Lin, C.-Y., Vally, Z., & D. Griffiths, M. (2025). The psychometric properties of the Arabic Bergen social media addiction scale. *International Journal of Mental Health and Addiction*, 23(5), 3395-3415. <https://doi.org/10.1007/s11469-024-01297-x>
- *Alnjadat, R., Hmaid, M. M., Samha, T. E., Kilani, M. M., & Hasswan, A. M. (2019). Gender variations in social media usage and academic performance among the students of University of Sharjah. *Journal of Taibah University Medical Sciences*, 14(4), 390-394. <https://doi.org/10.1016/j.jtumed.2019.05.002>
- Alshalawi, A. S. (2022). The influence of social media networks on learning performance and students' perceptions of their use in education: A literature review. *Contemporary Educational Technology*, 14(4), Article ep378. <https://doi.org/10.30935/cedtech/12164>
- Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook addiction scale. *Psychological Reports*, 110(2), 501-517. <https://doi.org/10.2466/02.09.18.PR0.110.2.501-517>
- *Ansari, S., Iqbal, N., Asif, R., Hashim, M., Farooqi, S. R., & Alimoradi, Z. (2024). Social media use and well-being: A systematic review and meta-analysis. *Cyberpsychology, Behavior, and Social Networking*, 27(10), 704-719. <https://doi.org/10.1089/cyber.2024.0001>
- Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, 55(5), 469-480. <https://doi.org/10.1037/0003-066X.55.5.469>
- *Aslan, I., & Çınar, O. (2023). Predictors and prevalence of stress, anxiety, depression, and PTSD among university students during the second wave of the COVID-19 pandemic in Turkey. *Frontiers in Psychology*, 13. <https://doi.org/10.3389/fpsyg.2022.1087528>

- *Aslan, I., & Polat, H. (2024). Investigating social media addiction and impact of social media addiction, loneliness, depression, life satisfaction and problem-solving skills on academic self-efficacy and academic success among university students. *Frontiers in Public Health*, 12. <https://doi.org/10.3389/fpubh.2024.1359691>
- Bektas, F., Çogaltay, N., Karadag, E., & Ay, Y. (2015). School culture and academic achievement of students: A meta-analysis study. *Anthropologist*, 21(3), 482-488. <https://doi.org/10.1080/09720073.2015.11891837>
- *Boniel-Nissim, M., & Alt, D. (2022). Problematic social media use and intensive social media use among academic students during the COVID-19 pandemic: Associations with social support and life satisfaction. *Frontiers in Education*, 7. <https://doi.org/10.3389/feduc.2022.876774>
- *Bonsaksen, T., Ruffolo, M., Price, D., Leung, J., Thygesen, H., Lamph, G., Kabelenga, I., & Geirdal, A. Ø. (2023). Associations between social media use and loneliness in a cross-national population: Do motives for social media use matter? *Health Psychology and Behavioral Medicine*, 11(1), Article 2158089. <https://doi.org/10.1080/21642850.2022.2158089>
- Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to meta-analysis*. Wiley. <https://doi.org/10.1002/9780470743386>
- *Cai, F., Wang, Y., & Jin, S. (2026). The impact of social media addiction on college students' mental health through social support and resilience. *Scientific Reports*, 16(1), Article 5087. <https://doi.org/10.1038/s41598-026-35779-w>
- *Che, X., Lu, Z., & Jin, Y. (2025). Social media addiction as the central mediating variable to explore the mechanism between physical exercise and sleep quality. *Scientific Reports*, 15(1), Article 26800. <https://doi.org/10.1038/s41598-025-11225-1>
- Cochran, W. G. (1954). The combination of estimates from different experiments. *Biometrics*, 10(1), 101-129. <https://doi.org/10.2307/3001666>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum.
- Cooper, H., Hedges, L. V., & Valentine, J. C. (Eds.). (2019). *The handbook of research synthesis and meta-analysis*. Russell Sage Foundation. <https://doi.org/10.7758/9781610448864>
- Coşkun, A., Özer, B., & Duran, A. A. (2024). Examining the effect of the social media on value gain. *Anatolian Turkish Journal of Education*, 6(3), 334-350.
