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Hipertensi Care: An Android-Based Mobile Application Integrating Acupressure, Progressive Muscle Relaxation, and Blood Pressure Monitoring

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Abstract
Hypertension remains a major public health concern, contributing to long-term healthcare costs and complications such as stroke and kidney failure. Although pharmacological therapy is essential, patient adherence to lifestyle-based approaches remains limited. Evidence demonstrates that acupressure and Progressive Muscle Relaxation (PMR) can lower blood pressure. However, no digital platform has integrated both interventions into a single self-management tool. This Research and Development (R&D) study developed an Android-based mobile application, Hipertensi Care, using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) to support hypertension self- management. The Analysis phase included a literature review, needs assessment, and Focus Group Discussions (FGDs) with 10 participants to identify user requirements. The Design phase involved creating the application workflow, interface, and evidence-based educational content. During Development, the application underwent content validation by 7 experts (three nurses, two acupuncturists, one cardiovascular internist, and one media specialist). A limited trial with 35 individuals with hypertension was conducted in the Implementation phase. Usability and user acceptance were evaluated using the System Usability Scale (SUS) and User Experience Questionnaire (UEQ). The results showed excellent usability, high perceived usefulness and ease of use, and positive user experience across all UEQ dimensions. Overall, Hipertensi Care demonstrated strong alignment with user needs for hypertension self-management and is ready to progress to effectiveness testing to assess its impact on blood pressure and related clinical outcomes.

Keywords: *Acupressure, Android, Hypertension, Mobile Application, Progressive Muscle Relaxation.*

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1. INTRODUCTION

Hypertension is one of the most prevalent non-communicable diseases worldwide and continues to increase across many countries, including Indonesia. This condition contributes substantially to morbidity and mortality due to cardiovascular, cerebrovascular, and renal complications (Unger et al., 2020). Reports from Indonesia's Ministry of Health indicate that hypertension remains a major public health problem requiring continuous and effective interventions (Badan Kebijakan Pembangunan Kesehatan, 2023). Challenges in hypertension control are not limited to adherence to pharmacological therapy but also involve poor self-management and low compliance with recommended lifestyle modifications (Alfian et al., 2016; Grassi, 2021).

Non-pharmacological interventions such as acupressure and Progressive Muscle Relaxation (PMR) have been proven effective in reducing blood pressure through parasympathetic activation, stress reduction, and enhanced physiological relaxation (Lee and Frazier, 2011; Habibi, 2020; Kim and Park, 2023; Rahmawati et al., 2024). Randomized controlled trials have demonstrated that the combination of slow breathing exercise and progressive muscle relaxation significantly reduces systolic and diastolic blood pressure in patients with essential hypertension (Pathan et al., 2023). Several studies highlight that these techniques are safe, easy to perform, and suitable for independent practice by patients (Asyari et al., 2024; Ermayani et al., 2020; Irawan et al., 2023). However, evidence suggests that the implementation of acupressure and Progressive Muscle Relaxation (PMR) in community settings remains limited. Previous studies report that although these interventions are clinically effective, their adoption in daily self-care is constrained by low health literacy, limited patient knowledge, lack of standardized community-based guidance, and the absence of structured educational media to support independent practice (Chellew et al., 2015; Alessa et al., 2021; Bozorgi et al., 2021). These barriers are particularly evident in community-based and primary care contexts, where patients often require structured guidance and visual support to correctly perform self-care interventions.

Alongside this, the rapid advancement of digital health technologies provides an opportunity to strengthen hypertension self-management through mobile applications offering educational content, reminders, and health monitoring features. Existing evidence indicates that mobile health applications can improve patient adherence, understanding, and engagement in hypertension management (Alessa et al., 2021; Bozorgi et al., 2021). Evidence from randomized controlled trials indicates that mHealth applications can significantly improve blood pressure control, hypertension knowledge, and medication adherence compared to usual care (Liu et al., 2025). Nonetheless, most available applications do not comprehensively integrate acupressure and Progressive Muscle Relaxation (PMR) guidance, nor are they tailored to the needs and cultural context of users in Indonesia. Furthermore, usability and user experience are often insufficiently evaluated, despite being critical determinants of technology adoption (Hach et al., 2023; Sunsanto & Goodwin, 2013).

