

Healthy Keeper: An App for Helping Users Solve the Problem of Correct Medication Use in Family-Style Management Systems and Personalized Customization

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Abstract. Many people struggle with medication adherence due to individual ability and environmental factors, posing a health hazard for those needing long-term drug or supplement intake. To address this, Healthy Keeper uses barcode scanning for medication entry, family-style collaborative management, and custom reminder sounds. These features reduce the learning curve and add a human touch to the otherwise cold reminder process. This research used mixed methods. Quantitative findings suggest that Healthy Keeper's interface is usable, though additional guidance is needed. Meanwhile, qualitative findings indicate that users feel a stronger sense of warmth and are more willing to open the app to record medication intake. This research shows that health reminder apps combining humanistic care with simple design can positively influence medication adherence, providing new empirical findings for the development of future digital health applications.

Keywords: Digital health, elderly care, health reminders, medication adherence, family care

1. Introduction

Regular medication adherence is essential for many populations, including chronic patients, those with periodic illness, and healthy individuals using supplements [1]. All these groups desire to enhance the medication adherence [2]. Sometimes, timely administration can aggravate chronic conditions due to psychological stress [3]. Although Reminder strategies are plentiful, but few are human-centered [4]. Specifically, the high learning curve of health reminder apps discourage many elderly chronic patients [5].

Based on the market situation and user research findings, I designed a health reminder app with simplified processes, a cleaner layout, and personalized care. My research question is: Can family-style management and personalized customization features improve users' medication accuracy more effectively than traditional methods and existing reminder apps? I hypothesized the users of Healthy Keeper app would enjoy greater supervision and psychological motivation through family-style management. Receiving the sounds of a personal reminder (the voice of a relative, etc.) will make them open the app more frequently, document the medication intake, follow correct action, and achieve better adherence.

The research method is based on a survey. After user and market research, I designed a prototype of the Healthy Keeper app, then elaborated an experimental plan and decided to act a mixed-methods approach, concentrating mainly on middle-aged, and elderly participants. Following the prototype usage, the users took a post-task usability survey. Finally, I gathered reviews and responses from 43 users regarding usability and features settings, confirm the efficacy of family-style management and customization features on their actual usage.

2. Related work

This section reviews existing health-related applications with medication reminder functions. We examined two popular apps from the App Store—Apple HealthKit and Medication Assistant—focusing on their function design, interface design, and user feedback to compare them with the application designed in this study.

2.1. Apple Healthkit

Apple HealthKit is an integrated health app in iPhone that tracks and record exercise, sleep, menstrual cycles, and medication information. Some functions need the Apple Watch companion app [6]. Add various types of drugs to the list, set individual prompts, connect to the original application for alarms, and switch to a different schedule automatically upon crossing a time zone boundary.

Only iPhone users can use the application at present. In addition, if the user is not used to saving or responding to reminders, only an extra reminder will be sent by the app, which may be inconvenient for people with memory problems or little experience. It will likely be less convenient for older adults to use. Older people are more likely to use technology that requires less learning and has fewer interactions [7].

2.2. iCare

iCare is an AI-powered intelligent medicine-taking reminder application for health management. Add a personal medical record to the application, and optionally import images and PDFs for this record. However, the added functions of automatic identification and input for medical images are available only through a subscription. According to research on the application of mobile health, cost and perceived value are important factors affecting whether users will use digital health products [8]. Financial difficulties prevent some people from participating in the extended activities. Additionally, iCare organises the medicine record according to drug type rather than time.

2.3. Functional design improvements of healthy keeper compared to similar apps

Healthy Keeper provides the necessary medicine reminder capabilities— medication details, and reminders, and maximizes it via special design. First, Healthy Keeper offers complete features at no cost. It is high-tech in that during the medication addition process, integrates a barcode scanning feature of medication boxes with support of both a one-dimensional (1D) barcode (UPC Universal Product Code and EAN European Article Number) that are standard product identifiers in the pharmaceutical industry [9]. The system also supports GS1 standards, a universal system of product identification and data exchange in healthcare supply chains [10].

Two additional entry points for the user are available in the medication area. The other is that one can choose manual entry. In addition, after scanning, each section of the automatically recognised

medicine data can be modified independently to ensure the accuracy of the data.

