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Why Patients Stop Using Health Apps: A Study on How Design Affects Long-Term Engagement in Chronic Disease Care

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Abstract- ***Mobile health (mHealth) apps have been increasingly adopted, which has changed the way chronic diseases are managed by facilitating self, monitoring, health education, and remote patient engagement. Although initially popular, most health apps lose a great number of users over time, thereby limiting their role in the care of chronic diseases. This article focuses on the reasons behind patients' discontinuation of health app usage and the impact of design features on patient engagement over time. A questionnaire survey of chronic disease patients who had experience with health apps was employed to investigate the relationship between application design and continued use empirically. The information was summarized by means of descriptive statistics and charts. The results uncovered that among the factors leading to dropping out were: bad usability, generic experience, too many notifications, lack of trust in privacy, and low perceived utility. The paper argues that making apps more user, centered and targeting user behaviors are measures that can drastically improve long, term engagement with health apps. The article suggests ways in which developers, healthcare workers, and lawmakers can work together to make apps more sustainable and thus raise patient outcomes levels.***

Keywords: Health Apps, mhealth, Chronic Disease, User Engagement, App Design, Patient Adherence

I. INTRODUCTION

Chronic disease such as diabetes, hypertension, cardiovascular diseases, and asthma are a huge worldwide health problem that is responsible for a large percentage of the cases of sickness, death, and healthcare costs in the whole world (World Health Organization, 2023). To combat the increasing incidence of chronic diseases, digital health technologies, especially mobile health (mHealth) apps, have become exciting instruments for patient disease self, management and better patient outcomes (Vaghefi & Tulu, 2019).

Health apps are made to help patients in various ways like tracking their symptoms, remembering to take their medications, getting health education, and contacting healthcare providers. There is data to prove that mHealth interventions, if they are well, designed, can lead to changes in self, care behaviors, give patients more power over their lives, and lower the use of healthcare services (Amagai et al., 2022). But, even though health apps are a popular download item, it is a real challenge to keep users engaged for a long time. The reports of studies are very similar to each other in that they all show that users stop using the apps at a very quick rate, many of them even before two or three months have passed since the first use (Kidman et al., 2024).

Stopping using health apps mostly negates the promise that digital health interventions hold, especially chronic disease management which is a long, term behavioral change and requires continuous engagement. It is obvious that the technical functionality is the most important factor; however, the studies have shown that the designs factors such as usability, personalization, simplicity of interface, feedback mechanisms and motivational features are playing a major role in continuing or abandoning the health apps by the users (Vaghefi & Tulu, 2019; Amagai et al., 2022).

Although there has been a lot of research done on mHealth adoption, hardly any empirical studies have been conducted that focus directly on patients perceptions of app design and the impact of these perceptions on their long, term engagement, especially in the context of chronic diseases. Most of the existing research depends on app usage analytics or very short, term trials and thus can offer only limited insight into user experiences and reasons for discontinuation (Kidman et al., 2024).

In this context, the present study explores the reasons behind patients discontinuing the use of health apps. More specifically, it examines the extent to which design features influence patients long, term engagement with their care needs, particularly in chronic disease scenarios. The questionnaire, based data collection method has brought user voices directly into the study, allowing it to make a meaningful contribution towards a better understanding of patient, centered design issues in mHealth.

The specific objectives of the study are to, Examine the extent of long-term engagement with health apps among chronic disease patients. Identify key design-related factors that influence patients' continued or discontinued use of health apps. Analyze patients' perceptions of usability, personalization, and usefulness of health apps. And to Provide recommendations for improving health app design to enhance long-term engagement.

II. LITERATURE REVIEW

2.1 Concept of Mobile Health Applications

Mobile health apps are applications that help in providing health, related services through mobile devices like smartphones and tablets (World Health Organization, 2023). These devices can be used for any range of activities from general fitness to managing very specific illnesses such as diabetes, hypertension, or mental health issues. Vaghefi and Tulu (2019) mentioned that because of their easy availability, low cost and ability to reach more people, health apps are becoming an integral part of modern healthcare systems.

In chronic disease management, health applications provide the patients with the means to monitor their condition, allow them to get instant feedback, and also help to change their habits by sending them reminders, educational materials, etc. (Amagai et al., 2022). However, the success of these apps is mostly determined by how involved the patients are with the apps over time rather than just their initial willingness to use them.

