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DIGITAL MEDIA-BASED MINDFULNESS INTERVENTIONS IN EDUCATION SETTING: SYSTEMATIC LITERATURE REVIEW

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Abstract

The rapid expansion of digital technology in education has encouraged the development of digital mindfulness interventions as an alternative approach to support students' psychological well-being. However, empirical evidence on the effectiveness of digital mindfulness specifically within educational settings remains fragmented. This study therefore aims to synthesize existing findings on digital media-based mindfulness interventions for students through a Systematic Literature Review (SLR). Following PRISMA 2020 guidelines, articles were retrieved from SpringerLink, PubMed, DOAJ, Wiley, and ScienceDirect, with a publication range of 2020-2025. Inclusion criteria required the use of digital mindfulness interventions, experimental research designs, and student or college populations. Six studies met the final criteria, representing videoconferencing and podcast-based mindfulness, virtual reality mindfulness, app-based meditation, digital game embedded mindfulness, and internet and mobile-based programs (IMIs). Overall, the findings indicate that digital mindfulness interventions can enhance mindfulness skills, stress regulation, emotional well-being, self-regulation, life satisfaction, and in some cases cognitive outcomes such as convergent creative thinking. Synchronous and immersive modalities, particularly videoconferencing and VR, showed the strongest and most consistent effects, while self-paced and game-based interventions demonstrated mixed results due to adherence challenges and cognitive load factors. Despite promising results, current evidence remains limited by heterogeneity across modalities and a lack of studies in non-Western and Indonesian educational contexts. Further research is needed to examine culturally adapted interventions, evaluate long-term outcomes, and assess their feasibility in diverse educational settings.

Keywords: *digital mindfulness; educational settings; psychological well-being; systematic literature review*

Introduction

Mindfulness is commonly defined as present-moment awareness (Kabat-Zinn, 2003). It is not simply the act of being aware, but a dynamic process involving three interacting mechanisms attention, intention, and attitudes that together shape the quality of mindful experience (Shapiro, 2006). A substantial body of research has demonstrated the effectiveness of mindfulness-based interventions, including their ability to reduce depression and enhance self-satisfaction (Dang, 2018). In addition, mindfulness has been found to improve cognitive performance and strengthen stress resilience (Zenner, 2014), underscoring its broad relevance for psychological well-being.

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Importantly, psychological difficulties are increasingly reported among students and college learners, who often experience academic pressure, emotional strain, and reduced mental well-being. Within educational settings, such psychological challenges are associated with decreased academic performance, impaired concentration, and reduced learning engagement (Benítez, 2025). These concerns highlight the need for interventions that not only address mental health but also support students' capacity to function effectively in academic environments.

Mindfulness has therefore gained prominence as a promising approach for enhancing student well-being and academic functioning. Empirical findings indicate that mindfulness interventions can improve academic achievement (Ostermann, 2022) and strengthen resilience in student populations (Galante, 2018). Such evidence demonstrates that mindfulness contributes to healthier psychological states, which in turn foster more adaptive behaviors, better focus, and improved learning processes.

While a number of systematic reviews have examined school-based mindfulness programs, these analyses predominantly focus on traditional, face to face intervention formats (Phan, 2022). This narrow scope limits their relevance for contemporary educational contexts, which have become increasingly integrated with digital technologies. As teaching, learning, and student support systems evolve, there is a growing need to understand how mindfulness can be delivered through modalities that align with modern educational practices.

Digital technology has been shown to enhance student engagement and enrich learning experiences (Rafiq, 2025). When utilized effectively, digital platforms create more flexible, interactive, and student-centered environments that can support both cognitive and emotional development. These shifts present new opportunities for delivering mindfulness interventions through digital means, such as mobile applications, online programs, or virtual environments, thereby increasing accessibility and personalizing the user experience.

