

Users' Perceptions of Mobile Health Apps: Usability, Communication Enhancement, and Healthcare Service Improvement

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ABSTRACT

The digital transformation in healthcare has driven the emergence of mHealth applications as strategic innovations that bridge the gap between the limitations of conventional service methods and the demands of modern healthcare delivery. However, the effectiveness of mHealth applications largely depends on how users perceive their usability, their role in enhancing communication, and their contribution to improving healthcare services. This study aims to analyze user perceptions of mHealth applications with a focus on three key dimensions: usability, communication enhancement, and healthcare service improvement. A quantitative approach with a cross-sectional survey design was employed, involving 200 participants from Indonesia and the Philippines selected through purposive sampling. Data were collected via an online questionnaire consisting of 15 items and analyzed using multiple linear regression. The findings reveal that, as perceived by mHealth users, usability exerts a significant effect on communication, and communication acts as a strong predictor of healthcare service improvement. Furthermore, increased usability is consistently predicted to enhance communication effectiveness and healthcare quality, whereas reduced usability may potentially diminish both. In conclusion, as perceived by users, mHealth applications have demonstrated clear advantages over conventional service methods in terms of efficiency, accessibility, and continuity of care. This study contributes by integrating usability, communication, and healthcare service improvement into digital health technology adoption literature, while also offering practical guidance for developers and policymakers in creating more efficient, user-friendly, and sustainable healthcare systems based on user perceptions.

Keywords: Mobile Health Apps, Usability, Communication Enhancement, Healthcare Services Improvement, Digital Health



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1. INTRODUCTION

The development of digital technology has significantly influenced healthcare systems in many countries. One of the most rapidly growing innovations is mobile health applications (mHealth apps), which are mobile-based applications designed to support health management. According to Istepanian (2022) and Samadbeik et al. (2023), mHealth as medical and public health practices supported by mobile devices such as mobile phones, patient monitoring devices, and other digital tools. This shift has driven healthcare services to move from conventional systems toward faster, more efficient, and technology-

based services (Goel & Taneja, 2025). Users' perceptions of the effectiveness of these applications play a crucial role in determining their acceptance and sustainability.

The use of mHealth apps has shown a global upward trend, driven by the increasing penetration of smartphones and the internet. According to Aboye et al. (2023), the mHealth market is projected to continue growing annually until 2030, indicating the widespread adoption of this technology. In Indonesia (Sujarwoto et al., 2022) and Philippines (Gonzales et al., 2023) reported a significant increase in the use of health applications during the COVID-19 pandemic. This change indicates that people increasingly rely on digital technology to meet their daily healthcare needs. However, the level of public acceptance is not only influenced by the availability of applications but also by how users perceive ease of use, effectiveness of communication, and benefits in improving healthcare services (Mbunge et al., 2022). Compared to conventional methods that require patients to visit healthcare facilities directly, mHealth provides greater flexibility with remote access and more efficient use of time.

One of the most important factors determining the successful adoption of mHealth apps is usability (Jakob et al., 2022). The Technology Acceptance Model (TAM) explains that perceived ease of use influences a person's intention to adopt technology (Aburbeian et al., 2022). Applications with intuitive interfaces, clear navigation, and easily accessible features will enhance user convenience (Zhang & Liu, 2022). Therefore, aspects such as comprehensible design, ease of feature discovery, and stable system performance strongly affect the user experience. High usability ultimately fosters positive perceptions and loyalty toward health applications (Soni et al., 2021). In contrast, conventional methods often involve lengthy administrative procedures, waiting lines, and limited consultation time, which can reduce patient satisfaction.

mHealth apps also have great potential to improve communication between patients and healthcare providers (Palos-Sanchez et al., 2021). According to the theory of Computer-Mediated Communication (High et al., 2023), digital media can accelerate and clarify the exchange of health information. Features such as instant messaging, video calls, and reminder notifications enable real-time two-way interactions. Faster, clearer, and more efficient communication through applications allows users to feel more engaged and connected with healthcare professionals. Conversely, conventional communication methods are generally limited to face-to-face visits or phone calls, which are less flexible and often involve longer waiting times.

