

Digital Interventions to Foster Adolescent Mental Health

Fauzi Giandra¹, Resti Muslimatus Sholeha¹, Nurul Shofiah^{*1}

^{1,2} Fakultas Psikologi Universitas Islam Negeri Maulana Malik Ibrahim

fauzigiandra19@gmail.com, restiyachmad@gmail.com,
nurulshofiah@uin-malang.ac.id

Abstract: The prevalence of mental health disorders among adolescents, including depression, anxiety, and stress, is rising globally, while access to face-to-face psychological services remain limited due to negative perceptions, cost, and a shortage of professionals. The advancement of digital technology has enabled the development of Digital Mental Health Interventions (DMHIs) that are more accessible and adaptable to adolescents' lifestyles. This study employed a scoping review to provide an overview of publication trends and types of digital interventions supporting adolescent mental health from 2020–2025. Following the Arksey and O'Malley framework and PRISMA-ScR guidelines, searches were conducted in the Springer and Garuda databases, identifying 17 studies meeting inclusion criteria. The review shows that the United Kingdom contributed the most publications consistently, while the United States and China have recently increased their participation. Identified interventions include mobile applications based on CBT, positive psychology, mindfulness, digital games, chatbots, web-based programs, and social media interventions. Mobile app-based interventions were the most common, addressing issues such as depression, anxiety, stress, loneliness, and substance abuse. Despite their potential, digital interventions face challenges including variability in effectiveness, lack of long-term data, and data privacy concerns. These findings underscore the significant potential of DMHIs as complementary to face-to-face services and highlight the need for global collaboration, adolescent-centered design, and further research with broader geographical coverage.

Keywords: Digital Mental Health Intervention, Adolescents, Mental Health, Digital Technology, Scoping Review

1. Introduction

Adolescent mental health has increasingly emerged as a global concern, with growing prevalence of depression, anxiety, and stress as reported by the World Health Organization (Wyn, 2022). These disorders not only affect emotional well-being but also undermine academic achievement, social relationships, and elevate long-term risks such as substance abuse, suicide, and social isolation. Unfortunately, access to conventional mental health services remains limited due to social stigma, shortage of professionals, high costs, and limited service availability (Zhang et al., 2025). These conditions highlight the urgent need for timely, appropriate, and innovative interventions to prevent negative consequences while effectively supporting adolescent mental health.

The proliferation of digital technologies, internet access, and smartphones has profoundly shaped adolescents' social lives, making them the most active users of digital platforms (Masril, 2018; Pew Research Center, 2021). Over 95% of adolescents

in high-income countries own smartphones, with many spending a substantial amount of time online (Pew Research Center, 2021). This creates opportunities to leverage technology for mental health interventions that are accessible, relevant, and embedded within adolescents' daily routines (Hamilton et al., 2025). Evidence suggests that digital mental health interventions (DMHIs) can enhance mental health literacy, support prevention, improve coping skills, and provide rapid and anonymous assistance (Torous et al., 2018; Matos Fialho et al., 2025). Recent work highlights their promise in increasing engagement, particularly in low- and middle-income settings (Wani et al., 2024).

A wide range of technology-based tools—including mobile apps, web-based programs, chatbots, virtual/augmented reality (VR/AR), and gamified platforms—have been developed to address adolescent mental health (Bell et al., 2024; Hasas et al., 2024). Cognitive behavioral therapy (CBT)-based apps have shown efficacy in reducing depression and anxiety (Firth et al., 2017) and may enhance engagement compared to traditional approaches (Hollis et al., 2017). Mindfulness apps such as Headspace and Calm help manage stress, while chatbots like Woebot deliver real-time emotional support. Digital interventions therefore offer practical, scalable, and youth-friendly solutions (Maiyo, 2023). However, questions remain regarding long-term effectiveness, privacy, and data security, which require further investigation for safe and sustainable integration into mental health systems.

Despite progress, challenges persist. Evidence on effectiveness is heterogeneous and sometimes methodologically limited (Veldhuizen et al., 2021). Engagement variability, privacy concerns, and data security risks remain critical issues, particularly among vulnerable adolescents (Anselimus, 2025). Moreover, most systematic reviews and meta-analyses to date have focused on studies published between 2015 and 2020 (Lehtimäki et al., 2021; Liverpool et al., 2020; Garrido, 2019; Bergin et al., 2020). More recent studies (2022–2024) have begun to explore user-centered design (Wright et al., 2023), low- and middle-income contexts (Wani et al., 2024), and cross-intervention comparisons (Chen et al., 2024). Nevertheless, a clear gap exists in the comprehensive mapping of publication trends and intervention modalities, which is essential for understanding the trajectory of this field. To address this gap, the present study maps publication trends and intervention types in digital mental health research targeting adolescents. By doing so, it provides an updated overview of the field and lays the groundwork for designing interventions that are more adolescent-centered, inclusive, and sustainable in promoting mental well-being.