In addition, the rising availability of digital tools has facilitated the development of digital mindfulness interventions that may offer advantages over traditional delivery methods. Such interventions can be accessed anytime and in various contexts, potentially increasing adherence and long-term continuity (Mefrouche, 2023). As digital platforms become more embedded in academic life, understanding which digital mindfulness strategies are effective and how they influence student outcomes becomes a pressing concern for researchers and educators alike.

Although digital mindfulness has begun to receive scholarly attention, much of the existing evidence is situated within clinical settings. Several systematic reviews have focused on specific populations, such as pregnant women or patients (Leng, 2023), and while mindfulness-based interventions have been applied in both clinical and non-clinical contexts (Chiesa, 2014), the findings from these studies cannot be directly generalized to educational environments. Student populations differ significantly in developmental needs, engagement patterns, and digital usage behaviors, highlighting the necessity for analyses tailored to education.

This creates a clear research gap despite the increasing integration of digital technology in schools and universities, there is no comprehensive synthesis that specifically examines the effectiveness of digital mindfulness-based interventions for students or college learners. Existing studies are fragmented across platforms, vary in methodological rigor, and employ inconsistent outcome measures. Consequently, the current evidence base remains insufficient to draw coherent conclusions about the efficacy, applicability, and comparative value of different digital mindfulness formats in educational settings.

Addressing this gap is crucial, as educational institutions are increasingly relying on digital tools to support students' psychological well-being amid rising mental health concerns. Without robust evidence identifying which digital mindfulness interventions are effective, scalable, and contextually appropriate, educators risk adopting programs that may lack impact or alignment with student needs. Systematic, education-focused evidence is therefore urgently required to guide practice and policy.

To respond to this need, the present study conducts a systematic literature review that specifically examines digital mindfulness-based interventions within educational settings. This review aims to (a) map the types of digital mindfulness interventions implemented with students, (b) evaluate their psychological and academic effects, and (c) synthesize existing evidence to inform future research and support the development of healthier, emotionally supportive learning environments grounded in empirical findings.

Method

This study employed a Systematic Literature Review (SLR) approach to examine the effectiveness of digital media-based mindfulness interventions in educational settings. The review followed the PRISMA 2020 guidelines for transparent reporting. Articles were systematically searched in five major databases SpringerLink, PubMed, DOAJ, Wiley Online Library, and ScienceDirect. The search was conducted between January 2020 and December 2025 to capture recent developments in digital mindfulness interventions, which expanded rapidly during the post-pandemic digitalization phase. Keywords and Boolean operators were combined using terms such as *"digital mindfulness," "mindfulness app," "virtual reality mindfulness," "online mindfulness," "internet-based mindfulness," "education,"* and *"students."* Search strings were adapted for each database.

The article selection process followed the PRISMA 2020 guidelines, and the flow of identification, screening, eligibility, and inclusion was visually mapped using a PRISMA 2020–compliant flow diagram. The diagram was generated using tools provided in the PRISMA2020 R package and Shiny application (Haddaway et al., 2022), which enhance transparency and digital reproducibility in systematic reviews.

Articles were included if they met the following criteria: (1) written in English; (2) published between 2020–2025; (3) conducted in educational settings (school or higher education); (4) implemented a digital media-based mindfulness intervention (e.g., apps, VR, web-based, game-based); (5) used an experimental or quasi-experimental design; and (6) involved adolescents or students as participants. Exclusion criteria included theoretical papers, non-digital mindfulness interventions, non-educational settings, and studies without measurable outcomes.