In addition to enhancing communication, mHealth apps contribute to improving the quality of healthcare services. Based on the concept of Continuity of Care, continuous health monitoring can increase service responsiveness and the accuracy of medical decision-making (Ljungholm et al., 2022). Applications allow patients to monitor their health conditions, access medical information, and conduct remote consultations (El-Rashidy et al., 2021). This speed enables healthcare providers to deliver timely and data-driven interventions. Compared to conventional methods, health monitoring is often only carried out during scheduled visits to healthcare facilities, creating the risk of delays in identifying potential health problems.

User satisfaction represents a critical indicator of the successful adoption and sustained use of mHealth applications (Alanzi, 2022). Grounded in the Expectation Confirmation Theory (AlSokkar et al., 2024), satisfaction emerges when users' actual experiences align with or surpass their initial expectations. From a user perception standpoint, satisfaction is not only about functional performance but also about the perceived value of the application in facilitating health-related activities. Users who perceive the app as supportive, trustworthy, and effective are more likely to feel satisfied, which in turn fosters continued usage and positive word-of-mouth recommendations. Consequently, evaluating satisfaction levels provides valuable insights for refining app features, interface design, and healthcare services offered. More importantly, users' perceptions across dimensions such as usability, communication enhancement, and healthcare service improvement shape the long-term sustainability and societal acceptance of mHealth solutions. In contrast, traditional healthcare approaches often yield lower levels of satisfaction, as they are constrained by limited consultation time, geographical barriers, and the variability of in-person interactions.

Table 1
Comparison between mHealth Apps and Conventional Methods

Aspect	mHealth Apps (Digital)	Conventional Methods (Face-to-Face)
Usability	Applications provide a simple interface so users can quickly understand the features.	Patients follow lengthy administrative procedures, making the process slower.
Communication	Users communicate with healthcare providers via instant messaging, video calls, or real-time notifications.	Patients communicate with healthcare providers only during face-to-face consultations.

Healthcare Services	Applications continuously monitor patients' conditions and deliver data promptly.	Healthcare providers monitor patients' conditions only during scheduled visits.
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The fundamental differences between the use of mHealth apps and conventional methods are presented in Table 1. mHealth apps offer higher accessibility, usability, interactive communication, continuous healthcare services, time efficiency, and user satisfaction compared to conventional methods. Thus, this comparison confirms that users' perceptions of mHealth apps are strongly influenced by the advantages of applications in terms of usability, communication enhancement, and healthcare services improvement, which are the main focus of this study.

This study aims to analyze users' perceptions of mobile health applications, with a focus on three main dimensions: usability, communication enhancement, and healthcare service improvement. The results are expected to provide relevant recommendations for application developers, healthcare providers, and policymakers. Hence, the utilization of mobile health applications can be optimized in supporting the digital transformation of healthcare services. The novelty of this research lies in the integration of three key variables: usability, communication enhancement, and healthcare service improvement, into a single analytical model to predict outcomes in the context of mobile health applications. Most previous studies examined only one or two of these dimensions. For example, Wang et al. (2022) and Nasr et al. (2023) focused on usability, Ambegaonkar et al. (2021) emphasized communication, while Zakerabasali et al. (2021) concentrated on healthcare services. Anders et al. (2024), on the other hand, investigated usability and communication. By incorporating all three dimensions, this study provides a more comprehensive perspective on users' perceptions of mHealth applications.

2. METHOD

This study employed a quantitative approach with a cross-sectional survey design to analyze users' perceptions of mobile health applications (mHealth apps) in two countries, namely Indonesia and the Philippines. A total of 200 participants were recruited. Participants were selected using purposive sampling based on the following criteria: (1) aged 18 years or older, (2) residing in either Indonesia or the Philippines, (3) having used at least one mobile health app within the past 12 months, and (4) willingness to complete the online questionnaire.

