Original Research Study

Use of Technologies in Promoting Adolescent Mental Health: A Scoping Review

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Abstract

Introduction: Technologies such as mobile apps, online platforms, virtual reality, and artificial intelligence have been explored to support adolescent mental health. Issues of accessibility, effectiveness, privacy, and equity need to be assessed to determine the true impact of these technologies. This review offers insights for health-care professionals, researchers, and technology developers aiming to improve adolescents' mental wellbeing. **Objectives:** To map studies on the advantages of using educational technologies in the promotion of mental health for adolescents aged 10 to 19 years. Methodology: Scoping review using the Joanna Briggs Institute (JBI) methodology. The research was conducted in PubMed, Cumulative Index of Nursing and Allied Health (CINAHL) via EBSCO, and PsycINFO via EBSCO. **Results:** The JBI methodology guided the review, including information on title, authors, year, country, study type, objectives, and results. The review highlighted a range of technological interventions for adolescent mental health, such as apps for mood monitoring, online support platforms, computer-based cognitive behavioral therapy programs, and virtual reality interventions for anxiety. Discussion: The analysis showed potential benefits of using technologies in adolescent mental health, such as greater accessibility, convenience, and personalization. However, issues of privacy, security, and effectiveness need careful consideration. **Conclusion:** This review highlights the promising role of technologies in adolescent mental health. However, it is crucial to continue research to optimize the design, implementation, and evaluation of these interventions, ensuring their impact and effectiveness in improving adolescents' mental wellbeing.

Keywords

mental health, technologies, adolescents, digital wellbeing, screen time, emotional regulation

Implications for Knowledge Translation

- Technological Tools: Mobile apps, virtual reality, and AI-based platforms are effective in addressing adolescent mental health issues like anxiety, depression, and stress.
- Key Benefits: These technologies provide accessible, personalized, and stigma-free support for adolescents, enabling early and convenient interventions.
- Challenges: Concerns include data privacy, security, and the risks of excessive screen time, which may lead to dependency or social isolation.

Digital platforms, including mobile applications (apps), telepsychology, and therapeutic games, offer new opportunities to engage adolescents in a format that resonates with their communication and interaction preferences. However, the effectiveness of these technologies depends on various factors, including content quality, usability, and the ability to adapt to the individual needs of users (Bear et al., 2022; Liverpool et al., 2020; McCashin & Murphy, 2022; Sohn et al., 2019; Welch et al., 2022). Additionally, constant use of technology can present challenges, such as excessive screen exposure and lack of social interaction, necessitating a careful balance to avoid adverse consequences (Diano et al., 2023).

To ensure the effectiveness of these technological interventions, it is essential to have specialized professionals who can integrate these tools into clinical and educational

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contexts. Psychologists, psychiatrists, and nurses are crucial in selecting and recommending appropriate technologies, monitoring progress, and making necessary adjustments (Sohn et al., 2019).

The promotion of adolescent mental health through the use of technologies is an innovative multidisciplinary field that involves prevention, diagnosis, and intervention in situations of psychological and emotional distress, often exacerbated during this crucial phase of development (Bear et al., 2022). Therefore, mental health technologies aim to provide accessible and practical support to adolescents, enabling early and personalized interventions that can be integrated into their daily lives (Punukollu & Marques, 2019; Sohn et al., 2019).

According to the literature, the use of technologies in promoting mental health can alleviate symptoms of anxiety, depression, and stress among adolescents, providing a safe and controlled environment for emotional expression and the development of coping skills (Punukollu & Marques, 2019; Zhou et al., 2021). Several studies have highlighted the effectiveness of mindfulness apps, online cognitive behavioral therapy (CBT), and anonymous support forums as valuable tools for adolescents (Csirmaz et al., 2023, Wright et al., 2023). However, it is crucial that these resources are scientifically validated and that professionals are trained to guide young people in their use (Rocha et al., 2021).

However, excessive use of technology can also present challenges to adolescent mental health. Excessive time spent on mobile devices can lead to dependency, social isolation, and sleep problems, negatively affecting adolescents' emotional wellbeing (Wright et al., 2023). Additionally, issues related to the privacy and security of adolescents' data remain significant concerns in the context of using technology for mental health (Dosovitsky & Bunge, 2022; Radovic & Badawy, 2020).