The findings of this study highlight the growing importance of digital approaches in supporting adolescent mental health and emphasize the need for interventions that are accessible, engaging, and responsive to young people's real-life needs. By mapping current publication trends and intervention types, this research provides valuable insights that can guide the development of safer, evidence-based, and inclusive digital mental health programs. It also encourages collaboration among researchers, educators, health professionals, and policymakers to ensure that digital innovations truly enhance the well-being of adolescents across different social and cultural contexts.

2. Method

Design of Reviews

This scoping review was guided by Arksey and O'Malley's framework (2005) and further refined by Levac et al. (2010). The protocol was developed in accordance with

the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR). The review team collaboratively developed and refined the protocol to ensure transparency and rigor. A scoping review was chosen as the methodology because it provides a systematic approach to mapping existing evidence, identifying knowledge gaps, and clarifying key concepts across diverse studies on digital interventions designed to promote adolescent mental health.

Research Questions

The following research questions guided the review:

RQ1: What trends can be identified in the existing literature on digital interventions for adolescent mental health (in terms of year of publication and country)?

RQ2: What types of digital interventions (e.g., mobile applications, online counseling platforms, games, chatbots, social media-based programs) have been developed and studied to support adolescent mental health?

Search Strategy

The search strategy was developed with support from a health sciences librarian. Keywords and subject headings were identified, including: adolescent, youth, teenager, digital intervention, mental health app, e-mental health, online counseling, telehealth, depression, anxiety, stress management, well-being. Databases to be searched include: Springer and Google Scholar. Boolean operators (AND/OR) will be used to combine terms. An example of the search string: ("adolescent" OR "youth" OR "teenager") AND ("digital intervention" OR "online counseling" OR "technology") AND ("mental health" OR depression OR anxiety OR stress OR wellbeing OR "psychological support"). Springer, Article found 147 Research article Garuda, article found 12 article but relevant article.

Eligibility Criteria

Inclusion criteria. Peer-reviewed empirical studies (quantitative, qualitative, or mixed methods), Studies focusing on adolescents (aged 10–19 years) as the primary population. Studies where digital or mobile-based interventions are the central focus for supporting or promoting mental health. Articles published in English and Indonesia between 2020 and 2025, Research conducted in any country.

Exclusion criteria. Opinion papers, editorials, or theoretical works without empirical data, Studies focusing exclusively on adult or child populations outside the 10–19 range., Digital interventions unrelated to mental health (e.g., general physical health apps), Studies where digital technology was not the main intervention (e.g., face-to-face therapy with minimal digital augmentation).

Selection Process.

The initial search results will be imported into Rayyan.ai for systematic screening. Duplicates will be removed, and two reviewers will independently screen titles and abstracts to determine eligibility. Full texts of potentially relevant studies will then be reviewed. Two independent reviewers evaluated titles and abstracts for relevance. Discrepancies were resolved through conversation, and a third reviewer was consulted as needed. Full-text screening followed the same procedure. Interrater agreement was calculated, and conflicts were handled by consensus. A PRISMA flow diagram showed the number of records found, reviewed, and excluded at the full-text stage (frequent

causes included wrong population age or failure to provide suicidality outcomes separately for opioid users) (Figure 1).

