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AI-Based Healthcare Mobile Applications: Complexity and Its Effects on Adoption

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Abstract

In the contemporary era, artificial intelligence (AI)-based healthcare applications are revolutionizing modern medical services, however, their inherent limitations and complexities can present major barriers to their utilization and adoption. Key issues include interoperability, data privacy, and lack of user trust. These applications are challenging for user owning to their complex user interface (UI) and limited technical literacy. The adopting of these apps necessitates simplified interfaces, enhanced data security, and adhering to ethical principles. The efficiency and reliability of applications can be improved through the design and training tailored to the user's needs. Considering these principles, this study examines five AI-based healthcare apps, assesses their limitations and shortcomings through expert evaluation, and proposed some suggestions and recommendation for further improvement. This research suggests that, until these issues are addressed, it will be difficult and challenging to realize the full potential of AI-based healthcare applications.

Keywords: AI-Based Healthcare Mobile Applications, Complexity, Adoption

1- Introduction

In the last few years, rising use of artificial intelligence in conjunction with health has, through years, produced an entire range of applications that come claiming to revolutionize the care of patients and even health outcomes (Hussain et al., 2022). A few examples include smart applications giving out tailored health advice, managing chronic conditions, and facilitating communication between health providers and patients. These technologies, in return, have become significant barriers to adoption (Mercenier & Voyvoda, 2021). Both healthcare professionals and patients face barriers in dealing with complex user interfaces, understanding complex functionalities, and trusting AI-generated recommendations (Zhang et al., 2023). In addition, some demographic segments with low technological literacy can be further challenged to appropriate the use of these applications. Thus, it is quite important to identify and reduce the different barriers that are found to hinder the adoption of the new tools to maximize benefits in healthcare. This paper will critically evaluate the complexity of the applications and its implications for user acceptance in routine healthcare practices.

1.1- AI-Based Healthcare Mobile Applications and their significance in modern healthcare

This study examines the integration of AI-based healthcare mobile applications, an innovative technology in modern medicine that transforms patient access to medical services. Artificial intelligence is utilized to enhance the efficiency of diagnostic tools, personalize treatment plans, and streamline patient data tracking, thereby leading to improved clinical outcomes (Zhang et al., 2023). AI technologies can analyze data in real time, enabling health professionals to make rapid decisions and implement appropriate measures. According to (Latif et al., 2017; Hussain et al., 2022), through the utilization of mobile applications, BDA can be adopted not only for effective resource allocation but also for more patient-centered services. Notably, recent post-pandemic research highlights that Big Data Analytics significantly contributes to improved organizational agility and decision-making, as seen in its positive impact on firm performance and resilience across industries (Rafi & Sulman, 2025). However, the implementation of these technologies is not without challenges; issues related to data privacy, ethics, and equitable access to care remain significant concerns. Furthermore, as demonstrated by Rajpoot and Raffat (2024), AI-driven systems used in Anti-Money Laundering (AML) showcase the power of intelligent compliance and adaptive threat detection capabilities that can be translated into healthcare for enhanced diagnostic accuracy and risk monitoring. Therefore, addressing these complexities is crucial for widespread adoption and ensuring that these innovations benefit all stakeholders in the healthcare ecosystem, as discussed in research on the digital transformation of healthcare (Lindeman et al., 2020).

1.2- Complexity of AI-Based Healthcare Mobile Applications

One major aspect that has made it quite challenging to have AI-based healthcare mobile applications accept and adopt the technology lies in its inherent complexity owing to the

inclusion of other technologies such as cloud systems, sensor integration, and connected sensing mechanisms, all of which are involved in the process beyond complex algorithms and data analytics. More critical issues of accessibility, equity, and privacy concerns are the barriers that potential users have to try to overcome (Latif et al., 2017; Hussain et al., 2022). Besides, increased digital health tool adaption in recent times witnessed in wake of COVID-19 has evidenced great potential of these applications, reflecting weaknesses related to interoperability standards and user-centered design (Holden & Karsh, 2010;Mercenier & Voyvoda, 2021). These complex issues need to be addressed in order to reach greater acceptability and the full benefits of AI-driven solutions in healthcare, which translate into better patient outcomes and efficiencies.