Given this scenario, it is essential to develop and implement effective strategies that maximize the benefits of technologies in promoting adolescent mental health while minimizing potential risks. This includes continuous professional training, creating digital health policies, and promoting conscious and balanced use of these tools (Arana-Álvarez et al., 2023; Cullen et al., 2024; Dosovitsky & Bunge, 2022).

From the available evidence on the topic, and in the absence of studies that have mapped the use of technologies promoting better mental health for adolescents, it was necessary to conduct this research. The specific research question was: What are the positive effects of using educational technologies in promoting mental health among adolescents? The protocol was registered in the Open Science Framework (2024).

Materials and Methods

This scoping review was conducted following the methodological guidelines of the Joanna Briggs Institute (JBI, 2024), encompassing all types of studies, including qualitative, quantitative, and mixed-methods studies. The review utilized the items identified in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (JBI, 2024; see Figure 1).

Inclusion criteria were defined based on JBI recommendations using the population, concept, and context (PCC) mnemonic for scoping reviews. The criteria were as follows: Participants: Studies included adolescents aged 10 to 19. Concept: Studies addressing the use of technologies for promoting mental health. Context: Scientific studies on the positive effects of using technologies on adolescent mental health without specific temporal restrictions.

Following the Peer Review of Electronic Search Strategies (PRESS) checklist, two reviewers developed the search strategy, which a third expert reviewed. The following databases were used: PubMed, Cumulative Index of Nursing and Allied Health (CINAHL) via EBSCO, and PsycINFO via EBSCO. The search was limited to articles in English, Portuguese, and/or Spanish, understood by the authors. A preliminary search in PubMed and CINAHL was conducted to identify keywords and indexing terms used in the articles. Based on these findings, the search strategy was adapted for each database. This search was performed on March 17, 2024, with a follow-up search in June 2024, which did not identify any additional articles meeting the inclusion criteria (see Table 1). The reference lists of all included articles were reviewed to identify potential additional studies. Identified themes were added to the Rayyan software, and duplicate studies were removed.

The search strategy used can be seen in Figure 1. All articles were selected based on the relevance of their titles and abstracts. The two leading reviewers independently evaluated the full text of the selected articles in detail, using the inclusion criteria. Data were extracted from the reports and included in the review individually by two reviewers using a data extraction form. The extracted data included the author, year, and country of the study, objectives, and population. Discrepancies in the inclusion of articles or relevant data were resolved through discussion or with the help of a third reviewer.

Results

Characteristics and Study Sample

The initial search identified 1070 articles, including duplicates, with 800 from PUBMED, 120 from the CINAHL database via EBSCO, and 150 from the PsycINFO database via EBSCO. After screening, 1059 articles were excluded, and articles were excluded for the following reasons: inadequate population (48 articles), irrelevant outcomes (964 articles), and irrelevant type of intervention (26 articles). Of the included articles, only 16 could be read in full. These articles were conducted in the following countries: Australia (1), Austria (1), Brazil (1), Canada (1), Scotland (1), Spain (1),