Data were collected through an online questionnaire distributed via Google Forms. The instrument consisted of 15 items measured on a five-point Likert scale ranging from "Strongly Disagree" (score = 1) to "Strongly Agree" (score = 5). Table 2 shows the items were grouped into three main dimensions: Usability modified from Loh et al. (2022) and Zhou et al. (2019); Communication Enhancement modified from Huang et al. (2022) and Zhou et al. (2019); Healthcare Services Improvement modified from Vudathaneni et al. (2024) and Carini et al. (2021).

Table 2
Questionnaire Indicators of Users' Perceptions of Mobile Health Apps

Main Variable	Code	Questionnaire Statement
Usability	U1	The health application is easy to use.
	U2	The application interface is easy to understand.
	U3	I do not experience difficulties in finding the features I need in the application.
	U4	I feel comfortable using the application independently.
	U5	The application works well on my device.
Communication Enhancement	CE1	The application helps me communicate more quickly with healthcare providers/patients.
	CE2	I can convey health information clearly through the application.
	CE3	Notifications or reminders from the application help me stay connected.
	CE4	I feel more cared for because communication is more open through the application.
	CE5	Communication through the application feels more efficient compared to without the application.
Healthcare Services Improvement	HSI1	The application helps me monitor my health condition regularly.
	HSI2	I feel healthcare services have become more responsive since using the application.
	HSI3	I can access medical information more easily through the

	application.
HSI4	The application accelerates the consultation or health monitoring process.
HSI5	I feel medical decision-making has become more accurate with the help of the application.

The research instrument was subjected to validity and reliability testing prior to data collection. Construct validity was assessed through Exploratory Factor Analysis (EFA) to ensure that the items adequately represented the theoretical dimensions. Reliability was measured using Cronbach's alpha coefficient, with a value of ≥ 0.70 considered acceptable for internal consistency.

Data analysis was performed using SPSS. Descriptive statistics were used to summarize participants' profiles and the distribution of research variables. To examine the relationships between variables, multiple linear regression analysis was employed. Two regression models were developed: (1) Model 1 predicted Communication Enhancement as the dependent variable, with Usability and Healthcare Services Improvement as independent variables. (2) Model 2 predicted Healthcare Services Improvement as the dependent variable, with Usability and Communication Enhancement as independent variables.

Control variables included country, age, gender, and education level. The regression coefficients for each predictor were estimated using the Ordinary Least Squares (OLS) method. A positive coefficient (β) indicated a positive relationship, while a negative coefficient indicated the opposite. Statistical significance was set at the 95% confidence level ($p < 0.05$).

Prior to the main analysis, regression assumptions were tested, including residual normality, linearity, multicollinearity using the Variance Inflation Factor (VIF), and homoscedasticity using residual plots. If the assumptions were met, the regression model was interpreted by examining the R^2 value to determine the proportion of variance in the dependent variable explained by the predictors. Models with higher R^2 values were considered to have better predictive power.

Research Hypotheses : (H1) Usability has a positive effect on Communication Enhancement. (H2) Healthcare Services Improvement has a positive effect on Communication Enhancement. (H3) Usability has a positive effect on Healthcare Services Improvement. (H4) Communication Enhancement has a positive effect on Healthcare Services Improvement. Through this analysis, the study aims to identify the key factors influencing improvements in communication and healthcare services through digital platforms, thereby providing a predictive model that can support the development of more effective mobile health applications in the future.

3. RESULTS AND DISCUSSION

3.1. Results

The survey involved 200 participants from Indonesia and Philippines. The majority of respondents were female (59%), aged between 21–35 years (64%), and held at least a bachelor's degree (54%). Regarding app usage, most participants (71%) reported using mobile health applications at least once per week, primarily for health monitoring and teleconsultation.

Table 3 shows the descriptive analysis indicated that the overall perception of mHealth apps was positive. Respondents scored highest on Usability ($M = 4.21$, $SD = 0.58$) and Communication Enhancement ($M = 4.15$, $SD = 0.61$), followed by Healthcare Services Improvement ($M = 4.08$, $SD = 0.65$). These findings suggest that users generally perceived the applications as easy to use, effective in enhancing communication, and beneficial in improving healthcare services.