The ADDIE development model provides a systematic framework that facilitates structured analysis, design, development, implementation, and evaluation, ensuring the production of effective educational tools (Adeoye et al., 2024; Rachma et al., 2023). This approach is particularly relevant for health application development, as it ensures content validity, alignment with user needs, and adequate usability based on standardized evaluation parameters such as the System Usability Scale (SUS) and User Experience Questionnaire (UEQ) (Suyasa et al., 2026; Umar et al., 2019).

Given these research gaps and user needs, this study aims to develop an Android-based mobile application for hypertension management that integrates acupressure, Progressive

Muscle Relaxation, and blood pressure monitoring using the ADDIE model, and to evaluate its feasibility, usability, and user experience through expert validation and user testing.

2. RESEARCH METHOD

This study employed a Research and Development (R&D) approach using the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) as the conceptual framework for developing an Android-based mobile application for hypertension management. The ADDIE model was selected because it provides a systematic and structured process for producing educational products, ranging from initial needs assessment to feasibility evaluation (Adeoye et al., 2024; Rachma et al., 2023). The study was conducted in primary healthcare settings in Denpasar in 2025.

The Analysis phase included a literature review related to hypertension, acupressure, PMR, and mobile health applications (Lee & Frazier, 2011; Alessa et al., 2021; Habibi, 2020; Kim and Park, 2023). A user needs assessment was conducted through Focus Group Discussions (FGDs) with 10 individuals with hypertension to identify barriers, feature preferences, and educational needs. The qualitative findings informed the selection of educational content and the design requirements for the application interface.

The Design phase involved creating the application workflow, interface layouts, navigation structure, and selection of evidence-based educational materials. The content included hypertension education, acupressure guidance supported by scientific evidence (Restawan et al., 2023; Sukmadi et al., 2021), PMR procedures (Chellew et al., 2015), and a blood pressure monitoring feature. The design specifications followed principles of clarity, efficiency, and reliability based on established software quality standards (Umar et al., 2019).

During the Development phase, the mobile application was built using an Android development platform. The educational content and functional features were validated by seven experts consisting of three nurses, two acupuncturists, a cardiovascular internist, and one media specialist. The expert validation used a 5-point Likert scale to evaluate the feasibility and relevance of each application feature, ranging from 1 (very inappropriate), 2 (inappropriate), 3 (moderately appropriate), 4 (appropriate), to 5 (very appropriate). This validation process ensured the accuracy, safety, and appropriateness of the content prior to user testing.

The Implementation phase involved a limited trial with 35 individuals diagnosed with hypertension. The sample size was determined using G-Power software based on a pre–post study design, with an assumed medium effect size (0.5), a statistical power of 0.80, and a significance level of 0.05, indicating that a minimum sample of 34 participants was required (Faul et al., 2009; Kang, 2021). To account for potential dropouts, 35 participants were recruited. Participants were selected using purposive sampling from community and primary healthcare settings to represent potential end users of the application. The inclusion criteria were adults aged ≥18 years with a clinical diagnosis of hypertension, ownership of an Android smartphone with basic operational ability, ability to read and understand Indonesian, and willingness to provide informed consent. Individuals with severe cognitive impairment, serious comorbid conditions requiring intensive medical management, or inability to complete the evaluation procedures were excluded.

The evaluation phase assessed usability using the System Usability Scale (SUS) and user experience using the User Experience Questionnaire (UEQ). Each SUS item was rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). These instruments provided a comprehensive assessment of the application's feasibility from the user perspective, including usability, interaction experience, and perceptions of usefulness and ease of use. This approach aligns with technology adoption principles, which emphasize that usability, perceived ease of use, and perceived usefulness are key determinants of digital innovation acceptance (Hach et al., 2023; Sunsanto & Goodwin, 2013).

Qualitative data from the FGD were analyzed using thematic analysis to identify user needs categories. Expert validation data were analyzed descriptively to assess the feasibility of the application's content. SUS scores were calculated according to standard scoring guidelines and resulting scores were then categorized into usability acceptance levels. UEQ scores were analyzed based on their six core dimensions to evaluate users' interaction experience.