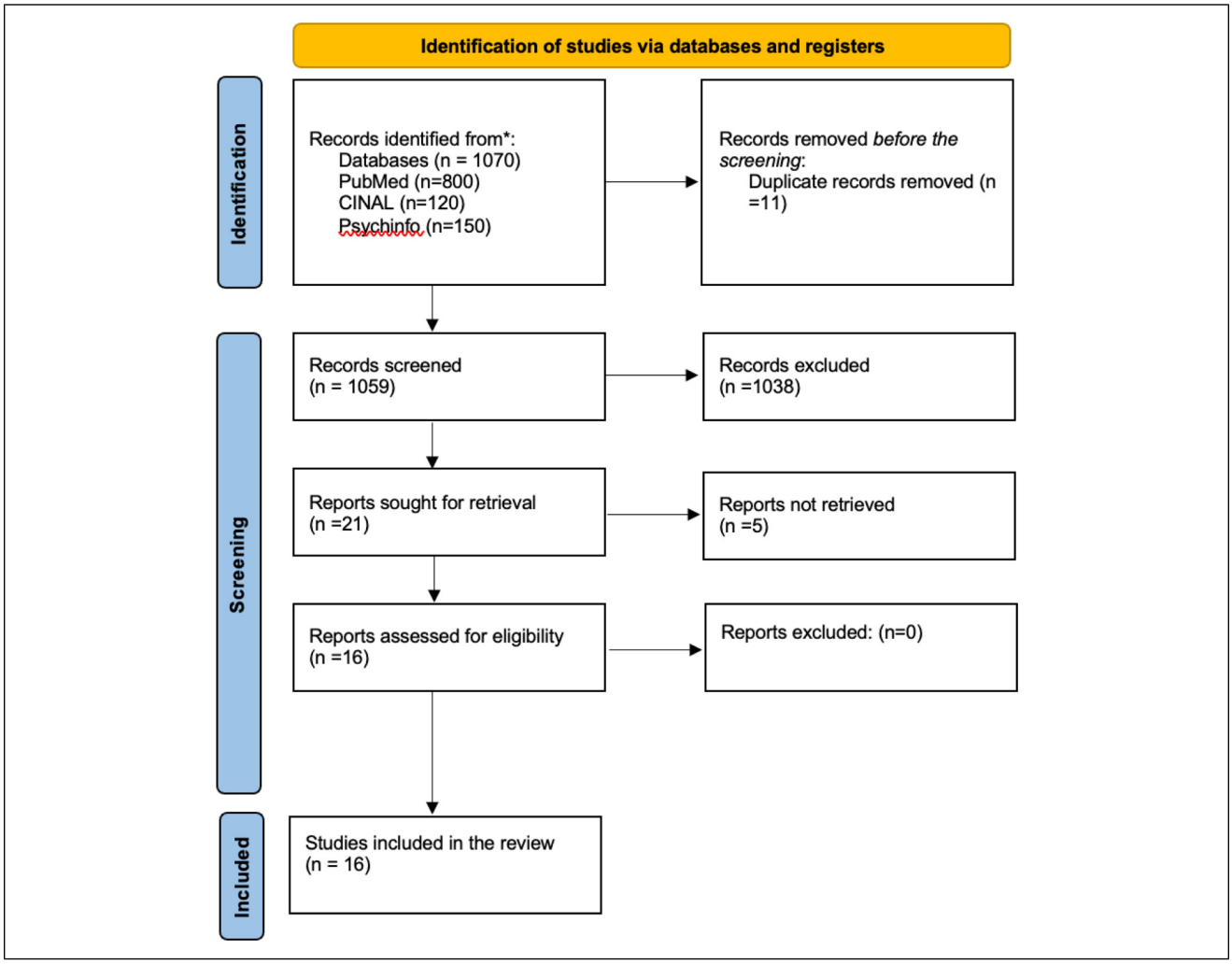

Figure 1. PRISMA flowchart (2020).

the United States (3), Hungary (1), Ireland (1), Italy (1), New Zealand (1), the United Kingdom (2), and Sweden (1). These studies span from 2019 to 2024 (see Table 2, Results of Scoping Review, in Supplemental File).

Characteristics of Technologies Used in Supporting Mental Health in Adolescents

The following topics are contextualized to show how these technologies have emerged and have been implemented to support adolescent mental health. Each intervention is analyzed based on recent studies that demonstrate their benefits. Following the content analysis, five categories emerged: anxiety, depression, stress, suicide prevention, and mental health literacy, where the use of various technologies is described.

Anxiety. Regarding anxiety, nine articles demonstrated significant positive effects with the use of technologies (Csirmaz et al., 2023; Diano et al., 2023; Dosovitsky & Bunge, 2022; Liverpool et al., 2020; McCashin & Murphy, 2022; Punukollu & Marques, 2019; Welch et al., 2022; Wright et al., 2023; Zhou et al., 2021). These studies explored the potential effectiveness of various technological interventions. Meditation apps were designed to help adolescents develop relaxation and mindfulness techniques, aiming to reduce anxiety levels. Additionally, online CBT platforms were created to provide therapies adolescents can follow at their own pace to promote positive cognitive and behavioral changes. Another intervention, artificial intelligence (AI)-based emotional self-management tools such as therapeutic chatbots, aimed to interact with users, offering emotional support and practical strategies for coping with anxiety (Dosovitsky & Bunge, 2022).