2.2 Prolonged User Participation in Health Apps and Dropout

Engagement is defined as the degree or level of user's interaction with a digital health intervention in a continuous, meaningful way (Kidman et al., 2024). On the flip side, attrition is the reduction or complete stop of app utilization over time. From the findings of various studies, it is evident that attrition rates are alarmingly high in health apps. In fact, Amagai et al. (2022) observed that more than 50% of users abandon health apps by their usage after the first month only. Likewise, Kidman et al. (2024) also mentioned that the rates of app abandonment are more than 70% within 90 to 100 days of usage.

There are various reasons for this trend. Some of the common reasons for discontinuation include loss of motivation, not having expectations met, and no feeling of value (Kidman et al., 2024). What is more, these reasons are, in fact, very briefly connected to the app's design and user experience rather than to health content itself.

2.3 Design and Usability of Health Apps

The term "design" is used for the aesthetic, functional, and interactive features of an application that determine user experience. Usability, which is a fundamental aspect of design, deals with how simple it is for users to learn, find their way around, and efficiently use a program (Vaghefi & Tulu, 2019). It is obvious that poor usability is a leading factor in discontinued use of an app, especially for elderly people and those with a low level of digital literacy.

A number of systematic reviews have revealed that apps for health purposes mostly do not follow the usability principles leading to users' frustration and quitting the apps (PubMed Systematic Review, 2021). Users are not satisfied when they have to struggle with complicated navigation, fill in too many forms, face technically unclear instructions, and experience technical problems. These factors make it very unlikely that they will want to continue using the app.

2.4 Personalization and Motivation

Personalization means modification of the app's content, objectives, and response according to individual user needs and preferences. Evidence

shows that health apps that are tailored to the individual are more capable of keeping the user engaged than standard interventions (Amagai et al., 2022). Personalized reminders, adaptive goal, setting, and situation, aware feedback increase users' feeling of autonomy and competence, which mainly drive intrinsic motivation.

Motivational features like gamification, progress tracking, and social interaction have also been shown to be effective in improving engagement (Kidman et al., 2024). Nevertheless, motivational features that are wrongly implemented, e.g., excessive notifications or irrelevant rewards, may result in disengagement instead of the desired effect.

2.5 Perceived Usefulness and Trust

Perceived usefulness is the degree to which the users think the app helps them in health management (Vaghefi & Tulu, 2019). If the users recognize direct benefits like better symptom control or more adherence to medication, they will be more inclined to keep on using health apps.

Trust and privacy are two more factors that have an important impact on engagement. Research reveals that concerns about data security and personal health information being misused are the major factors that influence users' decision to use health apps or not (Kidman et al., 2024). Therefore, clear data policies and secure design frameworks are necessary for maintaining user trust.

III. METHODOLOGY

3.1 Research Design

This investigation implemented a quantitative research model through a cross, sectional survey approach. Employing the quantitative method was considered fitting as it facilitates the gathering and processing of numerical data in a structured manner to reveal patients' use and discontinuation of health apps through patterns, relationships, and trends (Creswell & Creswell, 2018). This approach gave the author a tool to verify the extent to which design, related factors impact chronic disease patients' long, term engagement with health apps.

3.2 The study population

The study population targeted patients with chronic conditions like diabetes, hypertension, cardiovascular diseases, asthma, and arthritis who had used at least one health or mobile medical application for their disease management. The choice of chronic disease patients is warranted because of the prolonged nature of care which necessitates the need for such patients to be continuously engaged with the health apps (Vaghefi & Tulu, 2019)..

3.3 Sample Size and Sampling Technique

A sample size of 200 respondents was used to conduct the study. This sample size was deemed sufficient for carrying out both descriptive and inferential analyses in social and health sciences research (Saunders et al., 2019).The study utilized a purposive sampling technique which focused on individuals that met the inclusion criteria to be diagnosed with a chronic condition and have experience using health apps.

3.4 Instrument for Data Collection

Data were collected through a structured questionnaire that was self, designed by the researcher referring to the existing literature on mHealth engagement and app design (Amagai et al., 2022; Kidman et al., 2024). The questionnaire consisted of four parts:

Section A: Demographic characteristics of the respondents

Section B: Patterns of health app usage

Section C: Perceptions of health app design features

Section D: Reasons for discontinuation and engagement challenges

Majority of the items in Sections B, C, and D were assessed through a five, point Likert scale with the following scale Strongly Agree (5) to Strongly Disagree (1).

