INPLASY

Use of Information and Communication Technologies and mental health among university students: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 November 2026 and was last updated on 23 November 2026.

INTRODUCTION

Review question / Objective The general objective of this research is to analyze and synthesize the available scientific evidence regarding the relationship between the use of Information and Communication Technologies and the mental health of university students, through a systematic review and a meta-analysis of studies that provide sufficient statistical data to conduct a quantitative synthesis.

Rationale The increasing integration of Information and Communication Technologies (ICTs) into university students' academic and personal lives has made it necessary to examine their relationship with mental health. Although digital technologies offer important opportunities for learning, communication and social interaction, certain patterns of use may be associated with psychological difficulties, including depression, anxiety, stress and sleep disturbances. However, the available evidence remains diverse in terms of the technologies investigated, the definitions of problematic use, the characteristics of student populations and the instruments used to assess mental health.

Previous research has frequently focused on specific forms of technology use, such as Internet addiction, problematic smartphone use or social media addiction, making it difficult to obtain an integrated understanding of the broader relationship between ICT use and university students' mental health. Furthermore, differences in study designs and outcome measures limit the comparability of findings and highlight the need for a systematic synthesis of the available evidence.

This review therefore seeks to address these limitations by examining a broad range of digital technologies and mental health indicators in university populations. In addition to describing the methodological and thematic characteristics of the literature, the meta-analysis provides a quantitative

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examination of the associations between Internet addiction and problematic social media use and two key mental health outcomes: depression and anxiety. By combining a broad systematic review with a focused quantitative synthesis, this study aims to provide a clearer understanding of the current evidence, identify research gaps and inform future studies and initiatives promoting healthy technology use in higher education.

Condition being studied The relationship between Information and Communication Technology (ICT) use and mental health among university students. The review focuses particularly on problematic, excessive, addictive or dependent patterns of digital technology use, including Internet use, social media, smartphones and video games. Mental health outcomes include depression, anxiety, stress, psychological distress, sleep disturbances, insomnia, loneliness and psychological well-being. Particular attention is given to Internet addiction and problematic social media use and their associations with depressive and anxiety symptoms. The review also considers general patterns of technology use to distinguish between habitual digital engagement and potentially problematic behaviours. These patterns are examined as behavioural and psychological phenomena and are not necessarily considered clinically diagnosed disorders.

METHODS

Search strategy A systematic literature search was conducted in three scientific databases: ERIC, Scopus and Web of Science (WoS). The search strategy was structured around four conceptual blocks: (1) university students, (2) higher education, (3) Information and Communication Technologies (ICTs) and their patterns of use, and (4) mental health and related psychological outcomes. Terms within each block were combined using the Boolean operator OR, while the different blocks were connected using AND. The NOT operator was used to exclude review studies.

The search included terms related to general Internet and digital technology use, as well as specific forms of problematic or addictive use, including Internet addiction, social media addiction and gaming addiction. Mental health-related terms included psychological distress, psychological well-being, anxiety, depression, stress, social dysfunction, sleep problems, insomnia, sleep quality, social support and social interaction.

The search was restricted to peer-reviewed scientific journal articles published between 2021 and 2026 and written in English or Spanish. Additional filters relating to document type and relevant subject areas were applied according to the available options in each database. Searches in ERIC, Scopus and Web of Science were conducted on June 2026. All retrieved records were subsequently exported and managed using Zotero to organise references, identify duplicates and support the study selection process.

Participant or population The population of interest comprises university students enrolled in undergraduate and postgraduate programmes across different academic disciplines and higher education institutions. Studies involving general university student populations, as well as specific groups such as students in health sciences, education, engineering and other fields of study, are considered. No restrictions are imposed regarding participants' age, sex or country of residence, provided that they are enrolled in higher education at the time of the study.

Intervention The exposure of interest is the use of Information and Communication Technologies (ICTs), including the Internet, social media platforms, smartphones, instant messaging applications, video games and other digital technologies. Particular attention is given to problematic, excessive, addictive or dependent patterns of use, as well as general patterns of digital engagement. The review examines how these different forms of technology use are associated with mental health outcomes among university students. For the meta-analysis, the exposure is specifically defined as Internet addiction and problematic social media use. As this is an observational review, no experimental intervention is required.

