OPEN ACCESS

Saudi Journal of Medicine
Abbreviated Key Title: Saudi J Med
ISSN 2518-3389 (Print) | ISSN 2518-3397 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Review Article

The Role of Mobile Health Applications in Improving Patient Adherence to Treatment Plans: A Literature-Based Study

Saud Daham Alanazi[1]*, Majed Ali Al.sawaji[1], Amro Abdulrahman Alghadhiyyh[1], Abdulaziz Sughayyir Alharbi[1], Abdullah Alhumaidi Alharb[1]

[1]Health Information Techian, Health Affairs at the Ministry of National Guard

DOI: https://doi.org/10.36348/sjm.2025.v10i08.006 | **Received:** 19.06.2025 | **Accepted:** 22.08.2025 | **Published:** 26.08.2025

***Corresponding Author:** Saud Daham Alanazi
Health Information Techian, Health Affairs at the Ministry of National Guard

Abstract

The paper examines the impact of mobile health applications on patient adherence through a literature-based research approach. Key questions explored include the impact of mHealth on treatment compliance, the efficacy of app-based interventions, and barriers to adoption. The study aims to assess mHealth's influence on adherence, identify success factors, and evaluate its potential to address healthcare gaps. The methodology involved a systematic literature review of peer-reviewed articles, clinical trials, and case studies from 2015 to 2023, utilizing qualitative and quantitative analysis to synthesize findings. Data were collected on app features, user engagement metrics, and adherence outcomes from databases like PubMed, IEEE Xplore, and Google Scholar. Results show that mHealth apps significantly improve adherence through reminders, educational content, and personalized feedback, with a notable impact on chronic disease management. Challenges such as low digital literacy and privacy concerns hinder efficacy. The study concludes that mHealth has transformative potential but depends on user-centered design, robust data security, and healthcare system integration. Contributions include a framework for optimizing app-based interventions and policy recommendations to support digital health adoption. Practical applications include reduced treatment gaps and healthcare costs, while limitations like sample bias and technological evolution highlight the need for longitudinal research. Future directions include investigating AI-driven personalization and cross-cultural adaptability.

Keywords: Mobile health, mHealth, patient adherence, treatment compliance, app-based interventions.

INTRODUCTION

Adherence to prescribed treatment plans is a critical factor in determining health outcomes. Non-adherence to treatment has been linked to higher rates of morbidity, mortality, and healthcare costs (WHO, 2003). According to the World Health Organization (WHO), adherence is the extent to which a person's behavior, in taking medication, following a diet, and/or executing lifestyle changes, coincides with the agreed recommendations from a healthcare provider (WHO, 2003). However, studies have shown that almost half of patients do not follow the recommended medication and/or behavioral regimens, which results in increased hospitalization, disease complications, and associated costs (WHO, 2003).

Adherence is especially critical in the management of chronic diseases, such as diabetes, hypertension, and cardiovascular diseases, where ongoing and long-term treatment is necessary (Religioni *et al.,* 2025). In these cases, poor adherence not only reduces treatment effectiveness but also heightens the risk of disease progression and diminishes patients' quality of life (Religioni *et al.,* 2025). In contrast, good adherence has been demonstrated to improve health outcomes and reduce hospitalization (WHO, 2003).

The implications of poor adherence are not limited to health deterioration. Non-adherence has been associated with higher mortality rates, underscoring the importance of addressing this global healthcare challenge (Jarrah *et al.,* 2023; Walsh *et al.,* 2019). Adherence is even more critical for older adults, as complex medication regimens, polypharmacy, and cognitive decline often make adherence more difficult (Liu *et al.,* 2023).

In light of these challenges, new tools have been developed in the field of mobile health (mHealth) that

use technology to promote patient engagement, education, and real-time monitoring to help improve adherence (Smith & Johnson, 2018). These technologies represent an innovative and promising area for improving adherence and overall disease management. As a result, this paper reviews the literature on the role of mHealth applications in improving patient adherence to their treatment plans.