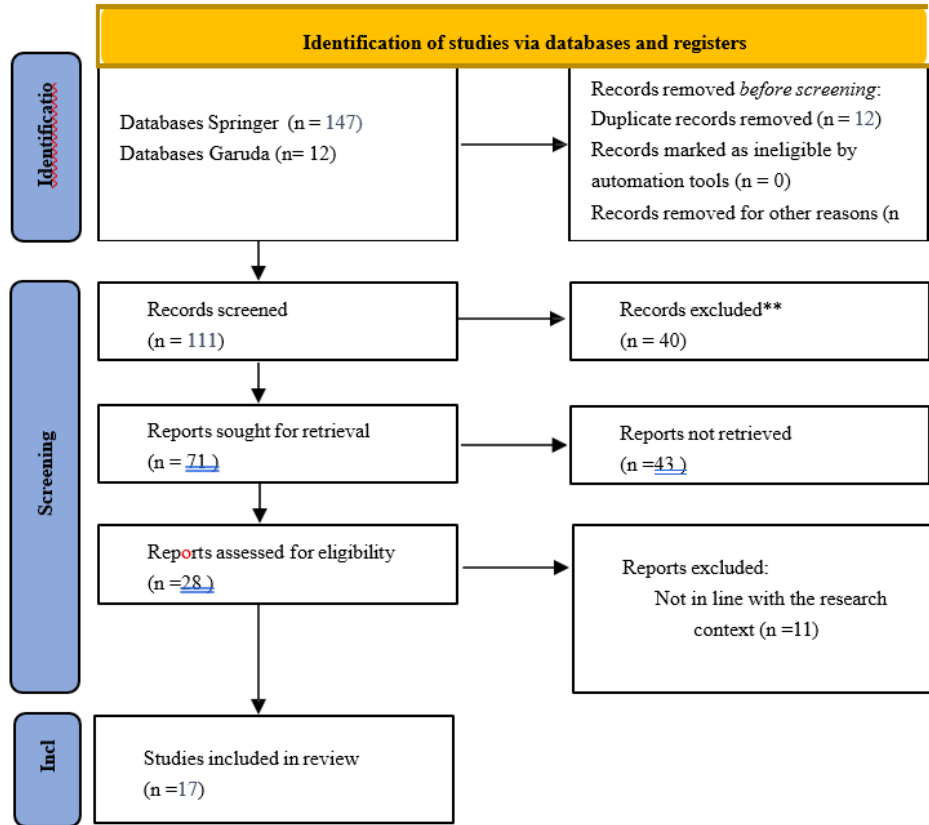


Figure 1. PRISMA-ScR Flow Diagram.

We ultimately included 17 studies in the review, which served as the foundation for data charting and analysis. Table 2 summarizes the features of the included studies. One reviewer extracted the data and a second validated its accuracy. Rather than narratively reporting each study individually, we combined the findings to address the review question concerning trends and differences.

Table 2. Summary of the Features of the Included Studies

Author	Year	Method / Design	Study	Country
Li, S. H. et al.	2022	Randomized Controlled Trial		United Kingdom
Zhu, S. et al.	2023	Protocol (CBT-based mobile app) Two-armed Randomized		United Kingdom

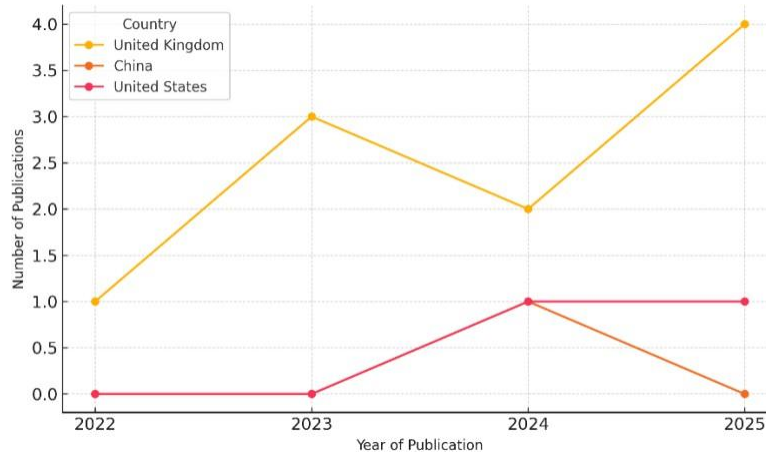
Author	Year	Method / Study Design	Country
Lim, M. H. et al.	2023	Controlled Trial Protocol Pilot Randomized Controlled Trial	United Kingdom
Brooks, H. et al.	2023	Mixed Methods, Multi-site Case Study	United Kingdom
Opie, J. E. et al.	2024	Systematic Review of Guided Digital Mental Health Interventions (DMHIs)	United States
Li, G. et al.	2024	Type 1 Hybrid Randomized Controlled Trial	China
Stiles-Shields, C. et al.	2024	Pilot Randomized Controlled Trial	United Kingdom
Willems, L. et al.	2024	Naturalistic Single-Arm Evaluation	United Kingdom
Helseth, S. A. et al.	2025	User-Centered Multiphase Design (Qualitative + Beta Testing)	United States
Ntumi, S., Upoalkpajor, J. L. N., & Nimo, D. G.	2025	Mediation–Moderation Cross-Cultural Quantitative Study	United Kingdom
Dallison, S. et al.	2025	Mapping Review	United Kingdom
Daros, A. R. et al.	2025	Non-Randomized Clinical Trial (Mindfulness App)	United Kingdom

3. Result

RQ1: What trends can be identified in the existing literature on digital interventions for adolescent mental health (in terms of year of publication and country)?