Comparator Students with different levels or patterns of ICT use, including non-problematic or lower levels of use compared with problematic, excessive or addictive use. Where available, comparisons between students with and without problematic technology use are considered. In correlational studies, differences in the degree of ICT use and their association with mental health outcomes are examined. No specific comparison group is required for study inclusion, as the review also considers studies investigating associations between continuous measures of technology use and psychological variables.

Study designs to be included Original empirical studies employing quantitative, qualitative or

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mixed-methods approaches will be considered. Eligible quantitative designs include cross-sectional, longitudinal and cohort studies, as well as observational and correlational studies. Qualitative and mixed-methods research will be included in the systematic review when it examines the relationship between ICT use and mental health among university students. For the meta-analysis, only studies providing sufficient statistical information to calculate comparable effect sizes, particularly correlation coefficients, will be considered. Systematic reviews, literature reviews, meta-analyses, theoretical papers, editorials, commentaries, conference abstracts and individual case reports will be excluded.

Eligibility criteria were formulated using the PICOS.
Population: Studies involving university students enrolled in undergraduate, master's degree programmes or PhD, regardless of age, sex, academic discipline or country. Studies conducted exclusively with non-university populations will be excluded.
Intervention: Studies examining the use of Information and Communication Technologies (ICTs), including the Internet, social media, smartphones, instant messaging applications, video games and other digital technologies. Both general technology use and problematic, excessive, addictive or dependent patterns of use will be considered. Studies that do not clearly identify the technology or digital behaviour being investigated will be excluded.
Comparator: Studies comparing different levels or patterns of technology use, including problematic versus non-problematic use, higher versus lower levels of use, or users versus non-users. A specific comparison group will not be mandatory, as correlational studies examining associations between ICT use and mental health outcomes will also be eligible.
Outcomes: Studies assessing at least one mental health or psychological well-being outcome, including depression, anxiety, stress, psychological distress, sleep quality, insomnia, loneliness, subjective well-being, suicidal ideation or other relevant psychological symptoms. Studies focusing exclusively on academic performance or other outcomes unrelated to mental health will be excluded.

Information sources The literature search was conducted using three electronic bibliographic databases: ERIC (Education Resources Information Center), Scopus and Web of Science (WoS). These databases were selected because of their relevance to the fields of education, psychology, social sciences and health research, allowing the identification of studies addressing the relationship between Information and Communication Technologies (ICTs) and mental health among university students. Searches were performed in all three databases on 24 June 2026.

Main outcome(s) The review examines a range of psychological indicators, including depression, anxiety, stress, psychological distress, sleep quality, insomnia, subjective well-being, loneliness, suicidal ideation and other psychological symptoms. Particular attention is given to the relationship between problematic or addictive Internet use and problematic social media use and two primary mental health outcomes: depressive and anxiety symptoms. The strength and direction of these associations are assessed through correlation coefficients and other statistical measures reported in the included studies. For the meta-analysis, pooled effect sizes and their 95% confidence intervals are used to quantify the associations between the specific technology-use patterns and mental health outcomes.

Additional outcome(s) Additional outcomes include the identification and classification of the different types of ICTs investigated, the prevalence of general and problematic technology-use patterns, and the assessment instruments used to measure technology use and mental health. Other psychological outcomes of interest include stress, psychological distress, sleep quality, insomnia, subjective well-being, loneliness, self-esteem, social functioning and suicidal ideation. The review also examines study characteristics such as publication year, geographical location, sample size, participants' age and sex, academic disciplines and methodological design. Where reported, potential mediating and moderating factors, as well as longitudinal associations between technology use and mental health, are also considered to provide a broader understanding of the relationships identified.