This research was conducted in accordance with recognized ethical standards for studies involving human subjects. Ethical clearance was granted by the Institutional Review Board of the Institute of Technology and Health Bali (Approval No. 04.173/KEPITEKES-BALI/VI/2025). All participants were provided with comprehensive information regarding the study aims and procedures prior to enrollment and gave their written informed consent. The confidentiality and anonymity of participants were rigorously protected throughout the study, with no personally identifiable data collected or disclosed. All collected data were used exclusively for research purposes and securely stored in accordance with institutional data protection policies.

3. RESULTS AND DISCUSSION

The findings indicate that the Hipertensi Care application demonstrates excellent feasibility, usability, and user experience, as evidenced by results from the focus group discussions (FGDs), expert validation, and quantitative evaluations using the SUS and UEQ instruments.

A. Expert Judgment

Formative evaluation through expert consultation was conducted to assess the content validity, design feasibility, and functional relevance of the mobile application for hypertension management, integrating acupressure, PMR, and blood pressure monitoring. Seven experts participated in the assessment: three nurses (practitioners and lecturers), two acupressure specialists, one internist, and one media/software expert. Experts evaluated several key features of the application, as summarized in Table 1.

Table 1. Expert Evaluation Scores for Each Application Feature

Evaluation Criteria	E1	E2	E3	E4	E5	E6	E7	Mean Score
Home / Dashboard	5	4	4	5	5	4	4	4.43
Hypertension Education Menu	4	4	4	5	5	4	5	4.43
Acupressure Guidance	5	4	4	2	5	4	5	4.14
Progressive Muscle Relaxation (PMR) Guidance	5	5	4	4	5	4	5	4.57
Blood Pressure Recording	5	4	4	5	5	4	5	4.57
Exercise Reminder	5	5	4	5	5	4	5	4.71
User Profile Input	5	5	4	5	5	4	5	4.71
Visualization & Interface	4	4	4	5	5	3	5	4.29
Overall Educational and Support Functions	5	5	4	5	5	5	5	4.86

The expert evaluation results demonstrated high feasibility across all application features, with mean scores ranging from 4.14 to 4.86. The highest score was observed for the overall educational and support functions (4.86), while the acupressure guidance feature received the lowest score (4.14), indicating a need for clearer instructional visualization.

Table 2. Feasibility Percentage and Interpretation of Application Features

Feasibility Percentage Range	Interpretation	Findings from Expert Evaluation
81–100%	Highly Feasible	All nine features of the application, including the dashboard, hypertension education, acupressure and PMR guidance, blood pressure recording, treatment reminder, user profile input, visualization/interface, and overall educational and support functions, achieved scores within this range.
61–80%	Feasible	Not applicable, no feature scored in this range.
41–60%	Moderately Feasible	Not applicable, no feature scored in this range.
21–40%	Less Feasible	Not applicable, no feature scored in this range.
<21%	Not Feasible	Not applicable, no feature scored in this range.

The expert evaluation results demonstrated high feasibility across all application features, with scores ranging from 82.86% to 97.14% and an overall mean score of 4.52. According to Arikunto's (2013) feasibility classification, all evaluated features fall within the Highly Feasible (≥81%) category, indicating that the developed application is appropriate for further pilot testing.

Among the evaluated features, the Educational and Support Functions achieved the highest feasibility percentage (97.14%), reflecting strong expert agreement regarding the relevance and comprehensiveness of the educational content. This finding is consistent with previous studies highlighting the central role of patient education in improving adherence and clinical outcomes in hypertension management (Unger et al., 2020; Alessa et al., 2021).

In contrast, the Acupressure Guidance feature received the lowest feasibility score (82.86%), suggesting the need for clearer step-by-step instructions and improved visualization of pressure points. This observation aligns with prior research emphasizing the importance of visual clarity in digital health interventions to enhance user comprehension and engagement (Sukmadi et al., 2021; Wang et al., 2024).

Additional expert recommendations included adding a time-input column for blood pressure recording and expanding lifestyle education modules, such as diet, physical activity, and stress management. These improvements are consistent with global hypertension management guidelines that recommend integrating lifestyle modification with pharmacological treatment to optimize clinical outcomes (World Health Organization, 2023).

Overall, the findings indicate that the developed mobile application is highly feasible, with only minor refinements required to enhance usability and user engagement.