The graph 1 above illustrates publication trends related to digital interventions for adolescent mental health by year and country from 2022 to 2025, comparing three countries—the United Kingdom, China, and the United States. The data reveal that the United Kingdom (UK) consistently leads in the number of publications each year. The trend begins with one publication in 2022, increases to three in 2023, slightly declines to two in 2024, and peaks at four in 2025. This upward trajectory reflects the UK’s sustained academic and policy-driven interest in leveraging digital approaches to address adolescent mental health issues. Factors such as technological advancement, heightened public awareness, and strong institutional support may contribute to this

consistent growth.



Graph 1. Trends in Publications on Digital Interventions for Adolescent Mental Health

In contrast, China and the United States (US) began contributing to this field more recently, with one publication each in 2024. By 2025, only the US continued its involvement with an additional publication, while China did not record any new entries. This suggests that, compared to the UK, the exploration of digital interventions for adolescent mental health is still emerging in these countries. Nevertheless, their initial participation indicates a growing global awareness and the potential for broader international engagement in the coming years.

Overall, the data demonstrate an expanding global trend in research on digital interventions for adolescent mental health, albeit currently dominated by the United Kingdom. The emerging involvement of other nations, such as China and the US, points to an increasing potential for cross-national collaboration in this area. The year-to-year rise in publication numbers further underscores that adolescent mental health remains a significant academic and public health concern—one that is progressively being addressed through innovative digital solutions. If this trend continues, it is expected that more countries will actively contribute to this domain, thereby strengthening the global evidence base for digital mental health interventions among adolescents.

RQ2: What types of digital interventions (e.g., mobile applications, online counseling platforms, games, chatbots, social media-based programs) have been developed and studied to support adolescent mental health?

The presented table 2 summarizes various forms of digital interventions that have been developed and studied to support adolescent mental health, along with examples of platforms, targeted issues, evaluation methods, and scientific references. Overall, the findings demonstrate a diversification of technological approaches in the mental health field, encompassing mobile applications, web-based programs, digital games (gamification), chatbots, and social media-based interventions.

The mobile application category emerges as the most dominant and diverse area of research. The approaches include Cognitive Behavioral Therapy (CBT) and Psychoeducation (e.g., Clearly Me, MobiliseMe), Positive Psychology (Peer Tree), Growth Mindset (U-SIGMA), preventive approaches (Boost My Mood), and Mindfulness-based interventions (AmDTx, Headspace, Calm). Some interventions also

target specific issues such as substance use (TECH) and severe depression.

Evaluation methods used to assess the effectiveness of these interventions vary, reflecting scientific efforts to ensure validity and reliability across different approaches. The most common method is the Randomized Controlled Trial (RCT), applied in both Clearly Me and the web-based intervention Step-by-Step (SbS). Other approaches surveys (U-SIGMA), naturalistic single-arm evaluations (Boost My Mood), and user-centered design development (TECH).

Another prominent category is digital games (e.g., Isamu), which utilize Dynamic Difficulty Scaling and cognitive restructuring principles to enhance user engagement. Meanwhile, chatbots such as Woebot integrate real-time AI-driven support with guided self-administered CBT techniques, providing an interactive and adaptive experience for adolescent users. Furthermore, the use of social media platforms such as Facebook and Instagram has also been explored through mapping reviews, particularly within CBT and Dialectical Behavior Therapy (DBT) frameworks addressing issues like sleep, stress, and negative thought patterns.

Overall, these findings highlight that digital interventions for adolescent mental health have evolved rapidly and gained substantial attention among researchers and practitioners. The growing number of indexed publications in reputable journals underscores the commitment to building a robust evidence base supporting the efficacy and implementation of these technologies. This advancement opens significant opportunities for the integration of digital interventions as a complement or alternative to traditional therapeutic approaches within mental health service systems.

Table 2. Types of Digital Interventions for Adolescent Mental Health Support

Digital Intervention	Example Platform / Application	Target Mental Health Issue	Evaluation Method / Approach	Author / Year
Mobile Application (CBT & Psychoeducation)	Clearly Me, MobiliseMe	Depression, anxiety	Randomized Controlled Trial (RCT), cognitive restructuring, mood tracking	Li, S. H. et al. (2022)
Mobile Application (Positive Psychology)	Peer Tree	Loneliness	Pilot RCT, psychology-based intervention	Lim, M. H. et al. (2023)
Mobile Application (Growth Mindset)	U-SIGMA	Depression, anxiety, stress	RCT, Intention-to-Treat (ITT) analysis, web-based survey	Zhu, S. et al. (2023)
Mobile Application (Preventive)	Boost My Mood (BMM)	(Sub)clinical depression,	Naturalistic single-arm evaluation (50	Willems, L. et al.