2- Literature Review

A review of the literature on AI-based healthcare mobile applications revealed that this technology is transforming healthcare, albeit with associated challenges.

1- mHealth Applications: This study examined the implementation of AI-based mHealth applications in providing personalized health support to patients, including data analysis and individualized treatment plans. This research identified AI models as a significant tool for integration into contemporary medical facilities (Afrah & Kose, 2021).

2- "AI in Remote Patient Monitoring": This study provides a thorough analysis of how AI enhances the predictive analytics, accuracy of monitoring, and personalized care plan of remote patient monitoring. Real-world applications and challenges discussed here make it an excellent resource for understanding the integration of AI in patient care systems (Stoddard et al., 1994; Afrah & Kose, 2021).

3- "Applications of Generative AI in Healthcare: Algorithmic, Ethical, Legal, and Societal Considerations": A study is conducted on using generative AI in health care particularly in medical imaging and decision making. It addresses some of the challenges such as data privacy, public trust, legal implications to provide insights for regulatory needs and ethical frameworks (Okonji et al., 2024).

This review demonstrated that AI capabilities have the potential to enhance healthcare delivery. However, challenges must be addressed to ensure its effective implementation.

3- Methodology

To comprehensively elucidate the characteristics of this study, two primary domains were incorporated into the methodology: perspectives of application developers and clinicians. Five prominent artificial intelligence-based healthcare mobile applications are selected for investigation, including Ada Health, Buoy Health, SkinVision, Babylon Health, and Pediatric Vision. Following the selection of applications, feedback is solicited from developers and clinicians to evaluate the complexity of the applications' design, data security, and user interface

usability. Recommendations from both groups were integrated to elucidate the challenges and propose potential solutions.

The process emphasized the user interface complexity aspect, taking into consideration the user experience, and determined the level of user interface complexity, in addition to addressing trust issues associated with the utilization of artificial intelligence. This methodological approach facilitates the effective implementation of artificial intelligence healthcare applications by synthesizing both user and developer perspectives.

4- Technical challenges and barriers to development and implementation

There are some major technical barriers in the development and implementation of AI-based health care mobile applications, which undermine their full potential effectiveness and adoption. In this regard, interoperability and standardization stand out as the most prevailing ones because different healthcare systems rarely have frameworks that are able to communicate effectively in sharing information. This not only thwarts effective application-to-application communication but also the delivery of integrated patient care (). This encompasses ethical data privacy and security issues that compound the adoption difficulty of these technologies as stakeholders must navigate tough regulatory regimes while at the same time winning user trust in AI technologies [8]. Also, changing technology rapidly can introduce a gap between what users expect to do with it and its actual application capability. All these interplaying challenges require the approach in terms of holistic methods based on accessible and human-centered design-the two relevant dimensions of enabling the diffusion of AI in the healthcare landscape of (Deniz-Garcia et al., 2023).

To assess the technical challenges and barriers to adoption of AI healthcare applications, this study employs five of the most common and popular applications and collects opinions from experts.

Table No 1: technical challenges and barriers to adoption of AI healthcare applications

Sr. #	Application	Description	Limitations	App developer Opinions	Medical Expert Opinions	Suggestions	UI complexity level
1	Ada Health	AI-powered symptom checker and health assessment tool	Reduced sensitivity for rare or complex presentations; it is based upon individual input that will	Lauded for its utilization of sophisticated AI algorithms to offer immediate feedback, yet suffers in the areas of NLP contextual	Useful for general awareness about health but not to be confused with professional diagnostic tools.	Add advanced NLP to enhance contextual understanding and multilingual support..	Moderate: Basic interface, but the user will likely get lost interpreting complex