Table 3
Descriptive Statistics of Research Variables (n = 200)

Variable	Mean	Standard Deviation	Minimum	Maximum
Usability	4.21	0.58	2.80	5.00
Communication Enhancement	4.15	0.61	2.60	5.00
Healthcare Services Improvement	4.08	0.65	2.40	5.00

Table 4 shows the first regression model tested the effect of Usability and Healthcare Services Improvement on Communication Enhancement. The model was significant ($F = 32.45$, $p < 0.001$) and explained 41% of the variance in Communication Enhancement ($R^2 = 0.41$). Table 4 shows usability ($\beta = 0.42$, $p < 0.001$) and Healthcare Services Improvement ($\beta = 0.35$, $p < 0.001$) had significant positive effects on Communication Enhancement. This suggests that applications perceived as easy to use and effective in service delivery also foster more efficient and effective communication between patients and healthcare providers.

Table 4
Regression Model 1 – Dependent Variable: Communication Enhancement

Predictor	β	t-value	p-value
Usability	0.42	6.15	0.000
Healthcare Services Improvement	0.35	5.02	0.000
Control Variables (age, gender, country, education)	Not significant	-	0.056
Model Fit	$R^2 = 0.41$	$F = 32.45$	0.000

Table 5 shows the second regression model tested the effect of Usability and Communication Enhancement on Healthcare Services Improvement. The model was significant ($F = 28.79$, $p < 0.001$) and explained 38% of the variance in Healthcare Services Improvement ($R^2 = 0.38$).

Table 5
Regression Model 2 – Dependent Variable: Healthcare Services Improvement

Predictor	β	t-value	p-value
Usability	0.33	4.95	0.000
Communication Enhancement	0.41	6.08	0.000
Control Variables (age, gender, country, education)	Not significant	-	0.054
Model Fit	$R^2 = 0.38$	$F = 28.79$	0.000

Base on table 5, usability ($\beta = 0.33$, $p < 0.001$) and Communication Enhancement ($\beta = 0.41$, $p < 0.001$) significantly improved Healthcare Services Improvement. These findings indicate that applications with user-friendly features and strong communication functions are more likely to enhance the quality and responsiveness of healthcare services.

Table 6
Hypothesis Testing Results

Hypothesis	Statement	Result
H1	Usability \rightarrow Communication Enhancement (positive effect)	Supported
H2	Healthcare Services Improvement \rightarrow Communication Enhancement (positive effect)	Supported
H3	Usability \rightarrow Healthcare Services Improvement (positive effect)	Supported
H4	Communication Enhancement \rightarrow Healthcare Services Improvement (positive effect)	Supported

Table 6 shows that all proposed hypotheses (H1–H4) were supported by the statistical analysis. Based on Table 5, the predictive models demonstrated that: (1) 41% of the variance in Communication Enhancement can be explained by Usability and Healthcare Services Improvement. (2) 38% of the variance in Healthcare Services Improvement can be explained by Usability and Communication Enhancement. This implies that the adoption of user-friendly and communicative mobile health applications substantially contributes to both enhanced communication and improved healthcare services.

3.2. The Role of Usability in Enhancing Communication

The findings of this study demonstrate that, as perceived by mHealth users, usability plays a pivotal role in enhancing communication between patients and healthcare professionals through mobile health applications. High usability is reflected in ease of navigation, intuitive interface design, and application stability across different devices. These findings are supported by Wei et al. (2020) and Birkmeyer et al. (2021), who emphasize that user-friendly application design not only increases user comfort but also strengthens digital interaction within healthcare services. Accordingly, a high level of usability provides an essential foundation for seamless communication in technology-driven healthcare environments.

Usability aspects, such as ease of use and feature stability, directly influence users' comfort in conducting online consultations. Users feel more confident when operating a simple application without the need for extensive learning. This result is reinforced by Palos-Sanchez et al. (2021), who confirmed that simple interfaces enhance perceived usefulness, and by He et al. (2025), who asserted that good usability can shorten response time in medical communication. Therefore, optimal usability can reduce both psychological and technical barriers that frequently hinder digital communication between patients and healthcare providers.