Mobile Application (Substance Use)	TECH (Teen Empowerment)	anxiety Cannabis use	adolescents) User-centered design, multistage development	(2024) Helseth, S. A. et al. (2025)
Mobile Application (Mindfulness)	AmDTx, Headspace, Calm	Moderate depression, anxiety, stress	Guided meditation, clinical trial, exercises	Daros, A. R. et al. (2025)
Digital Game (Gamification)	Isamu	Major depression	Dynamic difficulty scaling, cognitive restructuring	Amam, M. R. M. et al. (2024)
Chatbot (AI-Based CBT)	Woebot	Depression, anxiety, emotional support	Real-time AI-based support, self-guided CBT	Wang, T. (2021)
Web-Based Program / Online Counseling	Step-by-Step (SbS) – WHO, IMPETUS	Depression, anxiety, emotional literacy	Hybrid RCT (effectiveness– implementation), mixed-methods evaluation	Li, G. et al. (2024)
Social Media– Based Intervention	Facebook, Instagram, WhatsApp, Reddit, LinkedIn	Sleep disorders, negative self- image, self- harm, depression	Mapping review, feasibility studies, CBT-based interaction	Dallison, S. et al. (2025)

The mobile application category emerges as the most dominant and diverse area of research. The approaches include Cognitive Behavioral Therapy (CBT) and Psychoeducation (e.g., Clearly Me, MobiliseMe), Positive Psychology (Peer Tree), Growth Mindset (U-SIGMA), preventive approaches (Boost My Mood), and Mindfulness-based interventions (AmDTx, Headspace, Calm). Some interventions also target specific issues such as substance use (TECH) and severe depression.

Evaluation methods used to assess the effectiveness of these interventions vary, reflecting scientific efforts to ensure validity and reliability across different approaches. The most common method is the Randomized Controlled Trial (RCT), applied in both Clearly Me and the web-based intervention Step-by-Step (SbS). Other approaches include Pilot RCTs (Peer Tree), Intention-to-Treat (ITT) analysis and web-based surveys (U-SIGMA), naturalistic single-arm evaluations (Boost My Mood), and user-centered design development (TECH).

Another prominent category is digital games (e.g., Isamu), which utilize Dynamic Difficulty Scaling and cognitive restructuring principles to enhance user engagement. Meanwhile, chatbots such as Woebot integrate real-time AI-driven support with guided self-administered CBT techniques, providing an interactive and adaptive experience for adolescent users. Furthermore, the use of social media platforms such as Facebook and Instagram has also been explored through mapping reviews, particularly within CBT and Dialectical Behavior Therapy (DBT) frameworks addressing issues like sleep, stress, and negative thought patterns.

Overall, these findings highlight that digital interventions for adolescent mental health have evolved rapidly and gained substantial attention among researchers and practitioners. The growing number of indexed publications in reputable journals

underscores the commitment to building a robust evidence base supporting the efficacy and implementation of these technologies. This advancement opens significant opportunities for the integration of digital interventions as a complement or alternative to traditional therapeutic approaches within mental health service systems.

4. Discussion

Based on the results of this scoping review, which mapped publication trends and variations in digital interventions for adolescent mental health, several key findings emerged that offer important insights for the development of policy, clinical practice, and future research. This discussion outlines the implications of these findings, methodological limitations, and recommendations for further studies, emphasizing the potential of digital interventions as innovative solutions amid global mental health challenges. These findings can also be understood through the lens of the Technology Acceptance Model (TAM) and Behavior Change Theories, which explain how perceived usefulness and ease of access influence adolescents' willingness to adopt digital interventions.