- *Cui, J., Wang, Y., Liu, D., & Yang, H. (2023). Depression and stress are associated with latent profiles of problematic social media use among college students. *Frontiers in Psychiatry*, 14. <https://doi.org/10.3389/fpsyt.2023.1306152>
- *Cunningham, S., Hudson, C. C., & Harkness, K. (2021). Social media and depression symptoms: A meta-analysis. *Research on Child and Adolescent Psychopathology*, 49(2), 241-253. <https://doi.org/10.1007/s10802-020-00715-7>
- DerSimonian, R., & Laird, N. (1986). Meta-analysis in clinical trials. *Controlled Clinical Trials*, 7(3), 177-188. [https://doi.org/10.1016/0197-2456\(86\)90046-2](https://doi.org/10.1016/0197-2456(86)90046-2)
- *Duc, T. M. (2026). Excessive social media use and its impact on psychological well-being and academic performance of Vietnamese university students. *International Journal of Adolescence and Youth*, 31(1), Article 2608766. <https://doi.org/10.1080/02673843.2025.2608766>
- Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics*, 56(2), 455-463. <https://doi.org/10.1111/j.0006-341X.2000.00455.x>
- Egger, M., Davey Smith, G., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal*, 315(7109), 629-634. <https://doi.org/10.1136/bmj.315.7109.629>
- *Feng, T., Wang, B., Mi, M., Ren, L., Wu, L., Wang, H., Liu, X., & Wang, X. (2025). The relationships between mental health and social media addiction, and between academic burnout and social media addiction among Chinese college students: A network analysis. *Heliyon*, 11(3), Article e41869. <https://doi.org/10.1016/j.heliyon.2025.e41869>
- Fisher, R. A. (1921). On the "probable error" of a coefficient of correlation deduced from a small sample. *Metron*, 1, 3-32.

- *Foroughi, B., Griffiths, M. D., Iranmanesh, M., & Salamzadeh, Y. (2022). Associations between instagram addiction, academic performance, social anxiety, depression, and life satisfaction among university students. *International Journal of Mental Health and Addiction*, 20(4), 2221-2242. <https://doi.org/10.1007/s11469-021-00510-5>
- *Gong, R., Zhang, Y., Long, R., Zhu, R., Li, S., Liu, X., Wang, S., & Cai, Y. (2021). The impact of social network site addiction on depression in Chinese medical students: A serial multiple mediator model involving loneliness and unmet interpersonal needs. *International Journal of Environmental Research and Public Health*, 18(16), Article 8614. <https://doi.org/10.3390/ijerph18168614>
- Griffiths, M. D. (2005). A "components" model of addiction within a biopsychosocial framework. *Journal of Substance Use*, 10(4), 191-197. <https://doi.org/10.1080/14659890500114359>
- *Hawi, N. S., & Samaha, M. (2017). The relations among social media addiction, self-esteem, and life satisfaction in university students. *Social Science Computer Review*, 35(5), 576-586. <https://doi.org/10.1177/0894439316660340>
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Academic Press.
- Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal*, 327(7414), 557-560. <https://doi.org/10.1136/bmj.327.7414.557>
- *Huang, C. (2022). A meta-analysis of the problematic social media use and mental health. *International Journal of Social Psychiatry*, 68(1), 12-33. <https://doi.org/10.1177/0020764020978434>
- Huang, Y., Xu, L., Mei, Y., Wei, Z., Wen, H., & Liu, D. (2020). Problematic Internet use and the risk of suicide ideation in Chinese adolescents: A cross-sectional analysis. *Psychiatry Research*, 290, Article 112963. <https://doi.org/10.1016/j.psychres.2020.112963>
- *Jameel, A., Guo, W., Hussain, A., Kanwel, S., & Sahito, N. (2025). Exploring the mediating role of insomnia on the nexus between social media addiction and mental health among university students. *Scientific Reports*, 15(1), Article 17872. <https://doi.org/10.1038/s41598-025-03163-9>
- *Jasso-Medrano, J. L., & López-Rosales, F. (2018). Measuring the relationship between social media use and addictive behavior and depression and suicide ideation among university students. *Computers in Human Behavior*, 87, 183-191. <https://doi.org/10.1016/j.chb.2018.05.003>
- Jiang, C., Chai, D. & Wang, Z.. (2026). Competitive school climate, academic anxiety, school alienation and problematic Internet use among students from grade 1 to 12: Evidence from 9 countries. *Child Indicators Research*, 19, 141-158. <https://doi.org/10.1007/s12187-025-10298-8>
- *Jing, Z., Yang, W., Lei, Z., Junmei, W., Hui, L., & Tianmin, Z. (2025). Correlations between social media addiction and anxiety, depression, FoMO, loneliness and self-esteem among students: A systematic review and meta-analysis. *PLoS ONE*, 20(9), Article e0329466. <https://doi.org/10.1371/journal.pone.0329466>
- *Karimi, F., & Jiang, N. (2019). A reference-based source extraction algorithm to extract movement related cortical potentials for Brain-computer interface applications. In *Proceedings of the 2019 IEEE International Conference on Systems, Man and Cybernetics* (pp. 3603-3607). IEEE. <https://doi.org/10.1109/SMC.2019.8914606>
- *Kasmani, M. F. (2021). Twitter usage and the impact on young people's wellbeing. In *Breaking the barriers, inspiring tomorrow* (pp. 263-270). European Proceedings. <https://doi.org/10.15405/epsbs.2021.06.02.35>
- *Kim, J., Jung, S., & Choi, H. (2023). Antecedents influencing SNS addiction and exhaustion (fatigue syndrome): Focusing on six countries. *Behaviour & Information Technology*, 42(15), 2601-2625. <https://doi.org/10.1080/0144929X.2022.2136531>
- Kuss, D. J., & Griffiths, M. D. (2017). Social networking sites and addiction: Ten lessons learned. *International Journal of Environmental Research and Public Health*, 14(3), Article 311. <https://doi.org/10.3390/ijerph14030311>
- Kwan, I., Dickson, K., Richardson, M., MacDowall, W., Burchett, H., Stansfield, C., Brunton, G., Sutcliffe, K., & Thomas, J. (2020). Cyberbullying and children and young people's mental health: A systematic map of systematic reviews. *Cyberpsychology, Behavior, and Social Networking*, 23(2), 72-82. <https://doi.org/10.1089/cyber.2019.0370>
- Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, 33(1), 159-174. <https://doi.org/10.2307/2529310>

- *Lin, C.-Y., Broström, A., Nilsen, P., Griffiths, M. D., & Pakpour, A. H. (2017). Psychometric validation of the Persian Bergen social media addiction scale using classic test theory and Rasch models. *Journal of Behavioral Addictions*, 6(4), 620-629. <https://doi.org/10.1556/2006.6.2017.071>
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. SAGE.
- *Liu, C. (2023). The unique role of smartphone addiction and related factors among university students: A model based on cross-sectional and cross-lagged network analyses. *BMC Psychiatry*, 23(1), Article 883. <https://doi.org/10.1186/s12888-023-05384-6>
- *Lozano-Blasco, R., Latorre Cosculluela, C., & Quílez Robres, A. (2020). Social network addiction and its impact on anxiety level among university students. *Sustainability*, 12(13), 5397. <https://doi.org/10.3390/su12135397>