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3.5 Validity and Reliability of the Instrument

Content validity was primarily secured by the thorough alignment of the questionnaire items with the same constructs that the previous empirical studies and systematic reviews had identified (PubMed Systematic Review, 2021). In order to evaluate the reliability of the instrument, a pilot study was conducted on 20 respondents, and the instrument resulted in a Cronbach's alpha coefficient of 0.82, which means a very high level of internal consistency (George & Mallery, 2020).

3.6 Method of Data Analysis

Data collected were first coded and then analyzed using descriptive statistical methods such as frequency, percentage, mean scores, and graphical representations like bar and pie charts. These methods were chosen to best illustrate the user's perceptions and engagement trends. The results are visually presented through tables and explained charts for better understanding and readability.

IV. FINDINGS

The present section illustrates the results and their interpretation, which was obtained from the questionnaire survey distributed among chronic disease patients who have used health applications. The results are first displayed through tables and descriptive statistics, and then detailed interpretations are given to tell about the patterns and trends in the health app design and long, term engagement.

4.1 Demographic Characteristics of Respondents

Table 1: Demographic Distribution of Respondents

Variable	Category	Frequency	Percentage (%)
Gender	Male	96	48.0
	Female	104	52.0
Age	18–30	42	21.0
	31–45	78	39.0
	46–60	56	28.0
	60+	24	12.0
Chronic Condition	Diabetes	74	37.0
	Hypertension	62	31.0
	Cardiovascular diseases	34	17.0
	Others	30	15.0

The data indicates that the number of females (52%) marginally exceeds the number of males (48%). This indicates the use of the health apps by patients with chronic diseases is irrespective of the users' gender and aligns with the earlier mentioned mHealth studies not being gender biased (Amagai et al., 2022). The predominant number of women users is presumably because women tend to be more health conscious, an observation made in several studies related to digital health.

The age distribution shows that most of the respondents, (39%) are in the 31-45 year age bracket, and the next highest number being (28%) is in the 46-60 year bracket. This infers that most of the users of health apps are in the middle age category. This is the age group that is usually technology savvy, yet they are also more likely to have chronic illnesses, thus the need for digital health services. However, the participation of individuals above the age of 60 is noticeably lesser (12%) and this could be an indication of older users having inadequate digit proficiency, or more digital illiteracy, or simply not having access to smart phones, as also observed by Vaghefi and Tulu (2019).

Respondents revealed, in terms of health conditions, that diabetes (37%) and hypertension (31%) accounted for the largest shares of the chronic diseases they had. This is in agreement with worldwide pattern showing that these diseases are the most common chronic illnesses that people use health apps to manage (World

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Health Organization, 2023). The variation in the conditions represented increases the extent to which the findings can be generalized to the whole population of chronic disease sufferers.

4.2 Duration and Pattern of Health App Usage

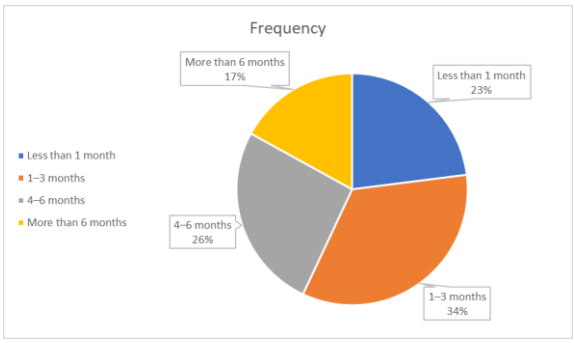

Figure 1: Duration of Health App Use

There is strong evidence that respondents used health apps for a very limited time. Health apps have been shown with limited retention; for example, 57% of users have been shown to stop using health apps within three months, whereas only 17% of users have been shown to report using health apps for more than six months (Kidman et al., 2024).

Discontinuation of app use is typically seen as users stop using apps after three months of initial engagement due to a lack of motivation or interest in the app. Oftentimes, user disengagement is caused by the novelty of the app being worn off and users evaluating any significant value the app offers in basic user goals and everyday use (Amagai et al., 2022).

This study shows that fostering a method of retaining users is more valuable than attempting to initially attract users for health apps requiring chronic retention features. health apps with low residual user engagement features aimed at chronic disease supportive care will retain users very little to none.