Depression. Regarding depression, 12 studies were identified (Arana-Álvarez et al., 2023; Bear et al., 2022; Csirmaz et al., 2023; Cullen et al., 2024; Diano et al., 2023; Dosovitsky & Bunge, 2022; Grudin et al., 2023; Liverpool et al., 2020; Punukollu & Marques, 2019; Radovic & Badawy, 2020;

Table 1. Search Strategy and Results.

Database	Filters	Results	Search strategy (17 March 2024)
PubMed	Last 5 years, English, Portuguese, Spanish	800	Health Promotion [Title/Abstract]) OR (Health Promotion [MeSH Terms])) AND (Mobile phones [Title/ Abstract])) OR (Mobile phones [MeSH Terms])) AND (Adolescent [Title/Abstract])) OR (Adolescent [MeSH Terms])) AND (Mental Health [Title/Abstract])) OR (Mental Health [MeSH Terms])
CINAHL Complete via EBSCO	Last 5 years, English, Portuguese, Spanish	120	TI « Technology » OR AB « Technology » OR MH « Technology ») AND (TI « Health Promotion » OR AB « Health Promotion » OR MH « Health Promotion » OR TI « Mental Health » OR AB « Mental Health » OR MH « Mental Health ») AND (TI « Adolescent » OR AB « Adolescent » OR MH « Adolescent » AND (TI « Technology » OR AB « Technology » OR MH « Technology » AND (TI « Technology » OR AB « Technology » OR MH « Technology ») AND (TI « Health Promotion » OR AB « Health Promotion » OR MH « Health Promotion » OR TI « Mental Health » OR AB « Mental Health » OR MH « Mental Health ») AND ((TI « Technology » OR AB « Technology » OR MH « Technology ») AND (TI « Health Promotion » OR AB « Health Promotion » OR MH « Health Promotion » OR TI « Mental Health » OR AB « Mental Health » OR MH « Mental Health »)) AND (TI « Adolescent » OR AB « Adolescent » OR MH « Adolescent
PsycINFO Complete via EBSCO	Last 5 years, English, Portuguese, Spanish	150	TI "Technology " OR TX " Technology " OR AB " Technology ") AND (TI "Health Promotion" OR TX " Health Promotion" OR AB " Health Promotion" ORTI " Mental Health" OR TX " Mental Health" OR AB " Mental Health")) AND (TI "Adolescent" OR TX " Adolescent" OR AB "Adolescent")) AND (TI " Technology" OR TX " Technology" OR AB " Technology" AND (TI " Technology" OR TX " Technology" OR AB " Technology") AND (TI " Health Promotion" OR TX "Health Promotion" OR AB "Health Promotion" OR TI "Mental Health" OR TX "Mental Health" OR AB "Mental Health") AND ((TI " Technology" OR TX "Technology" OR AB " Technology") AND (TI "Health Promotion" OR TX " Health Promotion" OR AB "Health Promotion" OR TI " Mental Health" OR TX "Mental Health" OR AB "Mental Health")) AND (TI "Adolescent" OR TX " Adolescent" OR AB "Adolescent"))) NOT covid-19

Rocha et al., 2021; Wright et al., 2023; Zhou et al., 2021), revealing positive results using technologies. The investigated technological interventions included psychological support apps, which combine elements of psychology and meditation, proving effective in reducing depressive symptoms. These apps offer activities and games to improve mood and promote mental wellbeing. Additionally, online therapy programs that connect adolescents to therapists through text, audio, and video messages were designed to provide effective support for mental health challenges (Csirmaz et al., 2023). The accessibility and flexibility of these services allow adolescents to receive ongoing psychological support without the traditional barriers of time and travel. Dedicated social networks for mutual support (Cullen et al., 2024; Radovic & Badawy, 2020; Rocha et al., 2021) were also highlighted, providing a safe space for adolescents to share their experiences and receive emotional support. These virtual spaces offer a sense of community and understanding, which is crucial for adolescents coping with depression.

Stress. Regarding stress, two articles showed clear beneficial effects (Bear et al., 2022; Welch et al., 2022). The technologies used in these studies included therapeutic digital games developed explicitly for mental health, which helped adolescents learn coping skills while playing. These games combine elements of fun and therapy, making the process of learning stress management techniques more engaging and effective. Additionally, stress monitoring apps assist adolescents in tracking their stress levels through questionnaires, providing immediate and personalized feedback on reducing stress. These apps encourage regular self-care practices and mindfulness. Meanwhile, coping skills training platforms offer breathing exercises and relaxation techniques that help adolescents manage stress more effectively. These platforms provide educational and practical resources for dealing with everyday stress.