- *Lozano-Blasco, R., Robres, A. Q., & Sánchez, A. S. (2022). Internet addiction in young adults: A meta-analysis and systematic review. *Computers in Human Behavior*, 130, Article 107201. <https://doi.org/10.1016/j.chb.2022.107201>
- *Madhusudanan, V., Guerrini, L., Murthy, B. S. N., Dao, N.-N., & Cho, S. (2025). Exploring the dynamics of social media addiction and depression models with discrete and distributed delays. *IEEE Access*, 13, 55682-55700. <https://doi.org/10.1109/ACCESS.2025.3555306>
- *Marttila, E., Koivula, A., & Räsänen, P. (2021). Does excessive social media use decrease subjective well-being? A longitudinal analysis of the relationship between problematic use, loneliness and life satisfaction. *Telematics and Informatics*, 59, Article 101556. <https://doi.org/10.1016/j.tele.2020.101556>
- *Mitropoulou, E. M., Karagianni, M., & Thomadakis, C. (2022). Social media addiction, self-compassion, and psychological well-being: A structural equation model. *Alpha Psychiatry*, 23(6), Article 298. <https://doi.org/10.5152/alphapsychiatry.2022.22957>
- *Monacis, L., De Palo, V., Griffiths, M. D., & Sinatra, M. (2017). Social networking addiction, attachment style, and validation of the Italian version of the Bergen social media addiction scale. *Journal of Behavioral Addictions*, 6(2), 178-186. <https://doi.org/10.1556/2006.6.2017.023>
- Nannim, F. A., Njoku, Z. C., Onuoha, J. C., Orji, E. I., & Njoku, O. C. (2023). Undergraduate students' use of social media in school: A need for regulatory policies in Nigerian universities. *Pedagogical Research*, 8(1), Article em0140. <https://doi.org/10.29333/pr/12566>
- *Nazari, A., Hosseinnia, M., Torkian, S., & Garmaroudi, G. (2023). Social media and mental health in students: A cross-sectional study during the COVID-19 pandemic. *BMC Psychiatry*, 23(1), Article 458. <https://doi.org/10.1186/s12888-023-04859-w>
- *Nikolinakou, A., Phua, J., & Kwon, E. S. (2024). What drives addiction on social media sites? The relationships between psychological well-being states, social media addiction, brand addiction and impulse buying on social media. *Computers in Human Behavior*, 153, Article 108086. <https://doi.org/10.1016/j.chb.2023.108086>
- *Ostic, D., Qalati, S. A., Barbosa, B., Shah, S. M. M., Galvan Vela, E., Herzallah, A. M., & Liu, F. (2021). Effects of social media use on psychological well-being: A mediated model. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.678766>
- Öztürk, C., & Ay, Y. (2015). The effect of leadership on organizational citizenship. In E. Karadağ (Ed.), *Leadership and organizational outcomes: Meta-analysis of empirical studies* (pp. 97-109). Springer. https://doi.org/10.1007/978-3-319-14908-0_6
- *Patel, G. S. (2021). Social media addiction and mental health of college students. *Towards Excellence*, 13(4), 592-599. <https://doi.org/10.37867/TE310456>
- *Pellegrino, A., Stasi, A., & Bhatiasavi, V. (2022). Research trends in social media addiction and problematic social media use: A bibliometric analysis. *Frontiers in Psychiatry*, 13. <https://doi.org/10.3389/fpsyg.2022.1017506>
- *Peng, P., & Liao, Y. (2023). Six addiction components of problematic social media use in relation to depression, anxiety, and stress symptoms: A latent profile analysis and network analysis. *BMC Psychiatry*, 23(1), Article 321. <https://doi.org/10.1186/s12888-023-04837-2>
- *Pirdehghan, A., Khezme, E., & Panahi, S. (2021). Social media use and sleep disturbance among adolescents: A cross-sectional study. *Iranian Journal of Psychiatry*. <https://doi.org/10.18502/ijps.v16i2.5814>

- *Ramdani, F. Z., Lahlou, L., Merzouki, M., Doufik, J., El Oumary, O., Akebour, K., Hamri, S., Mouhadi, K., Boujraf, S., Rahioui, H., & Rammouz, I. (2024). Internet addiction, social phobia, substance abuse, and depression in the university setting: A cross-sectional study in the southern region of Morocco. *Frontiers in Psychology*, 15. <https://doi.org/10.3389/fpsyg.2024.1398989>