The application has the following functions: family mode, personalized voice prompts and a multi-alert reminder function for extended periods. Medication records are shown in a date-sorted list. Healthy Keeper has used many icons and larger buttons in the design of the interface to enhance the convenience for middle-aged and older people [5]. In line with Cognitive Load Theory, the Design Strategy is to reduce the complexity of the interface to enhance the learning efficiency and task performance of new users [11].

The above attributes can create a simple window with a clear operating path and a good user experience, and at the same time, many functions of medication-reminder applications have been combined and improved, as shown in Table 1.

Table 1. Summarizes the functional comparison between Healthy Keeper and similar applications discussed above

App	Core functions	Strengths	Limitations	Key differences
Apple HealthKit	Tracks health data; integrates with iPhone system; supports time-zone adjustment	Comprehensive health management	iOS only; limited reminder frequency	Healthy Keeper offers barcode scanning and repeated reminders
ICare	AI reminder; Apple Health sync; medical record upload	Supports image/PDF import	Subscription required; records not date-based	Healthy Keeper is free and uses date-based display
Healthy Keeper	Barcode scanning; family management; voice reminders;	Free full; elderly-friendly UI	—	—

3. Methods

To learn how Healthy Keeper's family-style management system and personalised voice function are received by users, some interviews with them and prototypes in a combined qualitative and quantitative research study were conducted.

3.1. Exploratory research

First, I spoke with four people of different ages and backgrounds to learn how they take their medicine now and what they hope to achieve with reminder apps. Therefore, I believe that many people want more precise drugs. However, the existing applications have design flaws that do not meet users' needs fully, and people are eager for simpler and more effective smart devices. Based on the above results, I have developed user personas and carried out market research and competitor usage analysis.

3.2. User journey map and ideation

Based on the user interviews and product research, I have compiled the results and created a complete User Journey Map for a medication reminder application. Based on the above analysis, I have proposed some design optimizations to reduce the learning burden and cognitive load, and also introduced a human-centered care approach [12].

3.3. Prototyping

First, I made some Crazy 8s sketches and then developed grayscale versions from them. Thus, it was known that the app needed some functions and an interface. Optimization of greyscale led to the creation of the high-fidelity prototype shown in Figure 1.

According to the psychology of colors, they have different emotional effects on people [13]. Therefore, the app will use green and yellow as its primary colors. Green means safety, health and peace [4], and yellow is warm and happy [14]. Together, the two tones will highlight both the health-management functions and the humanistic care of the application.

Healthy Keeper can save reminder sounds in the alert setting area, such as the voice of a family member, as a function. It also has a family cooperative management function and can show when family members take their medicine in the app. Then, I improved the high-fidelity prototype several times. For example, I have disabled the quick-confirm button in the pop-up medication reminder to avoid accidental clicks. I have added a function for registering the weight of a medication unit (e.g., one pill contains 5 mg).



Figure 1. High-fidelity prototype-The picture shows some of the prototypes in the high-fidelity prototype

3.4. User study

3.4.1. Research

Can family-style management and personalized customization features improve users' medication accuracy more effectively than traditional methods and existing reminder apps?

3.4.2. Participants

A total of 43 participants were recruited for this study. Among them, 24 participants were aged between 20 and 39, 15 participants were between 40 and 59 years old, and 4 participants were over 60 years old.

Most participants had a relatively high educational background and reported being proficient in English, which enabled them to complete the experimental tasks and questionnaires independently.

Participants were recruited to cover a range of age groups to enhance the diversity of the sample and improve the generalizability of the research findings.

3.4.3. Procedure

Each participant was required to conduct the prototype test as per the requirements and filled out the questionnaire after the prototype test. There are four flows that need to be tested. Under the experimental conditions, each user needed to complete the click test from the first page of each flow to the final target page. Each experimental session followed the following process:

- The subject clicks on the questionnaire to read the instructions.
- Fill in personal information, including region, age, gender, and educational level (this information is only used for research and statistics).
- Start the first flow: Users add medication information according to the on-screen instructions, including medication type, dosage time, dosage amount, medication inventory, and reminder method. After completing the information input, users are directed to the main page (the overview interface of personal medication tasks). Finally, users enter the family medication information management interface.
- Second flow: Receive a pop-up reminder on the phone interface outside the app, click the pop-up to enter the app, and register medication situation.
- Third flow: After receiving a reminder from a family member, click the pop-up to enter the app, view family member information, and reply.
- Fourth flow: After a long time of not taking medication on time, receive an emergency reminder pop-up. After clicking the pop-up to enter the app, the main page changes color.
- Filled out the Post-Prototype Testing Questionnaire