B. Focus Group Discussion (FGD)

Two stages of focus group discussions (FGDs) were conducted with a total of ten participants diagnosed with hypertension who met the inclusion criteria (aged ≥18 years). The first session (n = 5), involving older adults, was held on July 25, 2025, at Banjar Ambengan, South Denpasar, Bali, while the second session (n = 5), involving younger adults, was conducted on July 29, 2025, via Zoom meeting. The grouping by age was used as a sampling strategy to capture diverse perspectives related to digital literacy, health behavior, and technology use. Age was not treated as an analytical research variable but served as a contextual characteristic to enrich the discussion findings.

Measurement of colony diameters after 7 days of incubation revealed differences among solvents (Table 3).

Table 3. Focus Group Discussion (First Session)

Evaluation Aspect	Summary of Participant Feedback (n = 5)
Educational Content	All participants reported that the educational content was beneficial, clear, and relevant for improving their understanding of hypertension. However, two participants emphasized the need for additional practical details to enhance applicability.
Acupressure & PMR Training	Three participants stated that the training guidance was adequate and easy to follow, while two highlighted that acupressure points were not sufficiently clear and required more detailed visualization to improve comprehension.
Visual Design & Interface	All participants found the design attractive, simple, and user-friendly. However, two participants recommended enlarging the font size to improve readability, particularly for older users.
Blood Pressure Monitoring	All participants considered this feature highly useful and essential for independent daily blood pressure monitoring. It was regarded as providing practical benefits to support patient adherence in hypertension management.
Implementation Feasibility	All participants agreed that the application was feasible for further development, with strong potential to support technology-based hypertension management.
Additional Suggestions	Two participants recommended improvements, specifically enlarging the font in educational content and adding more detailed explanations of acupressure points to facilitate understanding among users with limited digital literacy.

The first FGD explored participants' perceptions regarding educational content, acupressure and PMR training instructions, interface design, and blood pressure monitoring features. Overall, participants reported that the educational content was beneficial and relevant for improving their understanding of hypertension. Several participants suggested adding more practical details and clearer visualization of acupressure points to enhance the usability of the application. In addition, the interface was generally perceived as simple and easy to use, although some participants recommended enlarging the font size to improve readability, particularly for older users. Participants also highlighted the usefulness of the blood pressure monitoring feature as a tool for supporting daily self-monitoring.

These findings highlight the importance of clear instructional guidance and user-friendly interface design in mobile health applications. Participants' suggestions for improved visualization of acupressure points are consistent with previous studies indicating that visual clarity plays a critical role in enhancing user comprehension and engagement in digital health interventions (Alessa et al., 2021; Bozorgi et al., 2021). Furthermore, the perceived usefulness of the blood pressure monitoring feature aligns with prior mHealth research demonstrating that self-monitoring functions can improve patient awareness and adherence in hypertension management (Liu et al., 2025). The consistency of feedback across participants indicates that the data were sufficient to support the formative evaluation of the application.

Table 4. Focus Group Discussion (Second Session)

Evaluation Aspect	Summary of Participant Feedback (n = 5)
Educational Content	All participants reported that the educational content was adequate in providing basic knowledge about hypertension. Two participants suggested that the text

	should be presented more clearly to ensure comprehension among users with limited health literacy.
Acupressure & PMR Training	Four participants stated that the guidance for acupressure and progressive muscle relaxation was clear and easy to follow, while one participant rated the instructions as only "adequate," suggesting that further refinement was needed to make them more practical.
Visual Design & Interface	All participants considered the visual design attractive and easy to access. However, two participants recommended enlarging the font size and improving text contrast to enhance readability, especially for users with visual limitations.
Blood Pressure Monitoring	All participants indicated that the blood pressure recording feature was beneficial and relevant for supporting self-monitoring. It was considered effective in promoting consistent patient adherence to daily blood pressure tracking.
Implementation Feasibility	All participants judged the application as feasible for further development and use in the community. They emphasized its potential to improve awareness, adherence, and self-management capabilities among hypertensive patients.
Additional Suggestions	Participants did not provide additional recommendations, indicating general satisfaction with the current design and features.

The second FGD explored participants' perceptions regarding readability, visual design, and overall feasibility of the application. Overall, participants reported positive feedback on the educational content, acupressure and PMR guidance, and blood pressure monitoring features. Several participants suggested improvements in text clarity, font size, and visualization of acupressure points to enhance usability. A summary of participant feedback from the second FGD session is presented in Table 4.