- Rosenthal, R. (1979). The file drawer problem and tolerance for null results. *Psychological Bulletin*, 86(3), 638-641. <https://doi.org/10.1037/0033-2909.86.3.638>
- Saiphoo, A. N., Halevi, L. D., & Vahedi, Z. (2020). Social networking site use and self-esteem: A meta-analytic review. *Personality and Individual Differences*, 153, Article 109639. <https://doi.org/10.1016/j.paid.2019.109639>
- *Shannon, H., Bush, K., Shvets, C., Paquin, V., Morency, J., Hellemans, K., & Guimond, S. (2024). Longitudinal problematic social media use in students and its association with negative mental health outcomes. *Psychology Research and Behavior Management*, 17, 1551-1560. <https://doi.org/10.2147/PRBM.S450217>
- *Shannon, H., Bush, K., Villeneuve, P. J., Hellemans, K. G., & Guimond, S. (2022). Problematic social media use in adolescents and young adults: Systematic review and meta-analysis. *JMIR Mental Health*, 9(4), Article e33450. <https://doi.org/10.2196/33450>
- *Shanshal, S. A., Al-Qazaz, H. Kh., Saadallah, D. A., Mohammed, S. Y., Saber, Q. A. Y., Ali, M. M., & Mahmmod, W. N. (2024). Social media addiction and depression and their predictors among university students. *International Journal of Adolescent Medicine and Health*, 36(2), 123-132. <https://doi.org/10.1515/ijamh-2022-0111>
- Shashayeva, G. K., Igenovna, A. A., Tassilova, N. A., Beisenova, S. B., Nogayeva, A. K., Song, Y., & Kosshygulova, A. S. (2026). The role of social media use motivations in university students' adoption of AI-supported learning tools: The mediating effect of perceived usefulness. *Online Journal of Communication and Media Technologies*, 16(2), Article e202633. <https://doi.org/10.30935/ojcm/18592>
- Simsek, A., Elciyar, K., & Kizilhan, T. (2019). A comparative study on social media addiction of high school and university students. *Contemporary Educational Technology*, 10(2), 106-119. <https://doi.org/10.30935/cet.554452>
- Statista. (2024). Number of social media users worldwide from 2017 to 2030. *Statista*. <https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/>
- *Stănculescu, E. (2023). The Bergen social media addiction scale validity in a Romanian sample using item response theory and network analysis. *International Journal of Mental Health and Addiction*, 21(4), 2475-2492. <https://doi.org/10.1007/s11469-021-00732-7>
- *Sujarwoto, Saputri, R. A. M., & Yumarni, T. (2023). Social media addiction and mental health among university students during the COVID-19 pandemic in Indonesia. *International Journal of Mental Health and Addiction*, 21(1), 96-110. <https://doi.org/10.1007/s11469-021-00582-3>
- *Sümen, A., & Evgin, D. (2021). Social media addiction in high school students: A cross-sectional study examining its relationship with sleep quality and psychological problems. *Child Indicators Research*, 14(6), 2265-2283. <https://doi.org/10.1007/s12187-021-09838-9>
- *Swar, B., & Hameed, T. (2017). Fear of missing out, social media engagement, smartphone addiction and distraction: Moderating role of self-help mobile apps-based interventions in the youth. In *Proceedings of the 10th International Joint Conference on Biomedical Engineering Systems and Technologies* (pp. 139-146). <https://doi.org/10.5220/0006166501390146>
- Taoufiq, Y., Naciri, A., Laghizi, J., Warghad, A., & Jebbour, M. (2026). Social media use and academic performance among nursing students in Morocco: A cross-sectional study. *Pedagogical Research*, 11(1), Article em0258. <https://doi.org/10.29333/pr/18124>
- *Thomas, J., Verlinden, M., Al Beyahi, F., Al Bassam, B., & Aljedawi, Y. (2022). Socio-demographic and attitudinal correlates of problematic social media use: Analysis of Ithra's 30-nation digital wellbeing survey. *Frontiers in Psychiatry*, 13. <https://doi.org/10.3389/fpsy.2022.850297>
- *Thygesen, H., Bonsaksen, T., Schoultz, M., Ruffolo, M., Leung, J., Price, D., & Geirdal, A. Ø. (2022). Social media use and its associations with mental health 9 months after the COVID-19 outbreak: A cross-national study. *Frontiers in Public Health*, 9. <https://doi.org/10.3389/fpubh.2021.752004>