Suicide Prevention. Two articles (Diano et al., 2023; Punukollu & Marques, 2019) were identified that demonstrated significant positive effects in suicide prevention

using digital technology. These apps allow adolescents to seek immediate help and receive reminders of coping strategies, reducing feelings of hopelessness.

AI algorithms on social networks, implemented by companies like Facebook, monitor posts to detect patterns associated with suicide risk, sending alerts and information on how to seek help (Punukollu & Marques, 2019). Chatbots using CBT techniques provide immediate emotional support and help adolescents cope with suicidal thoughts. Online helplines also offer 24/7 support, providing quick and anonymous access to assistance (Rocha et al., 2021).

Mental Health Literacy. Four articles (Arana-Álvarez et al., 2023; Cullen et al., 2024; Radovic & Badawy, 2020; Rocha et al., 2021) were identified that demonstrated positive effects in enhancing learning through the use of technologies. They provide methods based on gamification and instant feedback, making learning more engaging and less stressful. These technologies aim to educate adolescents about mental health issues, including recognizing symptoms, seeking help, and promoting wellbeing.

Discussion

The use of technologies in promoting adolescent mental health represents a crucial area of investigation, notable for its potential effectiveness in mitigating emotional and behavioral challenges during this critical phase of development. Therefore, the aim was to identify available evidence regarding the use of educational technologies in promoting mental health among adolescents aged 10 to 19 years. Considering the increasing use of digital tools and the importance of addressing mental health issues in this age group, this study sought to map the use of technologies that promote better mental health for adolescents.

Adolescence is a critical phase in which many teenagers face emotional and social challenges that can contribute to increased anxiety. Digital technologies offer a practical and discreet solution, allowing adolescents to seek help and support without the stigma often associated with seeking traditional treatment. These technologies can be easily integrated into adolescents' daily lives, thus providing support when and where they need it most (Bear et al., 2022; Diano et al., 2023; Liverpool et al., 2020; Welch et al., 2022).

Mindfulness and meditation apps like Smiling Mind, Calm, and Headspace have demonstrated numerous benefits for adolescents who use them regularly. Smiling Mind, specifically designed for adolescents, offers tailored programs such as guided meditations, interactive activities, mood-tracking tools, and school educational programs. Similarly, Calm and Headspace, aimed at adolescents, provide an interactive experience designed to promote calmness and relaxation through activities like collecting items, appreciating the beauty of the environment, or engaging in small actions that encourage relaxation. All three apps are effective in reducing levels of anxiety, depression, and stress while also enhancing overall wellbeing. Data indicates that accessibility and engagement provided by these technologies are crucial for supporting adolescents' mental health and wellbeing (Bear et al., 2022). Regular exposure to these apps not only provides immediate benefits such as reducing anxiety and stress levels but also contributes to developing coping skills and emotional regulation that benefit adolescents in their future lives. This impact can be particularly significant in educational settings with high academic and social pressures.

The use of platforms like TikTok and Facebook to disseminate content related to mental health has shown potential in reducing depressive symptoms and enhancing emotional resilience among adolescents (Csirmaz et al., 2023; Punukollu & Marques, 2019). When used to deliver positive and educational mental health content, these platforms may influence adolescents' emotional wellbeing by providing additional resources for psychological support and strategies for coping with emotional challenges.

However, despite being one of the most popular social networks, platforms like Facebook are currently not the preferred choice among adolescents, who opt for other digital platforms. This shift reduces Facebook's effectiveness in promoting mental health among young people because they do not use the social network frequently. To effectively promote mental health among adolescents, it is essential to utilize social media platforms that adolescents use and where they are most engaged (Punukollu & Marques, 2019).

