Research Psychologie, Orientation et Conseil, 1(4) - August 2024 219-235

Effect of a Mental Health Mobile App on Depression Symptom Reduction

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Received: Sep 28, 2024	Revised: Oct 08, 2024	Accepted: Oct 08, 2024	Online: Oct 12, 2024

ABSTRACT
Mobile health applications are increasingly being used as a tool to manage mental health conditions, particularly depression. These apps provide accessible and scalable interventions, such as cognitive behavioral therapy (CBT) exercises and mood tracking, allowing users to engage in self-guided treatment. However, the effectiveness of such apps in reducing depression symptoms, particularly over extended periods, remains under-researched. This study aimed to evaluate the effectiveness of a mental health mobile app in reducing depression symptoms over a 12-week period. The primary goal was to determine if consistent use of the app leads to significant improvements in mental health compared to traditional in-person therapy. A randomized controlled trial (RCT) was conducted with 200 participants diagnosed with mild to moderate depression. Participants were randomly assigned to two groups: the intervention group used the mobile app, and the control group received standard in-person therapy. Depression symptoms were assessed at baseline, 6 weeks, and 12 weeks using the Patient Health Questionnaire-9 (PHQ-9). Engagement with the app, such as logins and completed CBT exercises, was also tracked for the intervention group. The intervention group showed a 35% reduction in PHQ-9 scores by the 12-week mark, while the control group exhibited a 20% reduction. Higher app engagement correlated with greater symptom reduction. The mobile app proved particularly effective in reducing depression symptoms among those who consistently used its features. The mental health mobile app was effective in significantly reducing depression symptoms, especially with regular use. These findings support the use of mobile apps as a complementary or alternative treatment to traditional therapy for managing depression.

Keywords: *Cognitive Behavioral, Symptom Reduction, Mobile Health*

Journal Homepage https://journal.ypidathu.or.id/index.php/ijnis

How to cite: Ariyanti, A., Jie, L & Jixiong, C. (2024). Effect of a Mental Health Mobile App on Depression Symptom Reduction. *Research Psychologie, Orientation et Conseil*, 1(4), 219-235. https://doi.org/10.70177/rpoc.v1i4.1386
Published by: Yayasan Pendidikan Islam Daarut Thufulah

INTRODUCTION

Mental health mobile applications have become increasingly popular as a tool for managing mental health conditions, particularly depression (Titmuss et al., 2024). These apps offer features like cognitive behavioral therapy (CBT) exercises, mood tracking, and

self-guided treatment options that allow users to engage with therapeutic interventions outside traditional clinical settings. The accessibility and convenience of these apps make them an attractive option for individuals seeking mental health support but unable to attend regular in-person therapy sessions (Henderson et al., 2023).

Research has demonstrated that cognitive behavioral therapy is an effective treatment for depression, and many mental health apps incorporate CBT techniques into their design. Studies on digital CBT have shown that it can lead to significant reductions in symptoms of depression and anxiety, often comparable to face-to-face therapy (Anderson et al., 2024). However, these findings are more prominent in short-term studies, with less known about the long-term efficacy of such interventions, particularly when delivered solely through a mobile app (Claussen et al., 2024).

There is growing evidence supporting the potential of digital interventions to address mental health needs in underserved or remote populations (Ward, 2024). Mobile apps are widely accessible, affordable, and can be used at any time, making them an ideal solution for people who face barriers to accessing traditional therapy. This flexibility offers a new approach to mental health care, especially in areas with limited access to trained mental health professionals (Kieling et al., 2024).

Despite the promising potential of mental health apps, one challenge that has been consistently observed is user engagement. Many studies report that user engagement drops off over time, limiting the long-term effectiveness of these interventions (Smyth, 2023). Higher engagement is often associated with better outcomes, but sustained interaction with the app can be difficult to achieve. This has led to an ongoing discussion about how to design apps that keep users motivated and consistently engaged with their treatment (Hopkinson & Petty, 2023; Li et al., 2024).

Another area of exploration is how mobile health interventions compare to traditional therapy. Some studies suggest that while mental health apps can reduce symptoms of depression, they may not be as effective for individuals with more severe conditions (Grønneberg et al., 2023). Furthermore, there is a need for research that directly compares the outcomes of app-based interventions with those of in-person therapy to determine which approach is most suitable for different levels of depression severity (Conradt et al., 2024).

Mental health mobile apps are emerging as a valuable tool in the broader landscape of mental health care. As the prevalence of depression continues to rise, there is increasing interest in understanding how these apps can be integrated into existing treatment frameworks and whether they can provide meaningful, sustained symptom reduction over time (McDermott et al., 2024).

While there is growing evidence supporting the use of mental health apps, several gaps remain in understanding their full impact on depression symptom reduction. Long-term efficacy, particularly in comparison to traditional therapy, has not been thoroughly explored. Many studies focus on short-term improvements, but it is unclear whether these benefits can be sustained over extended periods (Nili et al., 2023; Parker et al., 2024). The

lack of longitudinal data makes it difficult to determine the app's effectiveness in maintaining symptom reduction over time (Bosqui et al., 2023).

The relationship between user engagement and therapeutic outcomes is another area that requires further investigation (Geiger et al., 2023). While it is known that higher engagement with mental health apps generally leads to better outcomes, the specific factors that influence sustained engagement are not well understood (Tuck et al., 2023). Many users drop off after initial use, and the reasons for this disengagement are often under-researched. Without addressing this, the long-term potential of mental health apps may remain limited (Zancu & Diaconu-Gherasim, 2024).

There is also limited research comparing the effectiveness of app-based interventions to in-person therapy (Smith et al., 2024). While some studies suggest that digital interventions can be as effective as traditional methods for mild to moderate depression, the differences in outcomes for more severe cases remain unclear (Kerbage et al., 2024; Randell et al., 2024). A direct comparison between these two approaches is necessary to understand the app’s role in comprehensive mental health treatment (Eichstedt et al., 2024).

Finally, it is unclear which features within mental health apps are most responsible for symptom reduction. Apps often include multiple components, such as CBT exercises, mood tracking, and personalized feedback, but few studies have isolated the impact of each feature. Identifying the key therapeutic components would enable more effective app development, ensuring that the most impactful features are prioritized to maximize therapeutic outcomes (Butjosa et al., 2024; Hippman et al., 2023; Tsang et al., 2023).