The FGDs provided valuable insights into the strengths and areas for improvement of the developed application. Educational content and blood pressure monitoring features were consistently highlighted as strengths across both sessions. Nevertheless, participants emphasized the need for clearer acupressure visualization and improved text readability. These findings underscore the importance of tailoring digital health interventions to accommodate the needs of users with varying levels of health literacy and digital competence.

The results align with prior evidence that user-centered design and participatory evaluation are essential for optimizing mobile health applications (Alessa et al., 2021). By integrating recommendations from the FGDs, particularly those focused on enhancing visual clarity and readability, the application can better support patient engagement, adherence, and long-term self-management of hypertension.

C. Results of the System Usability Scale and User Experience Questionnaire

A total of 35 respondents participated in the usability and user experience evaluation of the application. Usability was assessed using the System Usability Scale (SUS), while user experience was evaluated using the User Experience Questionnaire (UEQ). The results of these evaluations are presented in the following sections.

Table 5. Results of the System Usability Scale (SUS)

SUS Number	SUS Item	Mean	Interpretation
SUS1	I would like to use this application frequently	4.43	Very Good
SUS2	I found the application unnecessarily complex (R)	2.60	Good (reversed)
SUS3	I thought the application was easy to use	3.89	Very Good
SUS4	I needed the assistance of another person to use the application (R)	2.60	Good (reversed)
SUS5	The functions in this application were well integrated	4.20	Very Good
SUS6	I found too much inconsistency in the application (R)	2.51	Good (reversed)
SUS7	I imagine most people would learn to use this application very quickly	3.83	Very Good
SUS8	I found the application cumbersome to use (R)	2.57	Good (reversed)
SUS9	I felt confident using the application	3.94	Very Good
SUS10	I needed to learn a lot of things before I could get going with this application (R)	2.83	Good (reversed)

The results of the System Usability Scale (SUS) indicate generally positive usability perceptions among users. The highest mean score was observed for SUS1 (4.43), reflecting users' willingness to use the application frequently. In contrast, the lowest mean score was recorded for SUS6 (2.51), a negatively worded item related to system inconsistency. After reverse interpretation, this result indicates that users generally did not perceive significant inconsistency within the application interface. Overall, the responses across the SUS items range from Good to Very Good, suggesting that the application provides a generally positive usability experience for most participants.

Table 6. Results of the User Experience Questionnaire

UEQ Dimension	Mean	Interpretation
Attractiveness	5.31	Highly attractive
Perspicuity	4.74	Very easy to understand
Efficiency	4.91	Efficient and fast
Dependability	5.31	Reliable
Stimulation	5.09	Enjoyable and motivating
Novelty	4.51	Innovative

User experience evaluation demonstrated highly positive perceptions across all six User Experience Questionnaire (UEQ) dimensions. The highest scores were observed for Attractiveness and Dependability, indicating that users perceived the application as visually appealing, stable, and reliable. High scores in Perspicuity and Efficiency suggest that the application was easy to understand and allowed users to complete tasks efficiently. In addition, positive results in Stimulation and Novelty indicate that users found the application engaging and perceived it as innovative due to the integration of acupressure, progressive muscle

relaxation, and blood pressure monitoring features. Overall, these findings demonstrate a consistently positive user experience evaluation of the application.