4.3 Users' Perceptions of Health App Design Features

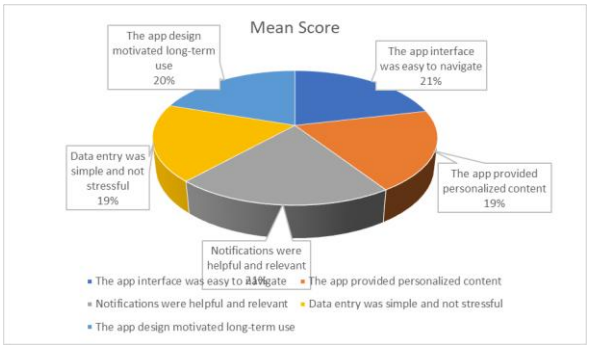

Figure 2: Perceptions of Health App Design Features

The mean scores in Figure 2 show user perception on each of the key design features of the systems. The design feature of interface ease-of-navigation recorded an average score of 3.12, meaning some users viewed the apps as easy to use, while a large number of users faced challenges navigatinf the interface or understanding the functions of the apps.

Users' perception as highlighted by the mean score of 2.84 on the design feature of personalization, suggests dissatisfaction in the ability of health apps to meet unique needs of individual users. The finding signal a crucial shortcoming as personalization is an important factor contributing to the likelihood of users remaining engaged with a digital health intervention (Vaghefi & Tulu, 2019). The lack of personalized content, customized feedback, and adaptive goal-setting may have caused users to feel a lack of relevance and ownership around the apps, ultimately contributing to user disengagement.

The mean score of 2.71 on ease of data entry is the lowest, highlighting a critical shortcoming in design. Many users viewed the data entry processes as being overly stressful or time-consuming, which may have caused frustration and fatigue with the use of the apps. This means excessive manual data entry may have caused a barrier to sustained use of the apps, as suggested by other studies (Amagai et al., 2022).

On a general note, the low score attributed to motivation, related factors (2.89) points to the fact that the features provided by the apps design were not enough to hold users' interest for a long time. This

conclusion confirms the view that solely focusing on usability is inadequate; health apps should, in fact, integrate motivational and behavioral design elements as well, to help users stick to long, term use.

4.4 Reasons for Discontinuation of Health App Use

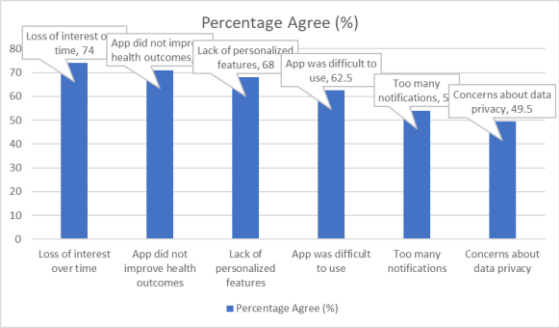

Figure 3: Reported Reasons for Stopping Health App Use

The main reason for app discontinuation was on a loss of interest over time as noted with 74% of respondents. The majority of health applications fail to keep users engaged after the primary or initial use. Loss of interest is often tied to the lack of content updates, no apparent progression on the user's part, and no other interactive or stimulating features that change with the user's health (Kidman et al., 2024).

Additionally, 71% of respondents stated the app did not improve their health outcomes, and here it is critical to observe that not all users need to experience beneficial changes with the app for use to continue. Users may observe no improvement and have no symptom management and app adherence improvement, and as a result, keep the app less than other users unengaged.

What is noted to be a lack of personalization (68%) is also the reinforcing of the previous findings, where poorly designed generic apps to not meet the patients individual health needs. Chronic patients need customized health interventions, and that need is not mitigated by app features that are self adaptive.

The percentage associated with the users' difficulties (62.5%) shows that there are persistent issues with the design, especially for users lacking in technical skills and those who have to control intricate processes in their own health. Problems related to design also impact the users` disengagement from the system. The design guidelines suggest that reminder systems must be balanced, so that users are not overwhelmed. Thus, the problems associated with too many notifications (54%) show that reminder systems, although they can be helpful, are poorly implemented in the design, leading users to abandon the system. The issue related to the users` concerns about the system`s privacy (49.5%) shows that almost half of the users were worried about the way their health related data were processed and stored. This proves the concerns of health technology users regarding the privacy and protection of their data, which gives design guidelines the purpose of creating transparent systems with clear privacy policies and design systems that are secure.