			often lack completeness or accuracy.	understanding.			health terms.
2	Buoy Health	Symptoms checker and guide or supportive tool for searching care options.	Complex or similar symptoms the user struggles with; some users find the advice too general [10].	Appreciated for user-friendly design and fast processing.	Valuable for preliminary screenings but needs validation studies to support wider medical use.	Implement AI-powered follow-up questions to clarify symptoms; enhance accessibility for visually impaired users.	Simple: Intuitive design focused on symptom input and immediate results, reducing cognitive load.
3	SkinVision	AI-based detection of skin cancer through image analysis.	Accuracy depends on the quality of the image; may miss subtle signs of other skin conditions [10].	Developers focus on the improvement of image processing algorithms to detect abnormalities efficiently.	Dermatologists warn against over-reliance on AI and recommend it as an adjunct tool for clinical examination.	Include feedback loops for incorrect diagnosis; improve image preprocessing functions.	Moderate: Clear camera capture instructions; visually simple but practically detailed UI.
4	Babylon Health	AI-driven chatbot for health advice and telehealth consultations.	Data privacy and AI biases are the ethical concerns, although the application sometimes misinterprets the symptoms [4].	Commended for scalability and seamless integration of AI with telehealth platforms.	It is criticized for over-reliance on AI decision-making and requires strict clinical oversight to ensure patient safety.	This includes transparent explanations from AI and global standards of private regulations.	Complex interactions with chatbots and integration with platforms of telehealth would overwhelm the techie challenged user.
5	Prediatric Vision	An AI-based application to detect early signs of vision problems in	Limited to specific age groups and conditions; requires parent	The developers have focused on its innovative, child-friendly design but	Pediatricians find it helpful for early screening but note that it is	Develop adaptive testing methods tailor-made for	Low: Simple and colorful interface tailored for children,

		children through interactive testing.	involvement which may affect accuracy [10].	recognize the limitation of usability to broader groups.	limited for comprehensive ophthalmological assessments.	children's ages and improve feedback to parents with respect to next steps.	with limited navigation options.

4.1 Effects of complexity on AI-Based Healthcare Apps Adoption

The complexity of AI-based healthcare mobile applications, as described in the table, greatly impacts their adoption by both caregivers and patients. Applications such as Ada Health and Babylon Health show how advanced functionalities like symptom checkers and chatbots can improve user interaction. However, overly intricate interfaces and technical language often deter users who lack technical literacy (Samad Dahri et al., 2019). For example, although highly innovative, SkinVision experiences challenges with high-quality pictures and poor accuracy in rare conditions of the skin. Such an application is required to behave as an adjunct tool rather than providing a stand-alone solution: it must strengthen the basis of clinical decision making without replacing the expertise of man (Torab-Miandoab et al., 2023).

App developers, on the other hand, point out the need for intuitive design and streamlined workflows to enhance user engagement while maintaining high standards of accuracy and efficiency. The adoption of success depends on solving issues such as interoperability, accessibility, and ethical concerns (Joshi, 2024). Simple designs, user feedback loops, and transparent AI functionalities are all necessary to bridge the gaps between advanced technology and practical usability. As indicated in the table, a balance of simplicity and functionality will lead to sustainable adoption and better healthcare outcomes (Samad Dahri et al., 2019).

4.1 User Experience and its Impact on Healthcare Professionals and Users

The user experience in AI-based healthcare mobile applications plays a key role in bridging the interaction between healthcare professionals and patients. Effective communication, trust building, and better health management by the patient can be enhanced by a well-designed user experience, improving the workflow of healthcare providers (Babajide Tolulope Familoni & Sodiq Odetunde Babatunde, 2024). Three main applications for UX-driven solutions in the healthcare industry include information generation, data management, and satisfaction enhancement. Together, these allow for more efficient and user-friendly health care experiences(Babajide Tolulope Familoni & Sodiq Odetunde Babatunde, 2024). Take, for example, Ada Health and Babylon Health. These health apps provide patients with immediate and accurate health information with intuitive interfaces. Similarly, healthcare providers are facilitated by more efficient workflows and decision support systems.