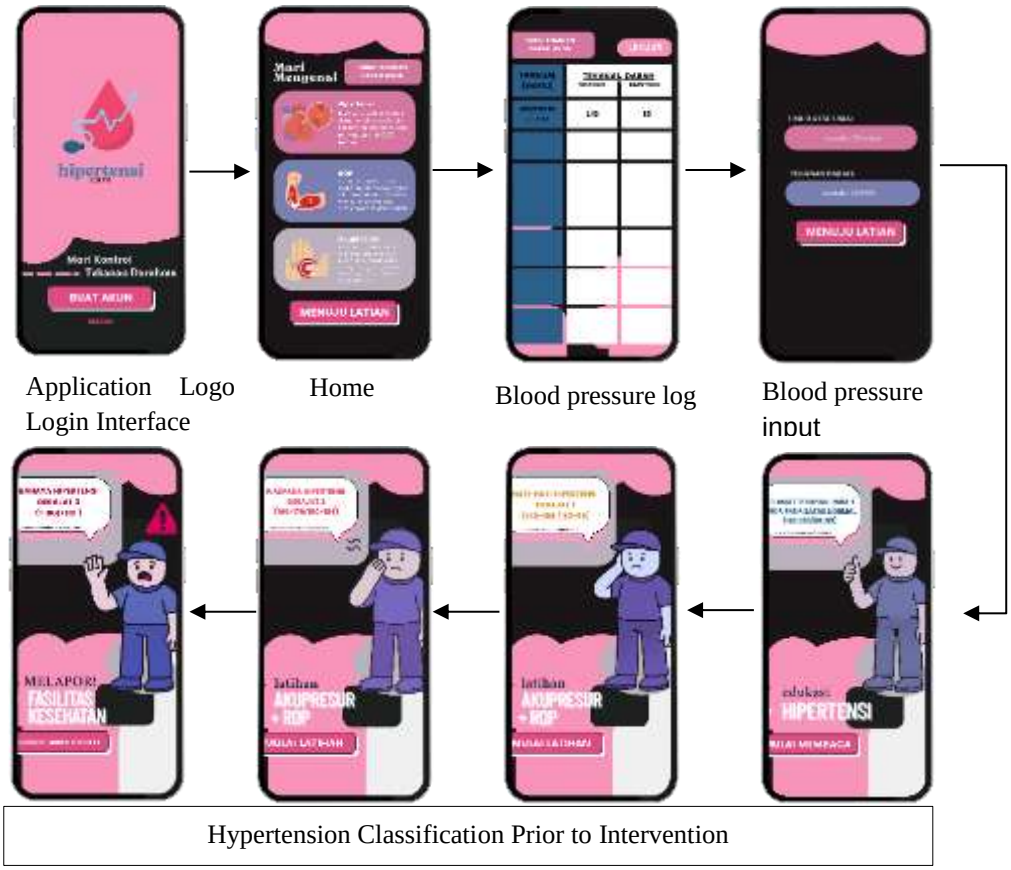

Figure 1 User interface and workflow of the Hipertensi Care application.

The Hipertensi Care application follows a structured workflow beginning with user login and access to educational modules on hypertension, acupressure, and progressive muscle relaxation (PMR). Users are subsequently directed to an assessment interface where age and blood pressure values (systolic and diastolic) are entered. Based on these inputs, the system automatically classifies blood pressure into elevated/normal range, Grade 1 hypertension, Grade 2 hypertension, or Grade 3 hypertension, according to internationally recognized hypertension guidelines (Unger et al., 2020). The application also includes a blood pressure monitoring feature that allows users to record systolic and diastolic values and track their measurements over time.

These findings collectively demonstrate that the Hipertensi Care application achieves strong usability and excellent user experience indicating readiness for pilot testing in a larger clinical context. FGD results across two age groups revealed that the application was perceived as easy to understand, relevant, and practically beneficial for hypertension self-management. Older adults emphasized the need for larger font sizes and clearer visualization of acupressure points, while younger adults highlighted preferences for improved color contrast and text clarity. Both groups consistently valued the educational content, acupressure guidance, progressive muscle relaxation (PMR), and blood pressure monitoring features. These findings suggest that the application's components align well with the diverse needs of hypertensive patients, particularly in supporting education and self-monitoring elements recognized in hypertension management literature (Alessa et al., 2021; Bozorgi et al., 2021).

Expert validation further reinforced the FGD results. With an average score of 4.52, experts rated the application as highly appropriate for hypertension management. The highest

ratings were associated with the "overall educational and supportive functions," indicating that the content structure and workflow align with established standards of health education (Joho, 2021). Minor suggestions included clearer visualization of acupressure points, additional content on healthy lifestyle behaviors, and the inclusion of time stamps for blood pressure input. These recommendations represent refinements rather than substantive redesigns, highlighting that the initial application framework is clinically sound and theoretically consistent with behavioral models such as the Health Belief Model (Becker et al., 1974).