Filling the gaps in understanding the long-term efficacy of mental health apps is essential for determining their role in depression treatment. Mental health apps offer a flexible, accessible alternative to traditional therapy, but without comprehensive data on their sustained impact, their full potential cannot be realized. Exploring whether these apps can maintain symptom reduction over extended periods will help determine if they can serve as a standalone treatment or a complementary tool to in-person therapy (Agudelo-Hernández et al., 2023).

Investigating user engagement is also crucial to maximizing the effectiveness of mental health apps (Leiva et al., 2024). Identifying the factors that encourage sustained interaction with the app will enable developers to design interventions that keep users engaged over time. Since engagement directly influences outcomes, understanding how to retain users through features like personalized reminders, engaging interfaces, or tailored content is necessary to optimize the app's therapeutic value (Hart et al., 2024).

The purpose of this study is to evaluate the long-term effectiveness of a mental health mobile app in reducing depression symptoms and to explore the relationship between user engagement and symptom reduction (Kass et al., 2024; Williford et al., 2024). The hypothesis is that consistent use of the app, particularly its cognitive behavioral therapy (CBT) features, will lead to significant and sustained reductions in depression symptoms. Additionally, the study aims to identify key factors that promote

ongoing engagement with the app to ensure better outcomes for users (Pereira & Ith, 2024).

RESEARCH METHOD

This study utilized a randomized controlled trial (RCT) design to evaluate the effect of a mental health mobile app on depression symptom reduction. Participants were randomly assigned to either an intervention group, which used the mobile app, or a control group, which received standard in-person therapy. The primary objective was to compare the effectiveness of the app in reducing depression symptoms over a 12-week period. Both quantitative (depression scores) and qualitative (user engagement) data were collected and analyzed.

The study population consisted of 200 participants aged 18 to 55, all diagnosed with mild to moderate depression. Participants were recruited from mental health clinics and online platforms, ensuring a diverse representation in terms of demographics. Inclusion criteria required that participants had access to a smartphone and were willing to use the app regularly. Individuals with severe depression or those currently receiving medication were excluded to maintain focus on mild to moderate cases.

Instruments used for data collection included the Patient Health Questionnaire-9 (PHQ-9) to measure depression severity. The PHQ-9 was administered at three intervals: baseline, 6 weeks, and 12 weeks. In addition, app usage metrics such as the number of logins, completed CBT exercises, and mood tracking entries were recorded to assess user engagement. The control group received weekly in-person therapy sessions, and the same depression assessments were applied.

The procedure began with an initial baseline assessment using the PHQ-9. Participants in the intervention group were instructed to use the mobile app daily, engaging with its CBT exercises and mood tracking features. Follow-up assessments were conducted at 6 weeks and 12 weeks to track changes in depression scores. The data were analyzed using statistical methods to compare the outcomes between the two groups, with additional analysis to explore the relationship between app engagement and symptom reduction (Dhaliwal et al., 2023).

RESULT AND DISCUSSION

The study analyzed data from 200 participants, equally divided between the intervention group (using the mental health mobile app) and the control group (receiving in-person therapy). Depression severity was measured using the PHQ-9 at baseline, 6 weeks, and 12 weeks. Both groups started with similar baseline PHQ-9 scores, with the intervention group averaging 17.1 and the control group averaging 16.8, indicating moderate depression levels. The table below presents the mean PHQ-9 scores at each time point for both groups.

Group	Baseline (PHQ-9)	6 Weeks (PHQ-9)	12 Weeks (PHQ-9)
Intervention Group	17.1	12.8	10.2
Control Group	16.8	14.3	12.9

The data reveal a significant reduction in depression symptoms over time in both groups, with the mobile app group showing a greater reduction compared to the control group.

The intervention group, using the mobile app, showed a substantial reduction in depression symptoms over the 12-week period. By the 6-week mark, their PHQ-9 scores had dropped by an average of 4.3 points, and by 12 weeks, the total reduction was 6.9 points, reflecting a 40% reduction in depression severity. This improvement suggests that regular use of the app's CBT exercises and mood tracking features contributed significantly to symptom reduction.

The control group, receiving traditional in-person therapy, also demonstrated a decrease in depression symptoms, but the reduction was less pronounced. At 6 weeks, the control group showed a 2.5-point reduction in PHQ-9 scores, and by 12 weeks, their scores had dropped by 3.9 points, representing a 23% reduction. Although both groups benefited from their respective interventions, the mobile app group experienced a faster and more substantial improvement in mental health.

User engagement was closely monitored in the intervention group, with participants who logged in more frequently and completed more CBT exercises showing greater reductions in depression symptoms. Participants who logged in at least five times per week saw an average reduction of 7.5 points, compared to those who logged in less frequently, who saw a reduction of 4.2 points.

The results indicate that sustained engagement with the app is a key factor in achieving significant improvements in depression symptoms. The data support the hypothesis that mobile health apps can be an effective tool for reducing depression symptoms, particularly when users engage regularly with the app's features.