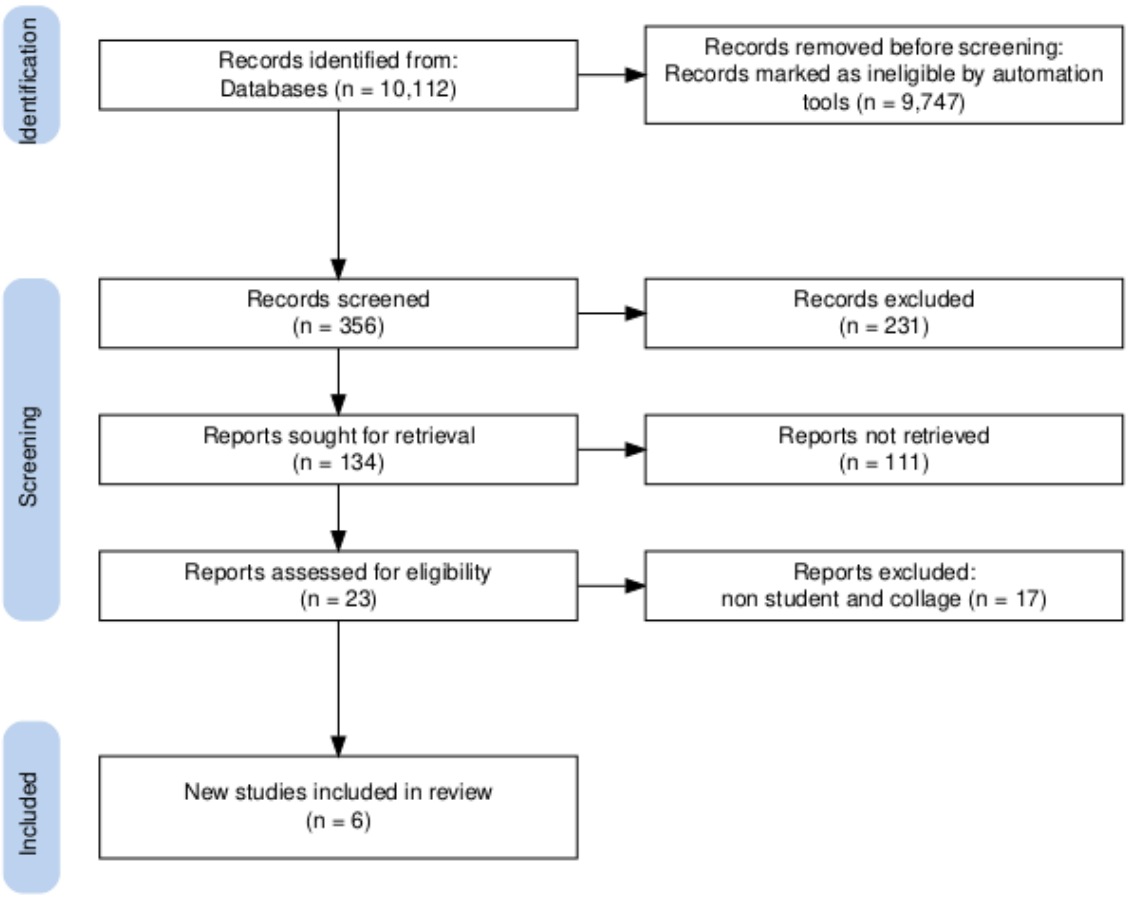

Figure 1 *PRISMA flowchart*

The screening process involved three stages identification, screening, and eligibility. A total of 10,112 records were identified across the five databases. After automated removal of ineligible records (duplicates or non-research items), 9,747 records were excluded, leaving 356 records for further screening. At the title and abstract screening stage, 231 records were excluded for not meeting the research criteria. The remaining 134 articles were then sought for full-text retrieval. Of these, 111 articles could not be retrieved or did not provide sufficient information, resulting in 23 articles proceeding to full-text eligibility assessment.

Full-text review revealed that 17 studies did not meet the inclusion criteria, primarily because the target population was not students or college learners. Consequently, 6 studies met all criteria and were included in the final synthesis. The screening process was conducted by two reviewers independently. Disagreements were resolved through discussion until consensus was reached. The final six studies were analyzed narratively based on their design, digital media format, outcomes, and key findings.

Result and Discussion

Before presenting the detailed findings, a synthesis of the six studies that met the inclusion criteria is provided to illustrate the diversity of digital mindfulness interventions examined across educational settings. The selected studies vary in sample characteristics, intervention formats, measurement instruments, and psychological or cognitive outcomes. Table 1 summarizes the essential characteristics and results of each study, forming the foundation for the critical analysis that follows.