The responses across the SUS items range from Good to Very Good. This score indicates that the application is intuitive and reasonably easy to use across varied age groups, although some users, particularly older adults, required a short adaptation period. The score reflects clear navigation pathways and a generally straightforward interface, while still indicating opportunities for refinement in clarity and simplification. These findings correspond with established patterns in mHealth usability research, where mixed-age populations often show slightly moderated usability outcomes (Alessa et al., 2021; Bozorgi et al., 2021).

User experience results from the UEQ further highlight the application's strengths beyond usability. All UEQ dimensions scored exceptionally high, with Attractiveness (5.31) and Dependability (5.31) reflecting strong visual appeal and system stability. Perspicuity (4.74) indicates that users found the interface easy to understand, while Efficiency (4.91) shows that the application supports fast and effective task completion. High scores in Stimulation (5.09) and Novelty (4.51) demonstrate that users experienced the application as engaging and innovative important predictors of motivation and sustained engagement in digital health interventions (World Health Organization, 2023; Paula et al., 2023). These outcomes underscore the psychological acceptability of the application, complementing its functional usability.

From a theoretical perspective, the positive user experience outcomes observed in this study align with established user experience and technology acceptance frameworks. High scores across UEQ dimensions particularly attractiveness, efficiency, dependability, and stimulation reflect key principles of user-centered design, which emphasize intuitive interaction, functional clarity, and emotional engagement as determinants of sustained technology use (Law et al., 2009). These findings are consistent with usability theory, which posits that systems perceived as efficient, reliable, and enjoyable are more likely to be accepted and integrated into users' daily routines (Bangor et al., 2008). Furthermore, the acceptable-to-good SUS score indicates that the application meets fundamental usability requirements, supporting its readiness for broader implementation. In the context of mobile health interventions, such usability and experiential qualities are critical for promoting user engagement, adherence, and long-term self-management behaviors, particularly among individuals managing chronic conditions such as hypertension (Alessa et al., 2021; Bozorgi et al., 2021).

Taken together, the integration of findings from the FGDs, expert validation, SUS, and UEQ demonstrates that the Hipertensi Care application satisfies the functional, educational, aesthetic, and psychological dimensions required for effective hypertension self-management support. The high acceptance levels, ease of use, and positive user experience indicate strong potential for broader implementation. These results also establish a solid foundation for subsequent research to evaluate the application's impact on blood pressure reduction and behavior change, reinforcing mHealth as a promising strategy for hypertension management (Alessa et al., 2021; Bozorgi et al., 2021).

The findings of this study have several important implications. From a practical perspective, the Hipertensi Care application demonstrates strong potential as a supportive tool for hypertension self-management, particularly in enhancing patient education, self-

monitoring, and engagement through user-centered design. The integration of educational content, acupressure guidance, PMR, and blood pressure monitoring within a single mobile platform may support more consistent self-care practices and improve adherence to non-pharmacological interventions. From a research perspective, this study contributes to the growing body of evidence supporting the role of usability and user experience evaluation as critical components in the early-stage development of mobile health interventions, providing a foundation for subsequent clinical and behavioral outcome studies.

Several limitations of this study should be acknowledged. First, the study focused primarily on usability, user experience, and feasibility rather than clinical effectiveness; therefore, the findings do not allow conclusions regarding blood pressure reduction or long-term behavior change. Second, the sample sizes for the usability testing and focus group discussions were relatively small, which is appropriate for formative evaluation but limits generalizability to broader populations. Third, the trial duration was short, and user interactions were assessed within a controlled evaluation period, which may not fully reflect long-term real-world use. Future studies should involve larger and more diverse populations, extended follow-up periods, and experimental designs to evaluate the clinical impact of the application on hypertension outcomes.

4. CONCLUSION

This study demonstrates that the Hypertension Care application is highly feasible, usable, and acceptable for supporting hypertension self-management. Expert evaluation showed consistently strong ratings, indicating solid content validity and functional readiness. Findings from FGD further confirmed the clarity, relevance, and practicality of the educational, acupressure, PMR, and monitoring features, with only minor refinements required. Usability and acceptance were also favorable, as reflected in the SUS score. User experience was consistently positive across all dimensions, with high scores in attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. Overall, the evidence indicates that the application is ready for pilot implementation and has strong potential to support effective and independent hypertension management. The application is also prepared for further evaluation to determine its effectiveness in reducing blood pressure and promoting sustained behavior change in real-world settings.

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