3.4.4. Data collection and analysis

I have collected the following data, as shown in table 2:

Table 2. Summarizes the collected items in testing

Type	Metrics / Items
Quantitative	Time on page, Success rate (click-through to target page)
Qualitative	Users' evaluations and satisfaction regarding: interface design, process design, voice reminder function, family management function

4. Results

4.1. Quantitative findings

I conducted a quantitative analysis of the completion rates and time spent by participants on the four Flows, and recorded their task performance, as shown in table 3.

Table 3. Summarizes the result of quantitative analysis

Flow	Task Description	Success Rate	Mean Time (s)	SD (s)	Success User	Mean Time (s)
1	Add drug info & enter family management	7%	32.57	33.71	91	
2	Daily medication reminder pop-up	27%	24.46	20.74	8	
3	Family reminder medication pop-up	28%	20.99	20.36	11	
4	Emergency alert pop-up	33%	13.03	14.31	6	

Results show that Flow 1 had the lowest success rate (7%), and participants' performance varied greatly during their first use of the prototype (SD = 33.71 s). Successful users took much longer than the average completion time of Flow 1. From Flow 2 to Flow 4, the standard deviation gradually decreased, and the success rate improved.

To examine whether performance differences among the four task flows were statistically significant, a repeated-measures ANOVA was conducted on task completion time. The results showed a significant effect of task flow on completion time ($F(3, 126) = 4.94, p = 0.003$), indicating that users spent significantly different amounts of time across the four flows, with Flow 1 taking the longest.

In addition, a chi-square test was applied to compare task completion rates across flows. The outcomes indicated a significant difference in success rates ($\chi^2(3) = 9.12, p = 0.028$), with Flow 1 having a lower overall success rate than the other flows.

4.2. Qualitative insights

The qualitative data in the Post-Prototype Testing Questionnaire were very insightful to supplement the quantitative results. I summarized three basic themes and anchor each theme with some of the representative examples of verbatim responses offered by the participants.

Interface design: Quantitatively, 81% of participants rated the interface as "elderly-friendly"; qualitatively, the most frequent praise centered on "large buttons, large text, and clear icons." These elements helped users "find functions quickly" and "avoid mistake taps."

Nevertheless, the greatest number of negative feedback came out during the Flow 1 (the initial addition of medication). Eight respondents referred to their first-time experience as either confusing or overwhelming.

Typical accounts include:

"I couldn't find where to set up the customised voice reminders—the interface was a bit cluttered and I didn't know which option to click."

"There were so many buttons that I didn't know where to start."

Majorly due to the confusion of page prompts and the absence of guidance in the first used. Users complained of not knowing which buttons to press next, which suggests that the existing flow of navigation structure in Flow 1 imposes a fairly large cognitive burden on the users.

These narratives echo the quantitative minority (19%) who disagreed that the interface was immediately intuitive and directly explain the extremely low success rate observed in Flow 1.

Feedback on family-style management: Eighty percent of respondents affirmed that family-style management would improve adherence. Participants repeatedly used affective language—"warmth," "togetherness,"—to describe the feature. Illustrative quotes include:

"Reminders from my granddaughter make me feel she is right beside me; I take the medicine immediately because I don't want her to worry."

"Seeing my son's name, I feel we are taking care of each other though living in different cities."

Such statements clarify why 80 % prefer a relative's voice to an alarm clock: the reminder is experienced as social bonding rather than external discipline.

Feedback on personalized notification tones: Eighty-eight percent reported that customized sounds made the app "feel made only for my family". Participants contrasted the "cold, easy-to-ignore beep" with voices that "call my name and tell me why the pill matters".

Representative excerpts are:

"When I hear the voice 'Time for your blood-pressure pill', I pay attention immediately."

"The sound shows the app 'knows' who we are; it feels considerate, not mechanical."

Overall, users perceived personalized notification sounds as emotionally significant, enhancing their engagement with the application.