Table 1 *Summary of Included Studies*

Author (Year)	Sample	Measures	Digital Intervention	Main Findings
Karing (2022)	70 university students	FFMQ, PHQ-8,GAD-7, LSS	Videoconference and podcast-based MBI	Both formats improved mindfulness, depression, anxiety, and life satisfaction; videoconferencing showed stronger reductions in depression.
Modrego-Alarcón (2025)	93 college students	MAAS, ITC-SOPI, VAS, SUS, Expectation & Satisfaction Scales	Virtual reality (VR) mindfulness	VR improved state mindfulness and emotional presence; high satisfaction; VR provides immersive environments conducive to mindfulness practice.
Schulte-Frankenfeld (2021)	64 university students	PSS-10, SRS-10, LSS, FMI-14, ERQ, SEA	Mobile app–based mindfulness	Improved stress, self-regulation, and mindfulness life satisfaction did not significantly change; mindfulness gains mediated self-regulation.
Bereczki et al. (2024)	404 students	Achievement tests, problem-solving behaviour, MAAS-A	Mindfulness embedded in digital math game	No significant improvements in learning gains or mindfulness; brief game-based induction failed to meaningfully increase mindfulness.
Küchler (2022)	387 students	PHQ-9, GADQ, PSS-4, WHO-WBI, SPS, BPQ, SES, CFQ-D, ERQ, TAS-20, INEP, CSQ-8	Internet- & mobile-based intervention (StudiCare-M)	Mental health outcomes improved; adherence low; "guidance on demand" modestly improved adherence but not effectiveness.
Rebecchi (2024)	107 students	EPoC, FFMQ, SOOR, AOOR	Digital mindfulness-based meditation (d-MBI)	No significant impact on mindfulness or divergent thinking; significant increases in convergent creative thinking and responsibility; moderate effect sizes.
Schulte-Frankenfeld (2021)	64 university students	PSS-10, SRS-10, LSS, FMI-14, ERQ, SEA	Mobile app–based mindfulness	Improved stress, self-regulation, and mindfulness; life satisfaction did not significantly change; mindfulness gains mediated self-regulation.

Synthesis of Findings

Following the summary of the included studies, several critical patterns and divergences emerge. Although the interventions utilized diverse digital modalities ranging from videoconferencing and VR to mobile apps, IMIs, and game-based environments most studies indicate that digital mindfulness can positively influence psychological functioning when appropriately designed and implemented. The heterogeneity in outcomes suggests that delivery modality, immersion level, and user engagement patterns are central determinants of effectiveness.

The Effectiveness of Digital Mindfulness in Educational Settings

Digital mindfulness interventions in education have been delivered through various technological modalities, each with its own mechanisms and limitations. Virtual reality (VR) appears to offer strong potential because immersive environments can enhance attentional focus and presence key mechanisms in mindfulness. Evidence shows VR can temporarily increase state mindfulness and emotional presence (Modrego-Alarcón, 2025; Marta, 2023), although cost and scalability remain major limitations.

Game-based mindfulness represents a different approach. Despite the motivational benefits of gameplay, empirical findings show that brief mindfulness elements embedded in digital games do not reliably enhance mindfulness or academic outcomes (Bereczki et al., 2024). High cognitive load and task demands may conflict with the reflective and slow-paced nature of mindfulness, creating a mismatch between the medium and the intended psychological effect.

Mobile apps and web-based interventions are more scalable and practical. App-based mindfulness reduced perceived stress and supported self-regulation among students (Schulte-Frankenfeld, 2021), though improvements in life satisfaction were inconsistent. Internet- and mobile-based interventions (IMIs), such as StudiCare-Mindfulness, also demonstrated mental health benefits but faced persistent challenges in adherence (Küchler, 2022). Even with "guidance on demand," adherence gains were modest and did not substantially improve overall effectiveness.