In the context of suicide prevention, emerging technologies such as AI algorithms and chatbots have been crucial in identifying risk patterns and providing immediate emotional support to adolescents in crisis, as observed in studies by Diano et al. (2023) and Punukollu and Marques (2019). These interventions not only provide an anonymous support channel but also help reduce feelings of hopelessness among vulnerable adolescents. Additionally, interactive educational initiatives such as virtual reality (VR) and AI to enhance mental health literacy can be effective in empowering adolescents to manage stress and promote healthy habits, as indicated by recent studies (Rocha et al., 2021).

Interactive educational initiatives incorporating VR and AI better empower adolescents to manage stress than interventions lacking these technological components (Bear et al., 2022; Welch et al., 2022). Adolescents tend to perceive educational initiatives using VR and AI as more relevant and engaging than conventional methods, contributing to better learning and application of mental health knowledge (Dosovitsky & Bunge, 2022; Rocha et al., 2021; Zhou et al., 2021). The benefits derived from interactive educational initiatives with VR and AI are more sustainable in the long term compared to those from traditional interventions (Liverpool et al., 2020).

The growing importance of technologies as allies in promoting adolescent mental health is evidenced by the results presented, indicating that when well implemented, these

technological tools can offer significant and accessible support, contributing to the reduction of anxiety, depression, stress, and suicide among adolescents (Bear et al., 2022; McCashin & Murphy, 2022; Radovic & Badawy, 2020; Zhou et al., 2021). Technologies not only expand access to mental health resources but also provide personalized and flexible interventions tailored to the specific needs of adolescents. For instance, mobile apps and online platforms utilize interactive and personalized tools, including breathing exercises, mindfulness techniques, and educational games, to help adolescents identify and manage stress in real time (Zhou et al., 2021).

VR technologies provide immersive learning experiences that enhance information retention and learning motivation. Time management tools assist adolescents in planning and managing their school tasks, thereby reducing stress. Mindfulness and meditation apps integrated into educational environments help develop relaxation techniques and improve focus. Literacy plays a fundamental role in educating adolescents about mental health in an accessible and educational manner. Mobile apps and online platforms offer resources that explain mental conditions and relaxation techniques and connect users with mental health professionals. VR and AI tools interactively educate about brain function and identify mental health warning signs. These technologies empower adolescents to understand their mental health better and make informed decisions about self-care, promoting greater awareness and self-management.

The results presented reaffirm the importance of technologies in promoting adolescent mental health, demonstrating their effectiveness across areas such as anxiety, depression, stress, suicide prevention, and mental health literacy. However, it is crucial to continue investigating these interventions more comprehensively and inclusively, addressing current limitations and exploring ways to make these technologies more accessible and equitable for all adolescents (Cullen et al., 2024; Punukollu & Marques, 2019).

However, it is equally important to acknowledge the risks associated with these platforms, such as the promotion of harmful content, including excessive focus on physical appearance or algorithms that amplify exposure to suicidal ideation. These issues, often more severe than concerns like excessive screen time or social isolation, highlight the need for careful monitoring and regulation to ensure these tools truly benefit adolescent mental health (Livingstone & Smith, 2014; Nesi, 2020; O'Reilly et al., 2018).

In summary, various technologies have proven effective in promoting adolescent mental health in five main areas: anxiety, depression, stress, suicide prevention, and mental health literacy. For anxiety, meditation apps, online CBT platforms, and emotional self-management tools based on AI, including therapeutic chatbots, were utilized. These interventions were effective in reducing anxiety levels, promoting relaxation techniques and mindfulness, and providing emotional support (Csirmaz et al., 2023; Diano et al., 2023; Dosovitsky & Bunge, 2022; Liverpool et al., 2020; McCashin & Murphy, 2022; Punukollu & Marques, 2019; Welch et al., 2022; Wright et al., 2023; Zhou et al., 2021). In the case of depression, psychological support apps, online therapy programs, and dedicated social networks for mutual support were employed. These technologies reduced depressive symptoms, improved mood, provided continuous psychological support, and fostered a sense of community among adolescents (Arana-Álvarez et al., 2023; Bear et al., 2022; Csirmaz et al., 2023; Cullen et al., 2024; Diano et al., 2023; Dosovitsky & Bunge, 2022; Grudin et al., 2023; Liverpool et al., 2020; Punukollu & Marques, 2019; Radovic & Badawy, 2020; Rocha et al., 2021; Wright et al., 2023; Zhou et al., 2021).