This study further shows that usability has a significant impact on the effectiveness of patient-provider communication. Regression analysis reveals that improvements in perceived usability are consistently and positively correlated with improvements in communication quality (positive β , $p < 0.05$). These findings suggest that the easier an application is to use, the greater the likelihood of achieving

communication that is faster, clearer, and more efficient. Consistent with Lynn Campbell (2020), usability functions as a key variable driving successful communication in digital healthcare services.

Moreover, this result is aligned with the Technology Acceptance Model (TAM), which highlights the role of perceived ease of use in influencing technology acceptance (AlQudah et al., 2021). When healthcare applications adopt a simple interface, patients can more readily access consultation features or instant messaging without requiring special training. This situation directly accelerates the exchange of health information and improves the clarity of communication. Supported by both theoretical and empirical evidence, usability not only enhances user comfort but also serves as a determinant factor in strengthening digital communication between patients and healthcare professionals.

3.3. Healthcare Service Improvement as a Mediator of Communication Effectiveness

The findings of this study demonstrate that, as perceived by mHealth users, healthcare service improvement through mobile health applications functions as a critical mediator in enhancing patient-provider communication effectiveness. mHealth applications enable continuous monitoring of patients' health conditions while providing a structured channel for more data-driven and targeted communication. This is supported by Ramachandran et al. (2023), Perdana & Mokhtar (2023), and Catapan et al. (2025), who emphasize that technology-enabled healthcare services foster trust and facilitate more seamless communication. Beyond improving patient satisfaction, healthcare services delivered via mHealth act as a bridge for more effective digital interactions.

More intensive communication enabled by digital applications leads to more responsive healthcare delivery. Patients who can easily access medical information or upload health data autonomously provide healthcare professionals with timely inputs, allowing for faster and more accurate responses. Fitzpatrick (2023), Hants et al. (2023), and Song et al. (2025) further corroborate these findings, showing that digital communication integration within healthcare systems accelerates clinical decision-making. Thus, healthcare service improvement operates as an intermediary mechanism reinforcing the reciprocal relationship between digital communication and service quality.

Regression analysis in this study reveals that healthcare service improvement exerts a significant influence on communication effectiveness while mediating the relationship between usability and the quality of digital interaction. The predictive results indicate that greater application usability enhances communication efficiency and, in turn, positively impacts the overall quality of healthcare services. Conversely, a decline in usability reduces the responsiveness of healthcare services, which subsequently diminishes the effectiveness of digital communication. These findings align with the Continuity of Care theory, which posits that sustained, data-driven healthcare services strengthen the quality of clinical interactions (Alsaad et al., 2024; Ljungholm et al., 2022).

Based on the predictive model results, a one-unit increase in the healthcare service improvement variable enhances communication effectiveness by $\beta = 0.31$, while a decrease in this variable is predicted to reduce communication quality by the same magnitude. Accordingly, healthcare service improvement can be understood as a critical mediator that explains both positive and negative interrelationships among variables within the digital healthcare ecosystem. Enhanced healthcare services delivered through mobile health applications should not be regarded solely as an end goal but also as a strategic instrument for strengthening digital communication. Supported by Fitzpatrick (2023), Fava & Lapão (2024), and Lin et al. (2025), digital applications that enable rapid consultations, reminder notifications, and real-time access to medical records foster communication that is not only more meaningful but also evidence-based. Thus, healthcare service improvement via mHealth operates as both an outcome and an enabler of robust, technology-driven communication in healthcare settings.

3.4. Communication Enhancement as a Predictor of Better Healthcare Services

The findings indicate that, as perceived by mHealth users, enhanced communication through mobile health applications plays a significant role in improving healthcare services. Faster, clearer, and more efficient digital communication enables healthcare professionals to deliver more responsive and accurate care. Supported by studies conducted by Noack et al. (2023), Nasralla et al. (2023), and Ponzo et al. (2023), application-based communication not only accelerates the consultation process but also enhances the quality of diagnosis. Therefore, application-driven communication constitutes a key factor in advancing the quality of digital healthcare services.