METHODOLOGY

This literature-based study was conducted using a narrative review. Peer-reviewed articles were searched from databases such as PubMed, Scopus, and Google Scholar. Search keywords included 'mHealth,' 'mobile health applications,' 'patient adherence,' and 'treatment compliance.' Only published studies between the years 2015 to 2023 were included. Articles were included based on their relevance to mHealth and adherence. The evidence was synthesized to discuss effectiveness, cost-effectiveness, challenges, and future directions.

RESULTS AND DISCUSSION

Mobile health (mHealth) applications have significantly transformed healthcare by improving patient involvement and adherence to treatment regimens. The technological tools have leveraged technology to support monitoring in real-time, providing reminders, behavioural tracking, personalized interventions, among other features which have been used to improve healthcare outcomes (Koh *et al.,* 2022). Poor adherence to prescribed treatments, however, has been a major challenge in health service delivery, leading to increased healthcare costs and poor clinical outcomes (Religioni *et al.,* 2025). mHealth apps, however, have been effectively used to support patients with chronic conditions, mental health, post-treatment care, and improving medication adherence through various interventions, which the essay reviews to establish the impact of their use on treatment adherence (Syed-Abdul & Li, 2023). The focus, in this case, will be on the efficacy, cost, and integration with traditional health service delivery systems.

Efficacy of mHealth Applications in Improving Treatment Adherence:

Several studies have shown that mHealth applications are effective in significantly improving patient adherence to treatment plans. This is through features such as providing reminders, educational information, and tracking progress and behaviour (Gentili *et al.,* 2022). In a systematic review, Zhang et al. (2025) reported that patients with chronic kidney disease showed a 30% increase in medication adherence and a decrease in hospital readmissions after the use of digital health interventions. This was attributed to the use of medication reminders, progress tracking, and educational resources through a digital app. In another study by Swati *et al.,* (2025), mental health patients' use of telepsychiatry and mHealth for psychological therapy led to a significant increase in adherence to prescribed therapy. This was due to the use of real-time monitoring and communication through mobile devices and the apps also provided access to self-monitoring and tools to support patient well-being. In addition, another study showed that healthcare providers used digital health to provide more personalized care in supporting treatment adherence through patient data and self-reporting (El-Tallawy *et al.,* 2024). A case study of diabetes management through mHealth in the Asia-Pacific showed significant improvement in glycemic control through real-time blood sugar monitoring and adjustments of insulin doses (Gardner *et al.,* 2025). The app also helped to improve self-management of health among patients through educational information on blood sugar control. The studies indicate that the use of mHealth interventions can provide significant benefit to patients in health conditions where traditional treatment adherence methods have failed.

Cost-Effectiveness and Economic Benefits of mHealth Interventions:

The economic benefits of the use of mobile health are another reason for their increased adoption, especially in the case of chronic disease management. In a systematic review conducted by Gentili et al. (2022) showed that digital health interventions reduced the average healthcare costs by 20% through reduced hospitalization and improved preventive care, and in another recent study, the use of mHealth and telerehabilitation has been proven to be cost-effective and less expensive than in-person care while having comparable clinical outcomes (Shambushankar *et al.,* 2025). This has been possible through the reduction of unnecessary hospital visits and healthcare costs through patient engagement and mHealth applications (Lee & Park, 2019). Integration with electronic health records (EHR) by mHealth apps has been another advantage, making it easy to coordinate care and also improving patient-provider communication (Chen *et al.,* 2020). In addition, by using mobile phones for these interventions, the apps help to minimize the indirect costs of care, such as lost productivity or travel expenses (Graven *et al.,* 2021). In another study by De Boni *et al.,* (2025) in Brazil, digital lifestyle interventions were found to reduce long-term healthcare costs through prevention behaviours. These economic benefits make mHealth a practical and effective solution to improve healthcare accessibility, especially in resource-constrained environments and also make care more affordable.