5. Discussion

The experimental results show that as a more humanistic medication reminder app, Healthy Keeper, with its simpler interface design, family-style management function and personalized reminder service, may be able to improve users' medication compliance. Although this result does not fully confirm my hypothesis, it still proves the importance of humanistic design for health service apps.

5.1. User-friendly interface design

The goal of the above optimisations is to reduce learning costs, improve the first-use experience and substantially boost the success rate of Flow 1. Most of the participants in the qualitative research reported that the large buttons and icon-based interface of Healthy Keeper were easy to learn for older adults, and the general rule of using good visuals had worked well. However, Flow 1 had an extremely low completion rate of 7 per cent and showed serious problems in the navigation logic. Based on the user's comments, the problems in the first use are mainly due to a lack of written instructions and confusing navigation. Therefore, the following optimisations are proposed to address this low success rate. First, guided onboarding tutorials will be added to teach the user how to use some basic functions of the app step by step upon first opening. Second, prominent buttons will have more explicit page prompts (e.g., "Add family member", "Record reminder voice") to reduce hesitation and improve understanding. The above optimisation measures will lower the cost of learning and improve the first-use experience for Flow 1. Therefore, a good-looking interface should also be easy to use and operate.

5.2. The combination of personalized custom alert tones and family-style management

Healthy Keeper is not a typical health alarm app; instead, it can also use the voices of family members as the alarm sound and customise them. Family-style management is relatively relaxed; therefore, the family members feel more at ease discussing their health problems and other issues loosely and trustingly. Most users believe that the functions have created an extended family for the application and are closer to their emotions.

5.3. Limitation

Healthy Keeper has a good functional Design based on statistics, but there are still some deficiencies in its actual operation. Firstly, in terms of function design, although a barcode scanner has been added to simplify the input of medicine information, it may be technically infeasible to operate in

practice. The reasons for the above deficiencies are mainly due to system compatibility problems, unstable scanning modules, a limited scope and infrequent updates of the medicine database, and a relatively low-performance user mobile hardware. Barcode recognition accuracy is also affected by the environment (such as low light or blurred labels) and unsupported barcode types; otherwise, a scan failure will occur. Users of different groups are also willing to use barcode-based input to different extents. Age and a person's threshold for adopting new technologies can also affect their willingness to use the scan function [15]. Second, the success rate of prototype Flow tests increased with more tests, and the performance under various users was stable. It may be that the users are more accustomed to how to use the app now, but it could also mean that there were indeed problems with the design of Flow 1. It is also possible that design limitations of the website used in the prototype test confused the participants. Thirdly, a limitation of this study is that the sample size is relatively small ($n=43$), and thus the results may not be generalisable. A relatively large and representative sample will help ensure the stability of the statistical results and improve external validity.

In the future, a longer experimental period and a more scientific method will be used to improve the accuracy and reliability of the results, such as observing changes in users' medication behaviour in their daily lives and conducting comparative experiments.

6. Conclusion and future work

Research on the impact of family management and personalisation features in a medication reminder application on medication adherence. Based on the prototype test and a combination of methods, it has been determined that Healthy Keeper offers a more user-friendly experience than traditional alarm devices; therefore, its interface, family-sharing function and customised reminders have been designed to evoke feelings of warmth and emotional connection. Based on the above results, it is proposed to combine the principles of user-friendliness design and humanistic care in order to improve the practicality and acceptance of digital health tools for middle-aged and older adults. There are also some deficiencies. The sample size is small and the testing period is short; thus, the reliability and generalisability of the results may be limited. In the future, a long-term study will be carried out to observe changes in actual behaviour of taking medicine over time and determine whether family participation and emotional support can help sustain improved medication adherence. Looking ahead, Healthy Keeper will work to improve the scanning and reminder system, increase its accuracy and responsiveness, add AI-based adaptive reminders in the personalisedisation function, and adjust the tone according to users' habits and emotions (e.g., time and frequency). Healthy Keeper is a typical case of a human-centred digital health tool that reduces the burden of medication management through more empathetic and supportive methods.

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Appendix

<https://www.figma.com/design/dWvXVBfiqB6oUJi6JyPzJ3/Lexi?node-id=96-164&t=OWKLHraedoOPsmeD-1>