4.5 Design Features and Long-Term Engagement

The respondents who appraised the usability, personalization, and motivational design, features positively and reported health app usage greater than six months indicate that design quality and sustained engagement are correlated. App users that viewed the app as easy to use, applicable, and motivating to their health needs more adopted the app into their daily activities.

This corroborated the previous literature that the sustained use of health apps is a result of designers understanding and implementing user experience, motivation, and trust-building (Vaghefi & Tulu, 2019; Amagai et al., 2022).

V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The design features that influence chronic disease care sustained engagement, and more specifically, why patients stop using health applications, was the focus of this study. The study, through a questionnaire aided quantitative approach, was able to provide empirical evidence pertaining to patients experience, perceptions, and reason about disengagement from health apps.

The findings indicated that health apps have been adopted as a means of tracking health objectives by a multitude of chronic disease patients, yet the continued health app usage by chronic disease patients

is extremely low. Most respondents stopped engaging with the app after three months and a tiny fraction continued to engage with the app after six months. This confirms apprehension noted by chronic disease patients concerning the gap between initial adoption and continued utilization of health apps (Amagai et al., 2022; Kidman et al., 2024).

The research also showed that design-related factors influence long-term engagement. Some of the factors that participants stated indicated disengagement were poor usability, design with no personal adaptation, complicated data entry, and lack of app engagement features. Many respondents stated that their engagement with the app decreased due to repetitive applications of the app, minimal stated usefulness of the app, and failing to adapt to the individuals own health objectives. This demonstrates an argument of great value. The use of technology is a crucial part of the health engagement process, yet, what is of equal value is the design of the app that is centered on the user (Vaghefi & Tulu, 2019).

Unwanted data privacy concerns and the volume of notifications received were the most immediate obstacles to ongoing use of the app. About 50% of the participants in the study were concerned with the handling of their personal health data while this emphasizes the need for digital health tools to be trustworthy. This reinforces the need for long-term user engagement to be functional and for the design to be ethical and secure.

The study shows that patients primarily stop using health apps because of the multitude of apps that do not provide enough meaningful, personalized, or motivating experiences for users in the long run. The design gaps must be filled if health apps are to deliver their potential for optimizing health outcomes and aiding in the management of chronic diseases.

5.2 Recommendations

With the results of the study in mind, the author recommends the following to health app developers, health care providers, and policy makers:

1. Adoption of User-Centered Design Approaches

Developers of health apps must involve end-users, especially those dealing with chronic illnesses, in each stage of app development. User-centered design can include activities such as usability testing, patient interviews, and designing through iterative prototypes, which can help to ensure development of apps to serve the real, practical needs and concerns of users. Building with users (rather than preemptively assuming what users would want) can help strengthen relevance, satisfaction, and retention over the long term.

2. Enhanced Personalization of App Features

An even greater level of personalization should be incorporated in health apps. They should include features that individually adapt content, objectives, reminders and feedback. Personalization of care plans, and context-aware notifications, along with recommendations specific to the user's condition can markedly increase the app's perceived usefulness and motivate the user in the primary task, which helps to mitigate attrition.

3. Simplification of User Interface and Data Entry

Developers must exercise simplicity in users' interfaces and less manual entry of data. Data collection should be automated through device compatibility, and streamlined pathways and design should minimize the cognitive load, especially with older users and users with multiple health issues.

4. Integration of Motivational and Behavioral Support Features

Health apps need to incorporate specific behavioral change techniques that have the greatest impact, including showing users their progress, providing goal tracking, offering rewards, and including some form of social support. These features need to be implemented in a streamlined manner to avoid excessive user friction. Motivational features have the potential to improve and sustain user engagement and ultimately foster long-term adherence to goals.

5. Improving Privacy and Security

There are plenty of reasons why people are hesitant to use health apps that relate to the privacy and security

of health data. Developers need to build a strong security system and clearly explain how user data will be protected. Users will be more likely to use the app if they are able to clearly provide consent and have some control over their data.

6. The Responsibilities of Healthcare Professionals and Policymakers

Health professionals need to direct their patients to health apps that are user-focused and designed effectively, and they need to drive the use of health apps in clinical practice. The policymakers and regulatory authorities need to protect users and improve the effectiveness of health apps by determining and enforcing minimum requirements related to the design, usability, and data security of health apps.

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