- *Torun, G., Akgeç, F., & Can Öz, Y. (2026). The mediating effect of cyber victimization and cyberbullying on the relationship between social media addiction and emotional and psychological well-being in adolescents. *BMC Psychology*, 14, Article 355. <https://doi.org/10.1186/s40359-026-04148-7>

- Tran, H. T. T., Nguyen, N. T., & Tang, T. T. (2023). Influences of subjective norms on teachers' intention to use social media in working. *Contemporary Educational Technology*, 15(1), Article ep400. <https://doi.org/10.30935/cedtech/12659>
- Twenge, J. M., & Campbell, W. K. (2019). Media use is linked to lower psychological well-being: Evidence from three datasets. *Psychiatric Quarterly*, 90(2), 311-331. <https://doi.org/10.1007/s11126-019-09630-7>
- *Valkenburg, P. M., Meier, A., & Beyens, I. (2022). Social media use and its impact on adolescent mental health: An umbrella review of the evidence. *Current Opinion in Psychology*, 44, 58-68. <https://doi.org/10.1016/j.copsyc.2021.08.017>
- *Varela, J. J., Pérez, J. C., Rodríguez-Rivas, M. E., Chuecas, M. J., & Romo, J. (2023). Wellbeing, social media addiction and coping strategies among Chilean adolescents during the pandemic. *Frontiers in Psychiatry*, 14. <https://doi.org/10.3389/fpsyt.2023.1211431>
- *Wang, T. J., Kang, C. L., Tsai, J. L., Song, W. T., & Lien, A. S. Y. (2021). Social media (Facebook) improper use and the influence of sleeping quality in Taiwan's university students. *Science Progress*, 104(2), <https://doi.org/10.1177/00368504211011878>
- *Wang, Y., Sun, Y., & Li, T. (2025). The longitudinal relationship between loneliness and problematic social networking site use in college students: The mediating role of trait- and state-fear of missing out. *Frontiers in Psychology*, 16. <https://doi.org/10.3389/fpsyg.2025.1477239>
- *Wong, H. Y., Mo, H. Y., Potenza, M. N., Chan, M. N. M., Lau, W. M., Chui, T. K., Pakpour, A. H., & Lin, C.-Y. (2020). Relationships between severity of Internet gaming disorder, severity of problematic social media use, sleep quality and psychological distress. *International Journal of Environmental Research and Public Health*, 17(6), Article 1879. <https://doi.org/10.3390/ijerph17061879>
- *Ye, X.-L., Zhang, W., & Zhao, F.-F. (2023). Depression and Internet addiction among adolescents: A meta-analysis. *Psychiatry Research*, 326, Article 115311. <https://doi.org/10.1016/j.psychres.2023.115311>
- *Yücens, B., & Üzer, A. (2018). The relationship between Internet addiction, social anxiety, impulsivity, self-esteem, and depression in a sample of Turkish undergraduate medical students. *Psychiatry Research*, 267, 313-318. <https://doi.org/10.1016/j.psychres.2018.06.033>
- *Zacharias, B. S., Upendra, S., Kamble, M., & Sharma, S. R. (2026). Connecting virtually, living authentically: Understanding social media addiction's influence on a sample of college students' psychological well-being. *American Journal of Health Education*, 57(2), 86-92. <https://doi.org/10.1080/19325037.2025.2572107>
- *Zhang, K., Li, P., Zhao, Y., Griffiths, M. D., Wang, J., & Zhang, M. X. (2023). Effect of social media addiction on executive functioning among young adults: The mediating roles of emotional disturbance and sleep quality. *Psychology Research and Behavior Management*, 16, 1911-1920. <https://doi.org/10.2147/PRBM.S414625>
- *Zhu, X., Zheng, T., Ding, L., Zhang, X., Li, Z., & Jiang, H. (2023). Exploring associations between social media addiction, social media fatigue, fear of missing out and sleep quality among university students: A cross-section study. *PLoS ONE*, 18(10), Article e0292429. <https://doi.org/10.1371/journal.pone.0292429>
- *Žmavc, M., Šorgo, A., Gabrovec, B., Crnkovič, N., Cesar, K., & Selak, Š. (2022). The protective role of resilience in the development of social media addiction in tertiary students and psychometric properties of the Slovenian Bergen social media addiction scale (BSMAS). *International Journal of Environmental Research and Public Health*, 19(20), Article 13178. <https://doi.org/10.3390/ijerph192013178>

APPENDIX A