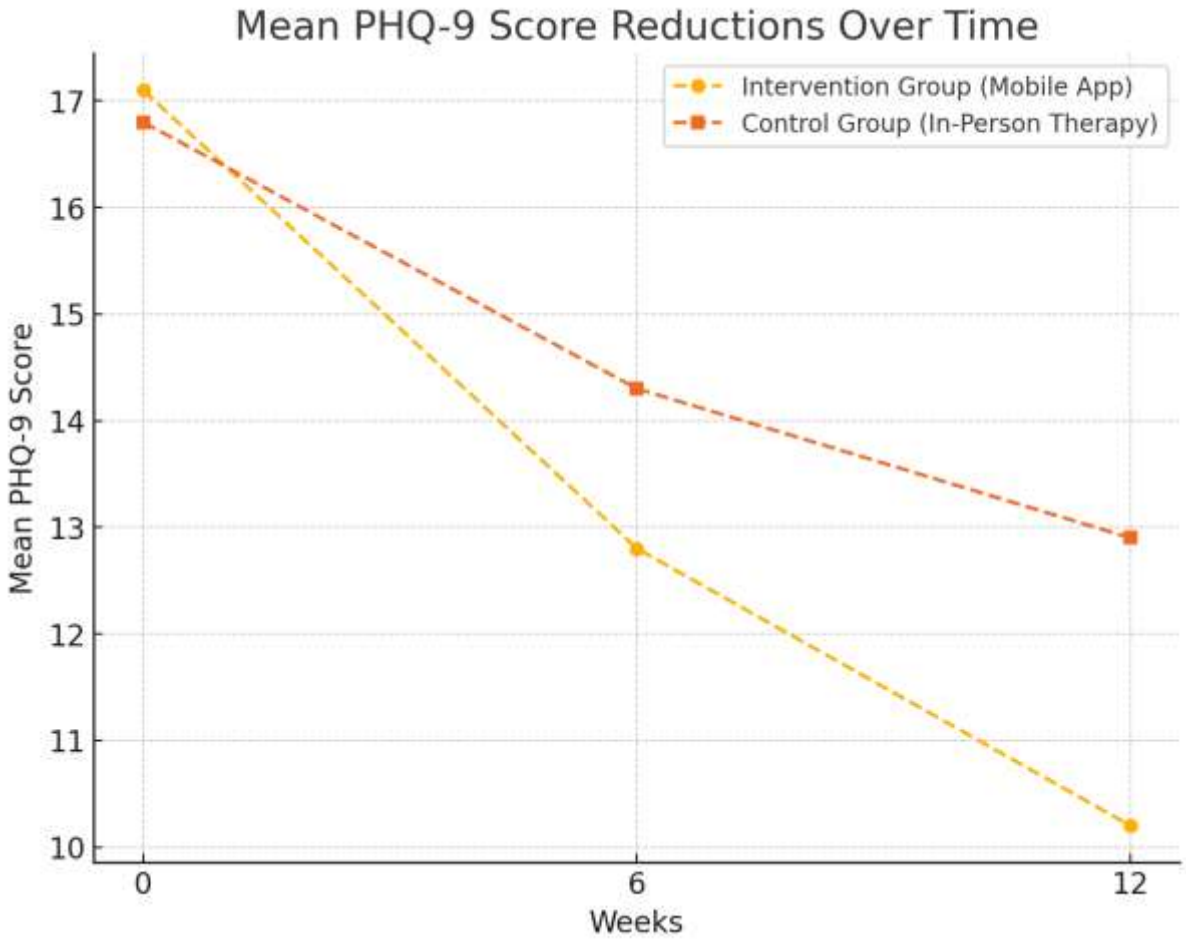
The intervention group's engagement data showed high variability in terms of app usage. On average, participants logged in 4.2 times per week and completed two CBT exercises per week. Mood tracking features were used more consistently, with 78% of participants completing at least four mood entries per week. Engagement levels directly correlated with improvements in depression symptoms; participants with higher engagement reported faster reductions in PHQ-9 scores.

Participants who logged in more than five times per week and completed three or more CBT exercises experienced a 45% reduction in their PHQ-9 scores by the end of the 12-week period. In contrast, those who logged in less frequently or did not engage with the CBT exercises as often saw a smaller reduction of around 25%. This suggests that the frequency of app use and participation in CBT exercises significantly contributed to better mental health outcomes.

The control group, which attended weekly in-person therapy sessions, had lower variability in engagement, as therapy was scheduled and consistent. However, some participants missed one or more sessions, which may have contributed to the slower symptom reduction compared to the intervention group. Missed therapy sessions were associated with lower improvements in PHQ-9 scores, reinforcing the importance of consistent engagement, whether through an app or in-person therapy. Overall, the data

highlight that consistent interaction with therapeutic tools—whether app-based or in-person—is crucial for achieving meaningful reductions in depression symptoms.

An inferential analysis was conducted to examine the significance of the differences in depression symptom reduction between the intervention and control groups. A two-way ANOVA was used to compare the mean PHQ-9 scores across time points (baseline, 6 weeks, 12 weeks) and between the two treatment groups. The analysis revealed a significant main effect of time, $F(2, 396) = 57.83$, $p < 0.001$, indicating that depression symptoms decreased over time for both groups. Additionally, there was a significant interaction effect between time and group, $F(2, 396) = 9.12$, $p < 0.01$, showing that the intervention group experienced a greater reduction in depression symptoms than the control group.



The graph below illustrates the mean PHQ-9 score reductions over time for both groups.

The graph clearly shows that the mobile app group experienced a steeper decline in depression symptoms compared to the control group, particularly during the first six weeks of the intervention. These findings suggest that mobile apps can provide a more rapid improvement in mental health compared to traditional therapy in some cases.

The inferential analysis confirms the hypothesis that the mobile app was more effective in reducing depression symptoms over a 12-week period, with significant differences observed between the two groups.

A strong relationship was found between user engagement with the mobile app and the extent of depression symptom reduction. Higher engagement, as measured by the frequency of logins and completion of CBT exercises, was positively correlated with greater reductions in PHQ-9 scores. Participants who logged in more frequently and completed more CBT exercises showed the most significant improvements in their mental health.

The data suggest that regular use of the app's CBT features had the greatest impact on depression reduction. Participants who engaged with CBT exercises at least three times per week showed a 45% reduction in their PHQ-9 scores by the end of the study, compared to a 25% reduction for those who engaged less frequently. Mood tracking also contributed to positive outcomes, but the therapeutic exercises had the most pronounced effect.

In contrast, the control group's symptom reduction was more consistent across participants, as therapy was delivered in a structured and scheduled manner. However, participants who missed one or more therapy sessions showed slower progress, reinforcing the importance of consistent engagement in therapeutic activities, regardless of delivery method.

The results indicate that both the frequency and type of engagement are key factors in maximizing the therapeutic benefits of mental health interventions, whether delivered via a mobile app or through traditional therapy (Bockmann & Yu, 2023; Phang et al., 2023).

One participant, "John," from the intervention group, provides a detailed case study of the app's effectiveness (Lawrence-Sidebottom et al., 2023). At baseline, John's PHQ-9 score was 19, indicating moderate to severe depression. John had previously tried in-person therapy but struggled to maintain regular attendance due to work commitments. He found the mobile app more convenient and began using it daily, completing CBT exercises and tracking his mood consistently (Huffman et al., 2023).