Data management All records retrieved from ERIC, Scopus and Web of Science were exported and imported into Zotero for reference management and organisation. Duplicate records and automatically identified ineligible records were removed before the screening process. Study selection decisions were recorded in Zotero, while the assessment of full-text articles was organised using Microsoft Excel.
A structured data extraction matrix was developed in Microsoft Excel to collect and organise information from the included studies. The extracted data covered bibliographic details,

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publication year, journal, country, sample characteristics, study design, types of ICT use, patterns of problematic technology use, mental health outcomes, assessment instruments and main findings. Two separate assessment matrices were used to allow independent evaluation by the two reviewers, followed by comparison and discussion of disagreements until consensus was reached.
For the quantitative synthesis, statistical information from eligible studies was recorded separately, including sample sizes, correlation coefficients and other relevant statistical data required to calculate and combine effect sizes. The extracted information was organised according to the type of technology use and mental health outcome to ensure consistency across the meta-analyses.

Quality assessment / Risk of bias analysis

Strategy of data synthesis The findings will be synthesised using both narrative and quantitative approaches. First, a descriptive synthesis of all 122 included studies will be conducted to summarise their methodological, geographical and sociodemographic characteristics, the types of ICTs investigated, the patterns of technology use, the mental health outcomes examined and the assessment instruments employed. The findings will be organised according to the specific type of technology and its relationship with mental health, taking into account differences in study populations, research designs and measurement instruments.
A meta-analysis will be performed on the 13 studies providing sufficient statistical information for quantitative synthesis. Studies will be grouped according to the type of technology use and mental health outcome to avoid combining conceptually different constructs. Separate analyses will examine the associations between Internet addiction and depression, Internet addiction and anxiety, problematic social media use and depression, and problematic social media use and anxiety.
Correlation coefficients (r) will be used as the primary measure of effect size. Random-effects models will be applied to calculate pooled estimates, considering the potential variability between studies. The results will be presented as pooled correlation coefficients with corresponding 95% confidence intervals. Positive effect sizes will indicate that higher levels of problematic technology use are associated with higher levels of psychological symptoms. The narrative and quantitative findings will be considered together to provide an integrated account of the relationship between ICT use and mental health among university students.

Subgroup analysis The meta-analyses were conducted separately according to the type of technology use and mental health outcome. Specifically, four independent analyses were performed: Internet addiction and depression, Internet addiction and anxiety, problematic social media use and depression, and problematic social media use and anxiety.
No additional subgroup analyses were conducted according to participants' characteristics, geographical location, academic discipline or study design. The relatively small number of studies available for each meta-analysis limited the possibility of conducting reliable subgroup comparisons. Differences in study characteristics were instead considered in the descriptive and narrative synthesis of the systematic review.

Sensitivity analysis Not applicable.

Language restriction Studies published in English or Spanish were included.

Country(ies) involved Spain - University of Granada, Granada, Spain.

Other relevant information This review follows the PRISMA 2020 guidelines for systematic reviews and meta-analyses. The study selection process involved two independent reviewers, who assessed the eligibility of the full-text articles and resolved disagreements through discussion and consensus. Zotero was used for reference management and duplicate removal, while Microsoft Excel was used for data extraction, organisation and assessment of the included studies.
The review comprises a narrative synthesis of 122 studies and a quantitative synthesis of 13 studies providing sufficient statistical information for meta-analysis. The systematic review adopts a broad approach to ICT use and mental health, whereas the meta-analysis specifically examines the associations between Internet addiction and problematic social media use and depressive and anxiety symptoms among university students.
Current review status: Completed but not published.
No geographical restrictions were applied. The review included studies conducted in China, Turkey, Saudi Arabia, India, Egypt, Bangladesh, the United States, Australia, Iran, Japan, Jordan, Hong Kong, Portugal, Algeria, Canada, Spain, Ethiopia, the Philippines, Malawi, Malaysia, Nepal, Nigeria, Norway, Poland, Serbia, Taiwan, Thailand, Tunisia,

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Ukraine and Vietnam. Three studies involved multiple countries: China and Malawi; Cameroon, Uganda and Nigeria (Sub-Saharan Africa); and Brazil, Spain and Portugal.

Keywords Information and Communication Technologies; mental health; university students; Internet addiction; social media; depression; anxiety; systematic review; meta-analysis.

Dissemination plans The findings of this systematic review and meta-analysis will be disseminated through publication in a peer-reviewed international scientific journal.

Contributions of each author

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