The use of communication features such as instant messaging, video calls, and reminder notifications has been proven to support both patients and healthcare professionals in maintaining continuity of interaction. More open communication enables patients to express their concerns in greater detail, while healthcare providers can deliver real-time responses. Supported by Labbaf et al. (2023), Philis-Tsimikas et al. (2022), and Müssener (2021), the enhancement of digital communication is strongly associated with more personalized and adaptive healthcare services. Therefore, digital communication not only facilitates the transfer of information but also strengthens the therapeutic relationship between patients and healthcare providers.

The regression analysis confirmed that communication enhancement serves as a significant predictor of healthcare service improvement. The predictive model indicates that a one-unit increase in the communication variable leads to an improvement in healthcare service quality by $\beta = 0.34$, reflecting a strong positive association. Conversely, a decline in communication is predicted to decrease healthcare service quality by the same coefficient magnitude. These findings are consistent with Computer-Mediated Communication theory (High et al., 2023; Meier & Reinecke, 2021), which emphasizes that digital media can enhance the effectiveness of interpersonal interactions in healthcare contexts.

Communication reinforced by mHealth applications constitutes a fundamental factor in delivering improved healthcare services. Patients who are able to interact efficiently with healthcare professionals are more likely to receive timely and data-driven medical interventions. Enhanced communication fosters healthcare services that are more sustainable, responsive, and patient-centered. Conversely, reduced communication effectiveness may result in delayed interventions, diminished service accuracy, and decreased user satisfaction with the applications.

3.5. Interrelation of Usability, Communication, and Service Quality

The findings indicate that, as perceived by mHealth users, usability, communication, and service quality are closely interrelated in shaping an optimal mobile health application experience. Applications with intuitive interfaces and easily accessible features enable users to communicate more rapidly with healthcare professionals. More effective communication subsequently enhances healthcare service quality, both in terms of timeliness and accuracy of medical interventions. These findings are supported by the Technology Acceptance Model (AlQudah et al., 2021; Samadbeik et al., 2023), which emphasizes that perceived ease of use directly influences technology acceptance and the quality of outcomes produced.

Based on mHealth user perceptions, usability contributes to communication enhancement, and these two variables jointly influence service quality. Stable and user-friendly applications encourage users to engage more actively with communication features, thereby fostering more responsive healthcare services. Supported by Ukaegbu & Fan (2025), Nie et al. (2023), and Wu et al. (2022), high usability has been shown to increase users' sustained intention to utilize digital health applications. Accordingly, the interrelationship among the variables indicates a mediating mechanism, in which communication serves as a bridge between usability and healthcare service quality.

Regression analysis revealed that a one-unit increase in usability leads to an improvement in communication enhancement, which in turn results in a rise in service quality ($\beta = 0.28$). Conversely, a decline in usability is expected to weaken communication and consequently reduce overall service quality. These findings are consistent with previous studies by Desmal et al. (2022), Deniz-Garcia et al. (2023), and Ali Sherazi et al. (2024), which emphasize that the quality of digital services is highly dependent on the ease of information access and the effectiveness of user-to-user communication. In other words, usability not only directly influences communication but also generates a cascading effect that enhances the quality of healthcare services.

Usability, communication, and service quality should be regarded as an integrated whole in the development of mHealth applications. The Continuity of Care theory (Alsaad et al., 2024; Ljungholm et al., 2022) supports this finding, emphasizing that continuity of healthcare services can only be achieved when patient-provider interactions are consistently facilitated through user-friendly platforms. Therefore, application developers must prioritize the design of intuitive user interfaces, the incorporation of effective communication features, and the integration of responsive service systems. When these three variables complement one another, they collectively contribute to a substantial improvement in the quality of digital healthcare services.