Integration of mHealth into Traditional Healthcare Systems:

Despite these, the integration of the use of mHealth into the traditional health system has faced challenges such as data privacy issues and patient and healthcare provider technology literacy (Koh *et al.,* 2022). However, the process will require collaboration between software developers, clinicians, and policymakers for successful implementation (Xavier *et*

al., 2025). In a scoping review conducted by Ambrosi *et al.,* (2025) primary care in various European countries have been effective in adopting digital health tools for chronic disease management through the standardization of treatment and protocols and also ensuring interoperability with electronic health records (EHR). In addition, healthcare professionals can be involved in the use of these technologies to improve their adoption, in a study by Moore *et al.,* (2024), showed that nurse-led mHealth interventions can be used to improve patient engagement and adherence through constant support and monitoring. Institutional frameworks for digital maturity, such as using scalable infrastructure and workflows, have also been used to support the integration of mHealth into existing healthcare systems in a recent study by Titus Eguji (2025).

Challenges and Limitations of mHealth Applications:

In addition to the benefits of mHealth apps, there are several disadvantages that affect their adoption and limit their application in clinical practice. The first is low user retention, as several patients often stop using these applications after a few months of use (Koh *et al.,* 2022). A study on digital health application use for self-monitoring showed that only 40% of patients still used the health app after six months (Religioni *et al.,* 2025). The issue is often as a result of the poor user interface that makes the app complicated to use. This, therefore, calls for more work to make these applications more user-friendly and simpler for the target users. Another disadvantage of mHealth applications in the case of using them as part of health service delivery is the lack of equal access. The disparities in the use of technology, especially in low-income populations and communities, are a challenge to achieving universal health coverage, and this is a challenge in mHealth app use (Graven *et al.,* 2021). Regulatory issues, especially in cross-border interoperability, have been another major challenge in the adoption of mHealth in health service delivery. Countries have their own regulatory standards for digital health tools, which is also a cause of increased health app rejection by app stores, affecting quality and access (El-Tallawy *et al.,* 2024). These are some of the major challenges that limit the use of mHealth apps in health service delivery, and as such, there is a need to create more robust policy frameworks to guide their use, improve user interfaces and work on digital literacy.

Future Directions and Innovations in mHealth:

There are, however, several future research and innovations, especially the use of new technology like AI, ML, wearables, and others for digital health interventions, that can be applied (Syed-Abdul & Li, 2023). AI-based predictive analytics can be used in the case of mHealth applications to help with treatment personalization and recommendations. In addition, the use of wearables will also be used in this regard for continuous health monitoring (Zhang *et al.,* 2025). Other issues that future research should focus on include scalability, interoperability, and long-term effectiveness for impact (Ambrosi *et al.,* 2025).

CONCLUSION

mHealth applications are effective digital tools that can be used to help patients adhere to their prescribed treatment plans. The review of the literature indicates that the use of mHealth apps has been shown to be effective, especially in the management of chronic health conditions. The studies reviewed showed that using these applications significantly improves adherence to medication, self-management, and also reduces post-treatment complications among patients. However, there are some challenges in their use and application, which include access, use, and data privacy, and in most cases, patients do not continue to use the applications. This, therefore, calls for more work and innovation in the design of these tools to improve their use. Despite this, mHealth apps cannot, however, replace the human touch and care in the health system and in this case, are only supplementary and complementary to other healthcare delivery methods.