The review reveals an increasing global publication trend, with the United Kingdom (UK) emerging as a leading contributor to research on digital interventions for adolescent mental health. From 2022 to 2025, the UK demonstrated a consistent increase from one publication in 2022 to four in 2025, while China and the United States (US) began contributing in 2024, each with one publication, and the US continuing in 2025. The upward trend in UK-led studies also corresponds with the expansion of CBT-based and mindfulness-oriented digital interventions originating from English-speaking academic systems. This implies that publication growth is not only quantitative but thematically shaped by regions leading digital innovation. This trend reflects heightened awareness in the UK, likely driven by mental health policy support, technological advancement, and academic priorities, as reflected in WHO reports on the prevalence of depression and anxiety among adolescents. This surge in research activity underscores a growing international recognition of digital solutions as crucial tools for addressing youth mental health challenges, particularly given the pervasive nature of conditions such as depression and anxiety in this demographic (Kruzan et al., 2022). Meanwhile, the initial engagement of China and the US signals potential global expansion, particularly in developing countries where access to mental health services remains limited. This aligns with Wani et al. (2024), who emphasized the potential of Digital Mental Health Interventions (DMHIs) to enhance adolescent engagement in low- and middle-income settings. The increasing prevalence of mental health disorders globally further emphasizes the urgency and relevance of these digital solutions for widespread adoption and policy integration (Kuberka et al., 2025). However, the dominance of the UK indicates a geographic imbalance that should be addressed through international collaboration to prevent research centralization in a single region. This concentration of research in Western countries reflects systemic disparities in infrastructure, funding, and cultural openness toward mental health in low- and middle-income countries (LMICs). Such imbalance underscores the importance of global partnerships to foster inclusive and context-sensitive intervention designs. This Western-centric bias in research, with Australia also showing high frequency in adolescent mental health studies, highlights a critical need for global cooperation and diversified research efforts to ensure equitable health outcomes worldwide (Chen et al., 2024) (Fu et al., 2023).

In contrast, RQ2 highlights the diversity and innovation in digital intervention types, with mobile applications being the most dominant category, followed by digital games

(gamification), chatbots, web-based programs, and social media platforms. Examples such as CBT-based apps (Clearly Me, MobiliseMe), meditation tools (Headspace, Calm), and chatbots (Woebot) target common issues including depression, anxiety, stress, and loneliness, as well as specific challenges such as substance use (TECH). The use of various evaluation methods, ranging from randomized controlled trials (RCTs) to user-centered design, demonstrates robust scientific evidence, supported by reputable journals. However, despite the predominance of RCTs, heterogeneity in study designs and short follow-up durations limit the ability to generalize findings. Moreover, user engagement metrics were inconsistently reported, constraining the assessment of long-term effectiveness. These findings are consistent with previous studies (Lehtimäki et al., 2021; Liverpool et al., 2020) highlighting the effectiveness of digital interventions in enhancing mental health literacy and coping skills, while addressing traditional access barriers such as stigma and cost. Technologies like gamification (Isamu) and social media platforms (e.g., Facebook, Instagram) also reflect adaptation to adolescents' digital-centric lifestyles, offering opportunities for more engaging and sustainable interventions. Overall, these findings affirm that DMHIs can serve as complementary or alternative forms of therapy, particularly in the post-COVID-19 era, where digital interaction has become increasingly important. Despite these advancements, significant barriers to user engagement with web-based mental health interventions persist, particularly within low- and middle-income countries, where limited technological development and resources hinder widespread dissemination and research into user feedback (Ho et al., 2024). Despite these potential benefits, only a small fraction of studies on digital health interventions originate from non-Western countries, underscoring a significant research gap in these regions (d'Halluin et al., 2023). This disparity is particularly concerning given that approximately 90% of the world's youth reside in low- and middle-income countries, yet a disproportionately small percentage of mental health intervention trials are conducted in these areas (Domhardt et al., 2021) (Ding et al., 2023).

Practical and Policy Implications

Practically, these findings encourage the integration of digital interventions into adolescent mental health service systems, such as through CBT-based applications proven to reduce symptoms of depression and anxiety. In countries like Indonesia, where service accessibility remains limited, platforms such as chatbots or gamification-based tools could be adopted for early prevention, supported by government initiatives to ensure data privacy and security. Global policies, as recommended by WHO, should promote the development of inclusive applications that engage adolescents in the design process (as seen in *TECH*), to enhance user involvement. Nevertheless, challenges such as fluctuating engagement levels and privacy risks must be addressed through strict regulations, especially considering the vulnerability of adolescent users.

Research Limitations

Although this scoping review provides a comprehensive mapping of the literature, several limitations should be acknowledged. First, the search was limited to the Springer and Google Scholar databases and to articles published in English and Indonesian, which may have excluded relevant studies from other databases or languages. Second, the time frame of 2020–2025 (with data collected up to 2025) may not fully capture the most recent trends, and the focus on three countries (the UK, China, and the US) limits the generalizability of the findings on a global scale. Third, while most included studies employed randomized controlled trials (RCTs) or

methodologically rigorous pilot evaluations, the lack of long-term data on effectiveness and safety (such as the risk of cyberbullying via social media platforms) introduces potential bias. Finally, the categorization of digital intervention types was based on summary tables that may not encompass all innovative approaches, such as virtual reality (VR) or augmented reality (AR), mentioned in the introduction.