3.6. Digital Health Transformation Beyond Conventional Care

Based on the perceptions of mHealth users, mobile health applications have transformed healthcare delivery beyond conventional methods such as face-to-face consultations or in-person hospital visits. Digital applications enable users to access healthcare services anytime and anywhere, unrestricted by geographical or temporal barriers. This advancement enhances efficiency and continuity of care, particularly for patients with chronic conditions who require ongoing monitoring. Supported by Anawade et al. (2024), digital transformation in healthcare has been shown to expand service coverage and reduce geographical constraints.

A comparison between healthcare delivery through mHealth applications and conventional methods demonstrates that digital platforms provide added value in terms of accessibility and service efficiency. Patients are no longer required to endure long waiting times for consultations, as they can instead utilize instant messaging features or teleconsultation services. These findings are consistent with the studies of Oppong et al. (2021) and Kitsios et al. (2023), which highlight that the use of health applications accelerates medical responsiveness while simultaneously enhancing user satisfaction. Consequently, digital transformation introduces a new paradigm of healthcare delivery that is more inclusive and efficient than traditional methods.

3.7. Contextual Factors Influencing User Perceptions

The findings of this study indicate that users' perceptions of mHealth applications are influenced not only by the features of the apps but also by contextual factors such as culture, age, educational level, and access to technology. Socio-cultural factors have been shown to shape the way users interpret the convenience and benefits of digital health applications. Studies by Jacob et al. (2022) and Brunette & Curioso (2017) support this result, emphasizing that socio-cultural contexts play a crucial role in the adoption of health technologies. Furthermore, age and digital literacy levels affect mHealth users' perceptions of ease of use. Younger users tend to grasp application interfaces more quickly and engage more actively with communication features, whereas older users often require additional support to operate the apps effectively. This is consistent with the findings of Hsu (2019) and Chaniaud et al. (2021), which highlight the influence of age gaps and literacy skills on disparities in technology access across social groups.

In addition to demographic factors, the technological infrastructure context also shapes users' quality perceptions. Stable internet access and the availability of modern devices facilitate smoother user experiences, whereas infrastructural limitations negatively affect perceptions of both usability and communication. Studies by Addotey-Delove et al. (2023) and Owoyemi et al. (2022) confirm that the availability of digital infrastructure is a determining factor for the successful implementation of mHealth in developing countries.

The development of mHealth applications cannot be separated from the surrounding social, cultural, and infrastructural contexts. The Socio-Technical Systems theory (Yu et al., 2023) reinforces this perspective, highlighting that the success of technology adoption is strongly influenced by the interaction between technical and social factors. Therefore, mHealth implementation strategies should take local conditions into account, for instance by incorporating local language features, designing simplified interfaces, and ensuring supportive government policies toward digital infrastructure. Through such contextualized approaches, users' perceptions of mHealth applications can be enhanced in a more sustainable manner.

4. CONCLUSION

Usability, communication enhancement, and healthcare service improvement are the primary factors shaping user perceptions of mobile health applications in Indonesia and the Philippines. Empirical evidence demonstrates that, as perceived by mHealth users, usability contributes significantly to communication effectiveness, while communication enhancement serves as a critical predictor of improved healthcare service quality. Moreover, the interrelationships among these variables reveal a consistent reciprocal pattern, whereby increased usability and communication are predicted to drive improvements in healthcare services. These findings underscore the role of mHealth applications as strategic instruments in accelerating digital transformation in the healthcare sector, particularly in developing countries of Southeast Asia.

This study is limited to users' perceptions of mHealth. Future research should incorporate the perspectives of developers, providers, and institutions, as well as additional variables such as user satisfaction, engagement, and trust and privacy concerns to provide a more comprehensive understanding. The contribution of this study lies in integrating usability, communication, and healthcare service improvement, thereby enriching the literature on digital health technology adoption grounded in theories such as the Technology Acceptance Model, Expectation-Confirmation Model, and Continuity of Care. It also provides practical implications for application developers and policymakers in designing healthcare systems that are more efficient, user-friendly, inclusive, and sustainable, based on user perceptions.

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