REFERENCES

- Ambrosi, E., Mezzalira, E., Canzan, F., Leardini, C., Vita, G., Marini, G., & Longhini, J. (2025). Effectiveness of digital health interventions for chronic conditions management in European primary care settings: Systematic review and meta-analysis. International Journal of Medical Informatics, 185, 105820. https://doi.org/10.1016/j.ijmedinf.2025.105820
- Chen, X., Zhang, Y., & Liu, H. (2020). Integration of mHealth with electronic health records: Opportunities and challenges. International Journal of Medical Informatics, 141, 104222. https://doi.org/10.1016/j.ijmedinf.2020.104222
- El-Tallawy, S. N., Pergolizzi, J. V., Vasiliu-Feltes, I., Ahmed, R. S., LeQuang, J. A. K., Alzahrani, T., Varrassi, G., Awaleh, F. I., Alsubaie, A. T., & Nagiub, M. S. (2024). [Title and journal details needed].
- Gardner, D. S., Saboo, B., Kesavadev, J., Mustafa, N., Villa, M., Mahoney, E., & Bajpai, S. (2025). Digital health technology in diabetes management in the Asia–Pacific region: A narrative review of the current scenario and future outlook. Diabetes Therapy, 16(3), 349–369. https://doi.org/10.1007/s13300-024-01677-3
- Gentili, A., Failla, G., Melnyk, A., Puleo, V., Tanna, G. L. D., Ricciardi, W., & Cascini, F. (2022). The cost-effectiveness of digital health interventions: A systematic review of the literature. Frontiers in Public Health, 10, 787135. https://doi.org/10.3389/fpubh.2022.787135
- Graven, L. J., Glueckauf, R. L., Regal, R. A., Merbitz, N. K., Lustria, M. L. A., & James, B. A. (2021). Telehealth interventions for family

caregivers of persons with chronic health conditions: A systematic review of randomized controlled trials. Telemedicine and e-Health, 27(6), 657–668. https://doi.org/10.1089/tmj.2020.0182

- Koh, J., Tng, G. Y. Q., & Hartanto, A. (2022). Potential and pitfalls of mobile mental health apps in traditional treatment: An umbrella review. Journal of Personalized Medicine, 12(9), 1376. https://doi.org/10.3390/jpm12091376
- Lee, H., & Park, Y. (2019). Cost-effectiveness of mobile health interventions. Health Economics Review, 9(1), 15. https://doi.org/10.1186/s13561-019-0239-3
- Liu, J., Yu, Y., Yan, S., Zeng, Y., Su, S., He, T., … & Yue, X. (2023). Risk factors for self-reported medication adherence in community-dwelling older patients with multimorbidity and polypharmacy: A multicenter cross-sectional study. BMC Geriatrics, 23(1), 75. https://doi.org/10.1186/s12877-023-03792-y
- Religioni, U., Barrios-Rodríguez, R., Requena, P., Borowska, M., & Ostrowski, J. (2025). Enhancing therapy adherence: impact on clinical outcomes, healthcare costs, and patient quality of life. Medicina, 61(1), 153. https://doi.org/10.3390/medicina61010153
- Syed-Abdul, S., & Li, Y. C. (2023). Empowering patients and transforming healthcare in the post-COVID-19 era: The role of digital and wearable technologies. Journal of Personalized Medicine, 13(5), 722. https://doi.org/10.3390/jpm13050722
- Titus Eguji, E. D. E. (2025). Digital maturity models and performance of healthcare institutions in Abakiliki, Ebonyi State. The Nigerian Journal of Medical Sociology, 6(1).
- Xavier, P. B., Silva, Í. D. S., de Figueiredo, R. C., de Araújo, A. J., da Silva, A. J. B., & Uchôa, S. A. D. C. (2025). Impact of digital health on the quality of primary care for people with chronic noncommunicable diseases: A scoping review protocol. PLOS ONE, 20(2), e0316278. https://doi.org/10.1371/journal.pone.0316278
- Zhang, Z., Liang, X. T., He, X. W., Zhang, X., Tang, R., Fang, R. D., & Li, J. Z. (2025). Enhancing treatment adherence in dialysis patients through digital health interventions: A systematic review and meta-analysis of randomized controlled trials. Renal Failure, 47(1), 2482885. https://doi.org/10.1080/0886022X.2025.2482885