Low-cost audio and video interventions, including videoconferencing and podcast-based mindfulness, have also shown promising outcomes. Videoconferencing produced stronger improvements in depressive symptoms than asynchronous podcast formats (Karing, 2022), likely due to interpersonal presence, synchronous interaction, and real-time support.

Taken together, these findings show that digital mindfulness can be effective, but outcomes depend heavily on modality, engagement, and cognitive-emotional fit. Synchronous and immersive formats appear particularly effective; self-paced interventions require stronger engagement strategies; and game-based mindfulness must be carefully designed to prevent cognitive overload. Practitioners should therefore select modalities based on learner needs, psychological targets, and institutional resources.

Psychological Development in Educational Contexts

Psychological development is crucial for academic success, as stress, emotional dysregulation, and reduced well-being can impair concentration, motivation, and performance (Barnett, 2021). The findings of this review show that digital mindfulness interventions can meaningfully support psychological development in both adolescent and college populations.

Consistent across the reviewed articles are improvements in mindfulness, stress management, emotional regulation, self-regulation, and mental health indicators (Karing, 2022; Schulte-Frankenfeld, 2021; Küchler, 2022). Certain modalities produced additional cognitive benefits such as improved convergent creative thinking and increased responsibility (Rebecchi, 2024). These outcomes align with theoretical frameworks describing mindfulness as a mechanism for strengthening attentional stability, emotional clarity, and cognitive flexibility (Kondirolli, 2022).

Nevertheless, several limitations must be acknowledged. The studies varied in sample characteristics, outcome measures, intervention durations, and technological modalities, making direct comparisons difficult. Adherence problems were consistently reported in unguided interventions, particularly IMIs (Küchler, 2022). Additionally, while adolescents and young adults are generally familiar with digital technology, familiarity does not always translate into sustained engagement (Whitehead, 2024).

A further limitation of this SLR is its reliance on international articles; therefore, the applicability of these findings to Indonesian educational contexts remains uncertain. Cultural relevance, digital access, and pedagogical norms may influence the effectiveness of digital mindfulness. Future research should examine culturally adapted digital mindfulness interventions, measure long-term outcomes, and explore implementation feasibility in Indonesian schools and universities.

Overall, digital mindfulness offers a promising avenue for enhancing students' psychological development. When appropriately adapted to learner characteristics and supported by engagement strategies, digital mindfulness can contribute to healthier, more supportive educational environments.

Conclusion

This systematic review of six empirical studies demonstrates that digital mindfulness interventions hold meaningful potential for supporting students' psychological functioning across educational settings. Various digital modalities including videoconferencing and podcast-based mindfulness, virtual reality environments, mobile mindfulness applications, internet and mobile-based mindfulness modules, and digital meditation programs were shown to enhance key psychological outcomes such as mindfulness, stress regulation, emotional well-being, self-regulation, and in some cases cognitive abilities such as convergent creative thinking. Synchronous and immersive modalities, particularly videoconferencing and VR, consistently exhibited stronger and more stable outcomes, while self-paced programs and game-based mindfulness produced more mixed results due to issues of cognitive load, adherence, and limited depth of engagement.

Despite these positive indications, the review also highlights important constraints. Adherence challenges remain a major barrier for mobile and web-based mindfulness programs, while game-based interventions may not effectively induce genuine mindful states. Furthermore, the heterogeneity of study designs and digital modalities limits direct comparability, and the exclusive focus on international research restricts understanding of contextual and cultural factors relevant to Indonesian educational environments.

Overall, digital mindfulness interventions represent a promising and flexible approach for enhancing students' psychological development and improving the emotional climate of educational settings. Future research should examine culturally adapted versions of these interventions, conduct long-term evaluations, and explore additional psychological outcomes to strengthen the evidence base for digital mindfulness within diverse educational systems, including Indonesia.

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Author Contributions Statement

NF served as the lead author and corresponding author, responsible for the overall conceptualization, drafting, and refinement of the manuscript. TF contributed as the second author by reviewing, verifying, and enriching the analysis and interpretation of the research findings. Both authors read and approved the final version of the manuscript.

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