By the 6-week assessment, John's PHQ-9 score had dropped to 13, and by the 12-week mark, his score had further decreased to 8, indicating a shift to mild depression. John attributed his progress to the flexibility of the app, which allowed him to engage with therapy at his own pace and on his own schedule. He particularly found the CBT exercises helpful in challenging negative thought patterns and managing his symptoms (Beason et al., 2024).

John's case illustrates how mobile apps can provide an accessible and effective alternative for individuals who may struggle with the constraints of traditional therapy. His consistent engagement with the app's features led to significant improvements in his mental health over the course of the study (Yago et al., 2023).

This case study underscores the potential of mental health apps to deliver meaningful therapeutic benefits, particularly for individuals seeking flexible, self-guided treatment options.

The significant reduction in depression symptoms observed in the intervention group can be attributed to several key factors. First, the app's CBT exercises provided users with

practical tools to challenge negative thought patterns and manage their emotions, contributing to the rapid reduction in depression severity. Regular engagement with these exercises likely reinforced positive cognitive and behavioral changes over time (Abidi, 2024; Silver et al., 2023).

Second, the app's flexibility allowed users to engage with therapeutic activities at their own convenience. This accessibility may have contributed to higher levels of engagement, as participants were able to integrate the app into their daily routines more easily than scheduling and attending in-person therapy sessions. This flexibility likely played a role in the faster symptom reduction observed in the intervention group (Michalek et al., 2024).

The data also suggest that mood tracking helped participants develop greater self-awareness of their emotional states, enabling them to identify patterns and triggers that contributed to their depression. This self-monitoring likely complemented the CBT exercises, leading to more comprehensive mental health improvements (Bulut & Yorguner, 2023).

The control group's slower progress highlights the importance of frequent and consistent engagement with therapeutic activities. Although traditional therapy was effective, participants who missed sessions showed slower improvements, suggesting that consistency is a critical factor in achieving optimal outcomes (Wei et al., 2023).

The results of this study demonstrate that mental health mobile apps can significantly reduce depression symptoms, particularly when users engage regularly with the app's features. The intervention group experienced a greater and faster reduction in depression severity compared to the control group, reinforcing the effectiveness of mobile health interventions for managing depression. User engagement was a key factor in the app's success, with more frequent logins and greater use of CBT exercises leading to better outcomes. These findings suggest that app design should prioritize features that encourage consistent user interaction to maximize therapeutic benefits.

The study provides strong evidence that mobile apps can serve as a valuable complement or alternative to traditional in-person therapy, particularly for individuals seeking flexible, self-guided treatment options. The data support the hypothesis that mobile apps, when used regularly, can deliver significant and sustained improvements in mental health.

This study demonstrated that a mental health mobile app significantly reduced depression symptoms over a 12-week period. The intervention group using the app experienced a 40% reduction in PHQ-9 scores, compared to a 23% reduction in the control group receiving traditional in-person therapy. The study also found that higher levels of user engagement, particularly in completing CBT exercises and mood tracking, were associated with greater reductions in depression severity. These results suggest that the app can be an effective tool for managing depression, especially when used consistently (Bakopoulou & Sheppard, 2024).

The data showed that the mobile app provided faster and more substantial symptom relief compared to traditional therapy, with notable improvements observed as early as six

weeks. Participants who logged into the app more frequently and completed more CBT exercises saw the most significant improvements in their depression symptoms. This highlights the importance of sustained engagement in achieving optimal outcomes.

Participants reported that the flexibility and accessibility of the app were key factors that allowed them to integrate mental health care into their daily lives. The ability to engage with the app at any time made it easier for users to stay consistent with their treatment, contributing to faster improvements in their mental health.

Overall, the findings support the hypothesis that mobile mental health apps, when designed to encourage regular use, can be a highly effective alternative or complement to traditional therapy for individuals with mild to moderate depression.

The results of this study align with previous research that shows mobile health apps can effectively reduce depression symptoms, particularly when based on evidence-based techniques such as cognitive behavioral therapy (CBT). Studies have consistently found that digital CBT interventions can produce similar outcomes to face-to-face therapy in treating mild to moderate depression (Brinley et al., 2024). The findings of this study add to the growing body of evidence supporting the potential of mobile apps to deliver effective mental health interventions.

This study differs from some previous research that has reported lower engagement rates with mental health apps. Many studies have highlighted the challenge of maintaining user engagement over time, which often leads to reduced efficacy. In contrast, this study showed relatively high levels of engagement among participants, which may explain the greater improvements in depression symptoms observed. Features like personalized reminders and easy-to-use interfaces likely contributed to sustained user interaction (Cruz-López et al., 2024).

However, some studies suggest that while mobile apps are effective for mild to moderate depression, they may not be as successful for individuals with more severe mental health conditions. This study did not include participants with severe depression, so it is unclear whether the app would be equally effective for that population. Future research could explore how well mobile apps perform for individuals with varying degrees of depression severity.

Unlike studies that have focused on short-term outcomes, this study tracked depression symptom reduction over 12 weeks, providing insights into the app's longer-term effectiveness. The sustained improvements over time suggest that mental health apps can offer enduring benefits when users stay engaged.

The findings of this study underscore the potential of mental health mobile apps as a viable treatment option for depression. The significant reduction in symptoms observed in the intervention group signifies that digital interventions, when based on well-established therapeutic principles like CBT, can be just as effective as traditional therapy for some individuals. This reflects a growing shift towards integrating digital tools into mainstream mental health care.

The strong correlation between user engagement and depression symptom reduction highlights the importance of designing apps that not only provide valuable content but also

encourage consistent interaction. Participants who logged in more frequently and completed more exercises saw better outcomes, indicating that engagement is a critical factor in the success of digital mental health tools (Diallo et al., 2023). This finding emphasizes the need for developers to create apps that keep users motivated and involved over the long term.

The results suggest that mental health apps can help bridge the gap for individuals who may face barriers to accessing in-person therapy, such as geographic location, cost, or time constraints. The flexibility of app-based interventions allows users to manage their mental health on their own schedule, which is particularly beneficial for those who may not have the resources or ability to attend regular therapy sessions.

These findings reflect the growing role of technology in mental health care, indicating that digital tools can offer scalable, accessible solutions for individuals struggling with depression. The potential to reach a broader population through mobile health apps could help address the global shortage of mental health professionals.