Regarding stress, therapeutic digital games, stress monitoring apps, and coping skills training platforms were used. These tools helped adolescents learn coping skills, monitor their stress levels, and provide immediate and personalized feedback (Bear et al., 2022; Welch et al., 2022). For suicide prevention, apps allowing immediate help requests and AI algorithms on social media to detect suicide risks were highlighted. Therapeutic chatbots and online support also effectively provided immediate emotional support (Diano et al., 2023; Zhou et al., 2021). Finally, in mental health literacy, game-based technologies and instant feedback effectively enhanced learning, making it more engaging and less stressful (Arana-Álvarez et al., 2023; Cullen et al., 2024; Radovic & Badawy, 2020; Rocha et al., 2021).

While these advancements are promising, it is essential to recognize challenges and limitations. The practical implementation of these technologies requires ethical considerations, such as data privacy and security, and the ongoing need for rigorous evaluation of clinical effectiveness and long-term impact on adolescent mental health. Low adherence to apps can also be attributed to the stigma associated with mental health. Many adolescents still face prejudices and misunderstandings about the importance of mental health care. Stigma can discourage young people from seeking or using these tools, even when available and accessible. This social barrier prevents many adolescents from benefiting from resources that could improve their mental and emotional wellbeing.

Conclusions

Based on the review evidence, it is clear that using technology to promote adolescent mental health is a promising intervention area. The discoveries have shown that digital platforms and apps have the potential to provide significant support, offering access to educational resources, support communities, and emotional monitoring tools. These results are particularly relevant given the growing concern about mental health issues among adolescents, demonstrating that technology can play a crucial role in addressing these challenges.

From a practical perspective, the findings suggest significant implications for health-care professionals, educators, and policymakers, highlighting the importance of integrating digital technologies into early intervention programs. However, while the benefits of these technologies are evident, it is crucial to address their limitations and risks more comprehensively. This includes the potential for algorithms to inadvertently amplify harmful content, such as promoting body dysmorphia or reinforcing suicidal thoughts, which can undermine their intended mental health benefits. These serious risks highlight the need for stricter algorithmic accountability, ethical design, and enhanced content moderation to safeguard adolescent users.

Furthermore, this study contributes to advancing the literature by highlighting the effectiveness of technological interventions and emphasizing their limitations. These include small sample sizes, the lack of longitudinal studies, limited exploration of diverse populations, and risks posed by excessive screen time and social isolation. Addressing these gaps presents opportunities for future research to prioritize ethical considerations, intervention customization, and long-term impact assessments. By doing so, the field can advance toward more effective and responsible practices tailored to the complex needs of contemporary adolescents.

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Supplemental Material

Supplemental material for this article is available online.

References

Arana-Álvarez, C., Gómez-Asencio, D., Gago-Valiente, F. J., Cabrera-Arana, Y., Merino-Godoy, M. A., & Moreno-Sánchez, E. (2023). Virtual pedagogy and care: Systematic review on educational innovation with mobile applications for the development of healthy habits in the adolescent population. *Nutrients*, *15*(18), 3966. https://doi.org/10.3390/nu15183966

Bear, H. A., Nunes, L. A., DeJesus, J., Liverpool, S., Moltrecht, B., Neelakantan, L., Harriss, E., Watkins, E., & Fazel, M. (2022). Determination of markers of successful implementation of mental health apps for young people: Systematic review. *Journal of Medical Internet Research*, *24*(11), e40347. https://doi.org/10.2196/40347

Csirmaz, L., Nagy, T., Vikor, F., & Kasos, K. (2023). Cognitive behavioral digital interventions are effective in reducing anxiety in children and adolescents: A systematic review and meta-analysis. *Journal of Prevention*, *45*(2), 237–267. https://doi.org/10.1007/s10935-023-00760-0

Cullen, J., Muntz, A., Marsh, S., Simmonds, L., Mayes, J., O'Neill, K., & Duncan, S. (2024). Impact of digital technologies on health and wellbeing of children and adolescents: A narrative review. *New Zealand Journal of Physiotherapy*, *52*(1), 62–78. https://doi.org/10.15619/nzjp.v52i1.364

Diano, F., Sica, L. S., & Ponticorvo, M. (2023). A systematic review of mobile apps as an adjunct to psychological interventions for emotion dysregulation. *International Journal of Environmental Research and Public Health*, *20*(2), 1431. https://doi.org/10.3390/ijerph20021431