In particular, integrating technologies like 5G connectivity in healthcare apps would overcome persistent limitations like slow response times and restricted accessibility in remote

areas (Samad Dahri et al., 2019). In addition, through careful UX design, this can ensure that these applications serve a wide range of audiences, including people with disabilities and low technological literacy (Pal et al., 2023). More detailed refinements of these applications might be achieved by incorporating datasets from user feedback. Surveys or usability tests could be performed in assessing features such as the ease of navigation, visual design, and error tolerance, ensuring continuous improvement for a more equitable healthcare experience. By addressing user pain points and iterating based on feedback, these apps might be able to transform healthcare into a truly patient-centric model.

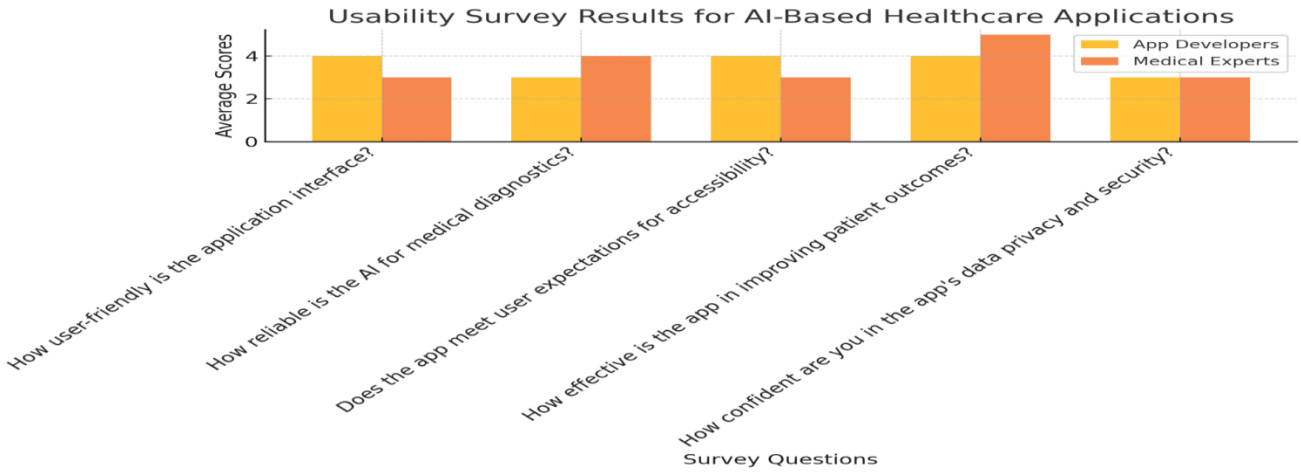
4.2 Usability Evaluation of AI-Based Healthcare Applications:

In order to evaluate these applications from professionals as well as users, a survey was conducted. The following table contains the usability survey conducted from the app developers and the medical experts based on the aspects of AI-based healthcare application:

Table No 2: App Developers and The Medical Experts Based on The Aspects of AI-Based Healthcare Application

Survey Question	App Developers (out of 5)	Medical Experts (out of 5)
How friendly is the application interface towards users?	3	4
How reliable is AI in medical diagnostics?	3	4
Does the application meet the expectations of users for accessibility?	4	3
How effective is the app in improving patient outcomes?	4	4
How confident are you in the app's data privacy and security?	3	3

Figure No 1: Survey Questions



5. Conclusion

The study presents modern medicine with the potential to transform healthcare through AI-based applications on mobile devices. Indeed, it enhances diagnostics and personalizes care and outcome for patients. Still, the complexity of the apps creates significant barriers for many users, especially those less technically literate or wary of AI technologies. Issues include data privacy, ethics, interoperability, and user interface complexity. An evaluation of five major healthcare applications indicated that simplification of UI design, ease of access, and the alleviation of ethical issues are the key factors that improve user engagement and trust. Recommendations include user feedback, advancements in algorithmic transparency, and the integration of adaptive features to suit diverse user needs. Finally, to enable the widespread adoption of AI-driven healthcare solutions, functionality must go hand in hand with usability. Addressing these challenges can pave the way for more equitable, efficient, and patient-centric healthcare, unlocking the full potential of these innovative technologies.

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