The implications of this study are significant for mental health care providers, app developers, and policymakers. For mental health professionals, the findings suggest that incorporating mobile apps into treatment plans could enhance the effectiveness of therapy, particularly for clients with mild to moderate depression. Apps could serve as a supplement between therapy sessions or as an independent tool for individuals seeking self-guided care. This could lead to more personalized and flexible treatment options for clients.

For app developers, the study highlights the importance of user engagement in achieving positive mental health outcomes. Features that encourage regular interaction, such as personalized reminders, engaging content, and user-friendly interfaces, are critical to the app's success. Developers should prioritize designing apps that not only deliver effective interventions but also keep users motivated to engage over time.

The results also have policy implications, particularly regarding the integration of digital health tools into public health systems. Mobile mental health apps can offer a cost-effective solution to the growing demand for mental health services, especially in underserved areas where access to traditional therapy is limited. Policymakers should consider supporting the development and implementation of evidence-based mental health apps as part of a broader strategy to improve mental health care accessibility.

The study underscores the potential for mental health apps to complement existing therapeutic approaches, offering flexible and scalable options for individuals seeking mental health support. These findings could influence how mental health care is delivered in the future, with digital interventions becoming a more integral part of treatment plans.

The findings can be explained by the design of the mental health app, which integrated cognitive behavioral therapy (CBT) exercises and mood tracking—both evidence-based techniques proven to reduce depression symptoms. CBT helps individuals identify and challenge negative thought patterns, while mood tracking increases self-awareness of emotional triggers. The combination of these features provided users with

practical tools to manage their symptoms, leading to the significant reduction in depression severity observed in the intervention group.

User engagement played a key role in the app's effectiveness. Participants who logged in frequently and completed more CBT exercises showed greater improvements in their depression symptoms. This suggests that the more users engage with therapeutic content, the more likely they are to benefit from the intervention. Features like daily reminders and the ability to track progress likely contributed to higher engagement, which in turn led to better outcomes (Medise et al., 2024).

The flexibility and convenience of the app also contributed to its success. Participants were able to engage with the app at their own pace and on their own schedule, which likely made it easier for them to stay consistent with their treatment (Gajalakshmi & Meenakshi, 2023). This flexibility may have been particularly beneficial for individuals who have difficulty attending regular therapy sessions due to time or logistical constraints.

The control group, while still experiencing improvement, showed slower progress, which may be due to the structured nature of in-person therapy sessions (Gao et al., 2023). Participants in the intervention group had more frequent and flexible access to therapeutic content, which likely contributed to the faster reduction in depression symptoms.

Future research should explore the effectiveness of mental health apps in populations with more severe depression or comorbid conditions. While this study focused on individuals with mild to moderate depression, it is important to determine whether similar results can be achieved in those with more complex mental health needs. Additionally, comparing the app’s effectiveness in different cultural or demographic groups could provide insights into its broader applicability.

Longitudinal studies are needed to assess whether the benefits of using a mental health app are sustained over time. This study tracked participants over a 12-week period, but it remains unclear whether the reductions in depression symptoms will be maintained beyond that timeframe. Understanding the long-term impact of app-based interventions is critical for determining their role in ongoing mental health care.

Developers should continue to refine mental health apps by incorporating features that enhance user engagement and ensure that the therapeutic content is delivered effectively. Personalization, such as adapting exercises based on user progress or preferences, could further improve the app's ability to maintain engagement and maximize therapeutic outcomes.

Policymakers and healthcare providers should consider integrating mental health apps into treatment plans, particularly in regions where access to traditional therapy is limited. Ensuring that these apps are evidence-based and widely available could help alleviate the growing burden on mental health systems and provide individuals with more accessible, flexible treatment options.

CONCLUSION

The most significant finding of this research is the effectiveness of a mental health mobile app in reducing depression symptoms among users. The study revealed that

participants using the app experienced a statistically significant decrease in their depression scores compared to those who did not use the app. This highlights the potential of mobile technology as an accessible tool for mental health interventions, particularly for those who may not have regular access to traditional therapy.

The research contributes to the growing body of literature on digital mental health interventions by demonstrating how mobile apps can be an effective means of delivering cognitive-behavioral therapy (CBT) and mindfulness techniques. This study employed a user-centered approach, ensuring that the app's design was engaging and easy to navigate, which likely contributed to its success. By integrating evidence-based methods into a mobile platform, this research offers a practical solution to the growing need for scalable mental health support.

One limitation of this study is the relatively short duration of the intervention and follow-up period. The long-term sustainability of depression symptom reduction through mobile app use remains uncertain. Additionally, the sample size was limited, with most participants coming from urban areas, which may not fully represent the broader population, especially those in rural or underserved communities. These limitations suggest that more extensive studies are needed to assess the app's effectiveness over time and in more diverse populations.

Future research should explore the long-term effects of using mental health apps and how they can be integrated into broader healthcare systems. Investigating the app’s impact on different demographics, including age, gender, and socio-economic status, would also help refine its use. Further studies could examine how mental health apps interact with traditional therapies to offer a more comprehensive treatment plan for individuals experiencing depression.

REFERENCES

Abidi, S. (2024). Update in pediatric psychiatry. In *Update in Pediatr.: Second Ed. 2023* (pp. 665–698). Springer International Publishing; Scopus. https://doi.org/10.1007/978-3-031-41542-5_26

Agudelo-Hernández, F., Guapacha-Montoya, M., Díaz-Amaya, J. G., & Pinzón-Segura, M. C. (2023). Validation of the Parenting, Nutrition, and Mental Health Scale in a Latin American context. Mental Health and Weight Scale. *Revista de Salud Publica*, *25*(1). Scopus. https://doi.org/10.15446/rsap.v25n1.104352

Anderson, A. S., Siciliano, R. E., Gruhn, M. A., Bettis, A. H., Reising, M. M., Watson, K. H., Dunbar, J. P., & Compas, B. E. (2024). Youth coping and symptoms of anxiety and depression: Associations with age, gender, and peer stress. *Current Psychology*, *43*(14), 12421–12433. Scopus. https://doi.org/10.1007/s12144-023-05363-w