Dosovitsky, G., & Bunge, E. (2022). Development of a chatbot for depression: Adolescent perceptions and recommendations. *Child and Adolescent Mental Health*, *28*(1), 124–127. https://doi.org/10.1111/camh.12627

Grudin, R., Vigerland, S., Ahlen, J., Widström, H., Unger, I., Serlachius, E., & Engberg, H. (2023). Therapy without a therapist?' The experiences of adolescents and their parents of online behavioural activation for depression with and without therapist support. *European Child & Adolescent Psychiatry*, *33*(1), 105–114. https://doi.org/10.1007/s00787-023-02142-7

Joanna Briggs Institute (JBI). (2024). *Scoping reviews—Resources*. JBI Global. https://jbi.global/scoping-review-network/resource

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

Livingstone, S., & Smith, P. K. (2014). Annual research review: Harms experienced by child users of online and mobile technologies: The nature, prevalence, and management of sexual and aggressive risks in the digital age. *Journal of Child Psychology and Psychiatry*, *55*(6), 635–654. https://doi.org/10.1111/jcpp.12197

McCashin, D., & Murphy, C. M. (2022). Using TikTok for public and youth mental health: A systematic review and content analysis. *Clinical Child Psychology and Psychiatry*, *28*(1), 279–306. https://doi.org/10.1177/13591045221106608

Nesi, J. (2020). The impact of social media on youth mental health: Challenges and opportunities. *North Carolina Medical Journal*, *81*(2), 116–121. https://doi.org/10.18043/ncm.81.2.116

O'Reilly, M., Dogra, N., Whiteman, N., Hughes, J., Eruyar, S., & Reilly, P. (2018). Is social media bad for mental health and wellbeing? Exploring the perspectives of adolescents. *Clinical Child*

Psychology and Psychiatry, *23*(4), 601–613. https://doi.org/10.1177/1359104518775154

Open Science Framework. (2024). Accessed June 11, 2024. https://osf.io/v3sqe. https://doi.org/10.17605/OSF.IO/EAK24

Punukollu, M., & Marques, M. (2019). Use of mobile apps and technologies in child and adolescent mental health: A systematic review. *Evidence-Based Mental Health*, *22*(4), 161–166. https://doi.org/10.1136/ebmental-2019-300093

Radovic, A., & Badawy, S. M. (2020). Technology use for adolescent health and wellness. *Pediatrics*, *145*(Suppl. 2), S186–S194. https://doi.org/10.1542/peds.2019-2056g

Rocha, S. P., Teodoro, L., Maristela, M., Maris, S., Castro-Silva, I. I., Kristine, K., & Teixeira, I. X. (2021). Mental health in adolescence: Elaboration and validation of an educational technology for health promotion. *Revista Brasileira de Enfermagem*, *74*(5), Article e20201023. https://doi.org/10.1590/0034-7167-2020-1023

Sohn, S., Rees, P., Wildridge, B., Kalk, N. J., & Carter, B. R. (2019). Prevalence of problematic smartphone usage and associated mental health outcomes amongst children and young people: A systematic review, meta-analysis and GRADE of the evidence. *BMC Psychiatry*, *19*(1), Article 356. https://doi.org/10.1186/s12888-019-2350-x

Welch, V., Ligezka, A., Hassett, L. C., Croarkin, P. E., Athreya, A. P., & Romanowicz, M. (2022). Use of mobile and wearable artificial intelligence in child and adolescent psychiatry: Scoping review. *Journal of Medical Internet Research*, *24*(3), e33560. https://doi.org/10.2196/33560

Wright, M., Reitegger, F., Cela, H., Papst, A., & Gasteiger-Klicpera, B. (2023). Interventions with digital tools for mental health promotion among 11–18 year olds: A systematic review and meta-analysis. *Journal of Youth and Adolescence*, *52*(4), 754–779. https://doi.org/10.1007/s10964-023-01735-4

Zhou, X., Edirippulige, S., Bai, X., & Bambling, M. (2021). Are online mental health interventions for youth effective? A systematic review. *Journal of Telemedicine and Telecare*, *27*(10), 638–666. https://doi.org/10.1177/1357633(211047285

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