Recommendations for Future Research

To address these gaps, future research should expand geographical coverage to include developing countries such as Indonesia, possibly through cross-cultural meta-analyses. Longitudinal evaluations of intervention effectiveness such as cohort studies on CBT-based applications are needed to assess long-term impacts on outcomes such as suicide risk. Furthermore, qualitative research exploring adolescents' user experiences during intervention design could enhance adaptability and user engagement, while studies on data privacy and AI ethics (e.g., in chatbot applications) are essential to ensure safety and trustworthiness. Collaboration among researchers, developers, and key stakeholders (including schools and governments) is also crucial for integrating DMHIs into everyday practice, thereby supporting adolescent mental health more effectively and sustainably.

5. Conclusion

This scoping review demonstrates that digital mental health interventions (DMHIs) for adolescents are gaining increasing attention, particularly in high-income countries such as the United Kingdom. The findings reveal both a steady rise in publications and a diverse range of intervention types, including mobile applications, gamified tools, chatbots, and social media-based programs. These innovations show promise in improving accessibility, engagement, and mental health literacy among young people.

However, the concentration of research in Western regions indicates a geographic imbalance, with limited evidence from low- and middle-income countries where access to mental health services remains limited. Moreover, variations in study design, short follow-up periods, and inconsistent reporting of user engagement highlight the need for more rigorous and longitudinal evaluations.

Overall, digital interventions represent a valuable complement to traditional therapy, offering scalable and cost-effective approaches to adolescent mental health. Future research should emphasize global collaboration, ethical standards, and inclusivity to ensure equitable and sustainable implementation worldwide.

6. References

- Bergin, A. D., Vallejos, E. P., Davies, E. B., et al. (2020). Preventive digital mental health interventions for children and young people: A review of the design and reporting of research. *npj Digital Medicine*, 3, 133. <https://doi.org/10.1038/s41746-020-00339-7>
- Chen, G., Chen, W. W., Qi, S., & Shek, D. T. L. (2024). Improving child and adolescent mental health: A bibliometric analysis of related intervention studies. *International Journal of Environmental Research and Public Health*, 21(12), 1576. <https://doi.org/10.3390/ijerph21121576>
- Dallison, S., Munir, S., Chubb, E., Padley, H. J., Fung, H. M., Desrochers, D. M., & Loades, M. E. (2025). How have contemporary research studies used social media to recruit to digital self-help intervention research for young people's mental health?: A mapping review.

- Daros, A. R., Patel, A., Otevw, O., Sotelo, S., Saab, B. J., & Quilty, L. C. (2025). Acceptability, engagement, outcomes, and dose–response associations of a mindfulness-based meditation app in individuals waiting for psychological services. *BMC Digital Health*, 3(1), 1–17. <https://doi.org/10.1186/s44247-025-00155-7>
- d'Halluin, A., Costa, M., Morgiève, M., & Sebbane, D. (2023). Attitudes of children, adolescents, and their parents toward digital health interventions: Scoping review. *Journal of Medical Internet Research*, 25. <https://doi.org/10.2196/44735>
- Ding, X., Wuerth, K., Sakakibara, B. M., Schmidt, J., Parde, N., Holsti, L., & Barbic, S. (2023). Understanding mobile health and youth mental health: Scoping review. *JMIR mHealth and uHealth*, 11. <https://doi.org/10.2196/44951>
- Domhardt, M., Engler, S., Nowak, H., Lutsch, A., Baumel, A., & Baumeister, H. (2021). Mechanisms of change in digital health interventions for mental disorders in youth: Systematic review. *Journal of Medical Internet Research*, 23(11).
- Fu, M., Lin, Q., Wu, J., Li, P., Meng, L., & Liu, L. (2023). Research trends in mental health problems of children and adolescents during the COVID-19 pandemic: A bibliometric and visualization analysis. *Cambridge Prisms: Global Mental Health*, 10. <https://doi.org/10.1017/gmh.2023.76>
- Garrido, S. (2019). What works and what doesn't work? A systematic review of digital mental health interventions for depression and anxiety in young people. *Frontiers in Psychiatry*, 10. <https://doi.org/10.3389/fpsy.2019.00759>
- Helseth, S. A., Piper, K. N., Dunne, C. J., Kemp, K., Barnett, N. P., Clark, M. A., Spirito, A., & Becker, S. J. (2025). User-centered design of an adjunct smartphone app to reduce cannabis use among youth diverted from the juvenile legal system. *Research on Child and Adolescent Psychopathology*. <https://doi.org/10.1007/s10802-025-01370-6>
- Ho, T. Q. A., Le, L. K., Engel, L., Le, N., Melvin, G., Le, H., & Mihalopoulos, C. (2024). Barriers to and facilitators of user engagement with web-based mental health interventions in young people: A systematic review. *European Child & Adolescent Psychiatry*, 34(1), 83. <https://doi.org/10.1007/s00787-024-03286-x>
- Kruzan, K. P., Williams, K. D. A., Meyerhoff, J., Yoo, D. W., O'Dwyer, L., Choudhury, M. D., & Mohr, D. C. (2022). Social media-based interventions for adolescent and young adult mental health: A scoping review. *Internet Interventions*, 28, 100578. <https://doi.org/10.1016/j.invent.2022.100578>
- Kuberka, P., Johnston, M., Shafran, R., Pike, K. C., & Yardley, L. (2025). Digital interventions for anxiety and depressive symptoms in adolescence: Systematic review. *Journal of Adolescent Health*, 77(3), 388. <https://doi.org/10.1016/j.jadohealth.2025.05.021>
- Lehtimäki, S., Martic, J., Wahl, B., Foster, K. T., & Schwalbe, N. (2021). Evidence on digital mental health interventions for adolescents and young people: Systematic overview. *JMIR Mental Health*, 8(4), e25847. <https://doi.org/10.2196/25847>
- Li, G., Sit, H. F., Chen, W., Wu, K., Sou, E. K. L., Wong, M., Chen, Z., Burchert, S., Hong, I. W., Sit, H. Y., Lam, A. I. F., & Hall, B. J. (2024). A WHO digital intervention to address