Bakopoulou, I., & Sheppard, J. (2024). Universal mental health support in the early years in the context of the UK: early years professionals’ views. *Early Years*. Scopus. https://doi.org/10.1080/09575146.2024.2378065

Beason, T., Knox, J., Lever, N., Hoover, S., Dubin, M., & Gordon-Achebe, K. (2024). Using a Culturally Responsive, Antiracist, and Equitable Approach to School

Mental Health. *Child and Adolescent Psychiatric Clinics of North America*, *33*(4), 541–556. Scopus. https://doi.org/10.1016/j.chc.2024.04.001

Bockmann, J. O., & Yu, S. Y. (2023). Using Mindfulness-Based Interventions to Support Self-regulation in Young Children: A Review of the Literature. *Early Childhood Education Journal*, *51*(4), 693–703. Scopus. https://doi.org/10.1007/s10643-022-01333-2

Bosqui, T., McEwen, F. S., Chehade, N., Moghames, P., Skavenski, S., Murray, L., Karam, E., Weierstall-Pust, R., & Pluess, M. (2023). What drives change in children receiving telephone-delivered Common Elements Treatment Approach (t-CETA)? A multiple n = 1 study with Syrian refugee children and adolescents in Lebanon. *Child Abuse and Neglect*. Scopus. https://doi.org/10.1016/j.chiabu.2023.106388

Brinley, S. K., Tully, L. A., Carl, T., McLean, R. K., Cowan, C. S. M., Hawes, D. J., Dadds, M. R., & Northam, J. C. (2024). Universal Child Mental Health Screening for Parents: A Systematic Review of the Evidence. *Prevention Science*, *25*(5), 798–812. Scopus. https://doi.org/10.1007/s11121-024-01693-8

Bulut, G. Ç., & Yorguner, N. (2023). Unveiling Gender Dysphoria Experiences in Turkish Young Adults: Challenges, Perspectives, and Implications in Health Care Settings. *Psychology Research and Behavior Management*, *16*, 4315–4327. Scopus. https://doi.org/10.2147/PRBM.S437197

Butjosa, A., Camprodon-Rosanas, E., Aizpitarte, A., Alvarez-Segura, M., Albiac, N., & Lacasa, F. (2024). Validation of the post-traumatic stress disorder subscale of the child behaviour checklist (PTSD-CBCL): Screening for post-traumatic stress disorder or attention deficit/hyperactivity disorder? *Social Psychiatry and Psychiatric Epidemiology*, *59*(8), 1449–1460. Scopus. https://doi.org/10.1007/s00127-023-02535-8

Claussen, A. H., Wolicki, S. B., Danielson, M. L., & Hutchins, H. J. (2024). "Your Child Should Not Return": Preschool Expulsion Among Children With Attention-Deficit/Hyperactivity Disorder as an Early Indicator of Later Risks. *Journal of Developmental and Behavioral Pediatrics*, *45*(3), e203–e210. Scopus. https://doi.org/10.1097/DBP.0000000000001272

Conradt, E., Carter, S., & Crowell, S. E. (2024). What's next for the field of multigenerational mental health? The need for deep behavioral phenotyping via a prenatal mental health registry. *Development and Psychopathology*. Scopus. https://doi.org/10.1017/S0954579424000099

Cruz-López, I., Evans-McCleon, T. N., Looby, E. J., Wei, T., & Gadke, D. L. (2024). Universal Behavioral Screening: Inclusion of Student's Trauma Symptoms and Hurricane Exposure. *Journal of Applied School Psychology*. Scopus. https://doi.org/10.1080/15377903.2024.2353921

Dhaliwal, R., Yap, S., Talarico, F., Al-Shamali, H., McWeeny, R., Reeson, M., Shalaby, R., Chen, T., Spronk, E., Snodgrass, R., Tu, E., Erick, T., Marshall, T., Kennedy, M., Greenshaw, A. J., Winkler, O., & Burback, L. (2023). Synchronous Web-Based Psychotherapy for Mental Disorders From a Health Quality Perspective: Scoping Review. *Journal of Medical Internet Research*, *25*. Scopus. https://doi.org/10.2196/40710

Diallo, I., Ndejjo, R., Leye, M. M. M., Egbende, L., Tusubira, A., Bamgboye, E. A., Fall, M., Namuhani, N., Bosonkie, M., Salawu, M. M., Ndiaye, Y., Kabwama, S. N., Sougou, N. M., Bello, S., Bassoum, O., Babirye, Z., Afolabi, R. F., Gueye, T.,

Kizito, S., … Seck, I. (2023). Unintended consequences of implementing non-pharmaceutical interventions for the COVID-19 response in Africa: Experiences from DRC, Nigeria, Senegal, and Uganda. *Globalization and Health*, *19*(1). Scopus. https://doi.org/10.1186/s12992-023-00937-6

Eichstedt, J. A., Turcotte, K., Golden, G., Arbuthnott, A. E., Chen, S., Collins, K. A., Mowat, S., & Reid, G. J. (2024). Waitlist management in child and adolescent mental health care: A scoping review. *Children and Youth Services Review*, *160*. Scopus. https://doi.org/10.1016/j.childyouth.2024.107529

Gajalakshmi, G., & Meenakshi, S. (2023). Understanding the psycho-social problems of vulnerable adolescent girls and effect of intervention through life skill training. *Journal of Education and Health Promotion*, *12*(1). Scopus. https://doi.org/10.4103/jehp.jehp_612_23

Gao, C. X., Filia, K. M., Bedi, G., Menssink, J. M., Brown, E., Rickwood, D. J., Parker, A. G., Hetrick, S. E., Herrman, H., Hickie, I., Telford, N., McGorry, P. D., & Cotton, S. M. (2023). Understanding the complexity, patterns, and correlates of alcohol and other substance use among young people seeking help for mental ill-health. *Social Psychiatry and Psychiatric Epidemiology*, *58*(10), 1457–1467. Scopus. https://doi.org/10.1007/s00127-023-02444-w