- depression among young Chinese adults: A type 1 effectiveness-implementation randomized controlled trial. *Translational Psychiatry*, 14(1). <https://doi.org/10.1038/s41398-024-02812-3>
- Li, S. H., Achilles, M. R., Subotic-Kerry, M., Werner-Seidler, A., Newby, J. M., Batterham, P. J., Christensen, H., Mackinnon, A. J., & O'Dea, B. (2022). Protocol for a randomised controlled trial evaluating the effectiveness of a CBT-based smartphone application for improving mental health outcomes in adolescents: The MobiliseMe study. *BMC Psychiatry*, 22(1), 1–15. <https://doi.org/10.1186/s12888-022-04383-3>
- Lim, M. H., Thurston, L., Eres, R., Rodebaugh, T. L., Alvarez-Jimenez, M., Penn, D. L., Kostakos, V., & Gleeson, J. F. M. (2023). A pilot randomised controlled trial of the Peer Tree digital intervention targeting loneliness in young people: A study protocol. *Trials*, 24(1), 1–13. <https://doi.org/10.1186/s13063-022-07029-7>
- Liverpool, S., Mota, C. P., Sales, C. M. D., Čuš, A., Carletto, S., Hancheva, C., Sousa, S., Cerón, S. C., Moreno-Peral, P., Pietrabissa, G., Moltrecht, B., Ulberg, R., Ferreira, N., & Edbrooke-Childs, J. (2020). Engaging children and young people in digital mental health interventions: Systematic review of modes of delivery, facilitators, and barriers. *Journal of Medical Internet Research*, 22(6), e16317. <https://doi.org/10.2196/16317>
- Wani, C., McCann, L., Lennon, M., & Radu, C. (2024). Digital mental health interventions for adolescents in low- and middle-income countries: Scoping review. *Journal of Medical Internet Research*, 26, e51376. <https://doi.org/10.2196/51376>
- Wang, T. (2024). An evaluation of what we have learned from Woebot to become a better student (pp. 0–15). <https://doi.org/10.13140/RG.2.2.33670.75843>
- Willems, L., Rasing, S. P. A., Heijs, D. A. M., Vermulst, A. A., Huvenaars, M. J., Onrust, S. A., & Creemers, D. H. M. (2024). Mental health app Boost My Mood (BMM) as preventive early intervention for adolescents with (sub)clinical depressive symptoms. *BMC Public Health*, 24(1). <https://doi.org/10.1186/s12889-024-19666-5>
- Zhu, S., Hu, Y., Qi, D., Qin, N., Chi, X., Luo, J., Wu, J., Huang, H., Wu, Q., Yu, L., Ni, S., Hamilton, K., & Tse, S. (2023). Single-session intervention on growth mindset on negative emotions for university student mental health (U-SIGMA): A protocol of two-armed randomized controlled trial. *Trials*, 24(1), 1–10. <https://doi.org/10.1186/s13063-023-07748-5>