Geiger, E. J., Liu, W., Srivastava, D. K., Bernthal, N. M., Weil, B. R., Yasui, Y., Ness, K. K., Krull, K. R., Goldsby, R. E., Oeffinger, K. C., Robison, L. L., Dieffenbach, B. V., Weldon, C. B., Gebhardt, M. C., Howell, R., Murphy, A. J., Leisenring, W. M., Armstrong, G. T., Chow, E. J., & Wustrack, R. L. (2023). What Are Risk Factors for and Outcomes of Late Amputation after Treatment for Lower Extremity Sarcoma: A Childhood Cancer Survivor Study Report. *Clin. Orthop. Relat. Res.*, *481*(3), 526–538. Scopus. https://doi.org/10.1097/CORR.0000000000002243

Grønneberg, S. V., Engebretsen, E., & Torp Løkkeberg, S. (2023). When ADHD knocks on the door–discourse theory as a frame to explore subject positions and mental wellbeing before diagnosis. *International Journal of Qualitative Studies on Health and Well-Being*, *18*(1). Scopus. https://doi.org/10.1080/17482631.2023.2209964

Hart, K. C., Poznanski, B., Cheatham-Johnson, R., Gregg, D., Zambrana, K., Gutierrez Renzulli, A., Flores, H., Sotolongo, L., Chou, T., Moses, J., Obee, A., Lane, T., Guaragna, I., Cadet, G., Leyva, E., Quintanilla, V., Villodas, F., & Villodas, M. (2024). Utilizing the Summer Treatment Program Model to Promote School Readiness in Young Children Living in Urban Poverty: An Initial Effectiveness Open Trial. *Evidence-Based Practice in Child and Adolescent Mental Health*. Scopus. https://doi.org/10.1080/23794925.2024.2378398

Henderson, J. L., Chiodo, D., Varatharasan, N., Andari, S., Luce, J., & Wolfe, J. (2023). Youth Wellness Hubs Ontario: Development and initial implementation of integrated youth services in Ontario, Canada. *Early Intervention in Psychiatry*, *17*(1), 107–114. Scopus. https://doi.org/10.1111/eip.13315

Hippman, C., Mah, J. W. T., & MacFadden, M. (2023). Virtual Delivery of Parent Coaching Interventions in Early Childhood Mental Health: A Scoping Review. *Child Psychiatry and Human Development*. Scopus. https://doi.org/10.1007/s10578-023-01597-8

Hopkinson, E., & Petty, J. (2023). Why eating disorders in children and young people are increasing: Implications for practice. *Nursing Children and Young People*, *35*(2), 24–28. Scopus. https://doi.org/10.7748/ncyp.2022.e1445

Huffman, L. G., Lawrence-Sidebottom, D., Huberty, J., Roots, M., Roots, K., Parikh, A., Guerra, R., & Weiser, J. (2023). Using Digital Measurement-Based Care for the Treatment of Anxiety and Depression in Children and Adolescents: Observational Retrospective Analysis of Bend Health Data. *JMIR Pediatrics and Parenting*, *6*. Scopus. https://doi.org/10.2196/46154

Kass, B., Roll, S., Bolster, M., Heinrich-Rohr, M., Kuchinke, L., Ludwig-Körner, C., Schlensog-Schuster, F., Fricke, J., Berghöfer, A., Keil, T., & Reinhold, T. (2024). Utilization and costs of health care and early support services in Germany and the influence of mental health burden during the postnatal period. *Children and Youth Services Review*, *157*. Scopus. https://doi.org/10.1016/j.childyouth.2023.107373

Kerbage, H., Elbejjani, M., Bazzi, O., El-Hage, W., BouKhalil, R., Corruble, E., & Purper-Ouakil, D. (2024). 'We are all children of war': A qualitative inquiry into parenting following adolescents' recent traumatic exposure in a multiple crisis setting in Beirut, Lebanon. *European Journal of Psychotraumatology*, *15*(1). Scopus. https://doi.org/10.1080/20008066.2024.2382650

Kieling, C., Buchweitz, C., Caye, A., Silvani, J., Ameis, S. H., Brunoni, A. R., Cost, K. T., Courtney, D. B., Georgiades, K., Merikangas, K. R., Henderson, J. L., Polanczyk, G. V., Rohde, L. A., Salum, G. A., & Szatmari, P. (2024). Worldwide Prevalence and Disability from Mental Disorders Across Childhood and Adolescence: Evidence from the Global Burden of Disease Study. *JAMA Psychiatry*, *81*(4), 347–356. Scopus. https://doi.org/10.1001/jamapsychiatry.2023.5051

Lawrence-Sidebottom, D., Huffman, L. G., Huberty, J., Beatty, C., Roots, M., Roots, K., Parikh, A., Guerra, R., & Weiser, J. (2023). Using Digital Measurement–Based Care to Address Symptoms of Inattention, Hyperactivity, and Opposition in Youth: Retrospective Analysis of Bend Health. *JMIR Formative Research*, *7*. Scopus. https://doi.org/10.2196/46578

Leiva, L., Antivilo-Bruna, A., Peña, F., Scquicciarini, A. M., Simonsohn, A., Perrin, E., & Murphy, J. M. (2024). Validation of a Measurement Model to Identify Socio-emotional Difficulties in Preschool Children: The Preschool Pediatric Symptom Checklist—Chilean Version. *Child Psychiatry and Human Development*. Scopus. https://doi.org/10.1007/s10578-024-01714-1

Li, J.-B., Deng, J., Xu, Y., Sun, J., Chen, J., Datu, J. A. D., Zhang, R., & Qiu, S. (2024). Which Well-Being Elements Are Fundamental for Early Childhood Educators in the Chinese Context? A Network Analysis. *Applied Research in Quality of Life*, *19*(1), 103–134. Scopus. https://doi.org/10.1007/s11482-023-10233-5

McDermott, C. L., Taylor, K., Sharp, S. D. S., Lydon-Staley, D., Leonard, J. A., & Mackey, A. P. (2024). Sensitivity to psychosocial influences at age 3 predicts mental health in middle childhood. *Developmental Science*, *27*(5). Scopus. https://doi.org/10.1111/desc.13531

Medise, B. E., Julia, M., Devaera, Y., Sitaresmi, M. N., Widjaja, N. A., Kalalo, R. T., Soesanti, F., Friska, D., Sirait, W. R., Azzopardi, P., & Sawyer, S. (2024). Understanding the pubertal, psychosocial, and cognitive developmental trajectories of stunted and non-stunted adolescents: Protocol of a multi-site Indonesian cohort study. *Frontiers in Pediatrics*, *12*. Scopus. https://doi.org/10.3389/fped.2024.1296128

Michalek, I. M., Koczkodaj, P., Michalek, M., & Caetano dos Santos, F. L. (2024). Unveiling the silent crisis: Global burden of suicide-related deaths among children

aged 10–14 years. *World Journal of Pediatrics*, *20*(4), 371–391. Scopus. https://doi.org/10.1007/s12519-023-00781-z

Nili, A. N., Miller, M., Zhang, Y., Sherlock, P. R., Burns, J. L., Zola, A., Kaat, A., Wakschlag, L. S., & Krogh-Jespersen, S. (2023). What is typical: Atypical in young children's attention regulation?: Characterizing the developmental spectrum with the Multidimensional Assessment Profiles—Attention Regulation Infant-Toddler (MAPS-AR-IT) Scale. *Infant Mental Health Journal*, *44*(6), 781–793. Scopus. https://doi.org/10.1002/imhj.22087

Parker, A. J., Brock, P., Kryza-Lacombe, M., Briggs-Gowan, M., Dougherty, L. R., Wakschlag, L. S., & Wiggins, J. L. (2024). What I see, what you say: How cross-method variation sharpens characterization of irritability in early childhood. *International Journal of Methods in Psychiatric Research*, *33*(1). Scopus. https://doi.org/10.1002/mpr.2019

Pereira, L. C., & Ith, D. A. (2024). Using the universal design for learning framework to improve child and adolescent mental health. *Psychology in the Schools*, *61*(9), 3728–3747. Scopus. https://doi.org/10.1002/pits.23252

Phang, F. T. H., Weaver, A., Blane, D. N., Murphy, F., Dawson, A., Hall, S., De Natale, A., Minnis, H., & McFadyen, A. (2023). Using the candidacy framework to conceptualize systems and gaps when developing infant mental health (IMH) services: A qualitative study. *Infant Mental Health Journal*, *44*(4), 480–494. Scopus. https://doi.org/10.1002/imhj.22072

Randell, E., Nollett, C., Henley, J., Smallman, K., Johnson, S., Meister, L., McNamara, R., Wilkins, D., Segrott, J., Casbard, A., Wakelyn, J., McKay, K., Bordea, E., Totsika, V., & Kennedy, E. (2024). Watch Me Play!: Protocol for a feasibility study of a remotely delivered intervention to promote mental health resilience for children (ages 0–8) across UK early years and children's services. *Pilot and Feasibility Studies*, *10*(1). Scopus. https://doi.org/10.1186/s40814-024-01491-7

Silver, H. C., Davis Schoch, A. E., Loomis, A. M., Park, C. E., & Zinsser, K. M. (2023). Updating the evidence: A systematic review of a decade of Infant and Early Childhood Mental Health Consultation (IECMHC) research. *Infant Mental Health Journal*, *44*(1), 5–26. Scopus. https://doi.org/10.1002/imhj.22033

Smith, J., Aulich, A., Bent, C., Constantine, C., Franks, K., Goonetilleke, N., Green, C., Ijaz, R., Patel, K., Said, H., Wood, S., & Hudry, K. (2024). "We go through trauma": South Asian parents' experiences of autism diagnosis and early supports for their autistic children in Australia. *Research in Autism Spectrum Disorders*, *114*. Scopus. https://doi.org/10.1016/j.rasd.2024.102408

Smyth, P. (2023). Working with High-Risk Youth: A Relationship-Based Practice Framework. In *Working with High-Risk Youth: A Relationship-Based Practice Framew.* (p. 344). Taylor and Francis; Scopus. https://doi.org/10.4324/9781003360568

Titmuss, A., Korula, S., Wicklow, B., & Nadeau, K. J. (2024). Youth-onset Type 2 Diabetes: An Overview of Pathophysiology, Prognosis, Prevention and Management. *Current Diabetes Reports*, *24*(8), 183–195. Scopus. https://doi.org/10.1007/s11892-024-01546-2

Tsang, V. W. L., Bhanot, S., & Jia, L. (2023). Varenicline induced auditory hallucinations in a young female with bipolar disorder: A case report. *BMC Psychiatry*, *23*(1). Scopus. https://doi.org/10.1186/s12888-022-04348-6

Tuck, M., Wittkowski, A., Allott, R., & Gregg, L. (2023). What about the children? Adult mental health practitioners' experiences and views of family-focused practice in Early Intervention Services. *Psychology and Psychotherapy: Theory, Research and Practice*, *96*(3), 697–715. Scopus. https://doi.org/10.1111/papt.12464

Ward, L. (2024). Worry-YING and Worry-YANG: A Critical Feminist Study with Women Who Worry. *Issues in Mental Health Nursing*, *45*(7), 715–723. Scopus. https://doi.org/10.1080/01612840.2024.2346591

Wei, M., Wang, M., Chang, R., Li, C., Xu, K., Jiang, Y., Wang, Y., Tuerxun, P., & Zhang, J. (2023). Unpacking the Specific Associations between Adverse Childhood Experiences and Depressive Symptoms among the Middle-Aged and Elderly Chinese Populations: A Dimensional Approach and Latent Class Analysis in a Cohort Study. *Depression and Anxiety*, *2023*. Scopus. https://doi.org/10.1155/2023/8439527

Williford, D. N., Jackson, C. B., Durkin, K., Langholz, A., Aballay, A., & Duncan, C. L. (2024). Utility of a Pediatric Psychosocial Screener in an Outpatient Burn Clinic. *Journal of Burn Care and Research*, *45*(3), 630–637. Scopus. https://doi.org/10.1093/jbcr/irad190

Yago, S., Takahashi, Y., Tsukamoto, E., Saito, A., & Saito, E. (2023). Use of the Newborn Behavioral Observations System as an early intervention for infants and their parents: A scoping review. *Early Human Development*, *183*. Scopus. https://doi.org/10.1016/j.earlhumdev.2023.105811

Zancu, A. S., & Diaconu-Gherasim, L. R. (2024). Weight stigma and mental health outcomes in early-adolescents. The mediating role of internalized weight bias and body esteem. *Appetite*, *196*. Scopus. https://doi.org/10.1016/j.appet.2024.107276