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A Phenomenological Exploration of Mobile Health Application Use among Patients with Type 2 Diabetes in Indonesia

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ABSTRACT

Mobile health (mHealth) applications are increasingly used in chronic disease management to support patient autonomy and self-monitoring. While their clinical benefits are well documented, less is known about how patients emotionally and culturally engage with these technologies in daily life. This study explores the experiences of ten adult patients with type 2 diabetes in Indonesia using a descriptive phenomenological approach. Semi-structured interviews were conducted and thematically analyzed to identify essential meanings across participants' narratives. Four themes emerged: enhanced self-control, emotional burden, digital adaptation challenges, and shifts in patient-provider relationships. Patients described mHealth applications as influential elements that shaped emotions, behaviors, and self-perception. These findings suggest that the effectiveness of digital health interventions depends not only on their technical design but also on how users integrate them into their sociocultural context. This study underscores the need for human-centered and culturally responsive digital health solutions.

INTRODUCTION

The growing integration of digital technology into healthcare systems has significantly transformed the way individuals manage chronic conditions, including type 2 diabetes. Mobile health (mHealth) applications have emerged as tools that enable patients to track blood glucose levels, receive medication reminders, and access lifestyle recommendations, thereby promoting self-management and patient autonomy in daily health routines. This digital shift aligns with broader global trends emphasizing health digitalization and personalized care, particularly in urban and semi-urban populations in developing countries where smartphone penetration continues to rise1.

However, the use of mHealth tools unfolds within complex sociocultural and psychological realities. For people living with chronic illnesses, disease management is not only clinical but also personal and emotionally nuanced. Engagement with health technology—how patients interpret data, respond to prompts, and incorporate apps into routines—is influenced by subjective meaning-making, cultural context, and individual coping strategies. Such experiences are often underrepresented in research focused mainly on quantifiable outcomes.

To address this gap, phenomenology offers a philosophical and methodological foundation for exploring lived experiences. By focusing on how individuals perceive and give meaning to their interactions with health technologies, this approach enables a deeper understanding of user experiences beyond what is measurable.

Understanding the lived experience of individuals using mobile health applications thus becomes essential to advancing human-centered approaches in health technology design and implementation. This is especially important in societies where digital literacy, emotional well-being, and social support systems vary widely. Exploring how patients navigate their health journeys through technology provides insight into the meanings they assign to care, control, and self-efficacy—concepts that extend beyond biological parameters to the essence of everyday life.

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Given the layered nature of this phenomenon, there is a pressing need for research that moves beyond surface-level evaluation of mHealth interventions. A phenomenological perspective offers a valuable framework for capturing the richness and complexity of individual experiences, making it possible to illuminate the ways in which technology is lived, not just used.

In recent years, research exploring patients' subjective experiences in managing chronic illnesses has become increasingly vital, particularly within the realm of digital health. Studies focusing on the lived experience of individuals using mobile health applications have begun to uncover the psychological, emotional, and behavioral complexities that accompany digital self-monitoring. These experiential insights offer depth beyond what can be measured through clinical indicators alone, contributing to a more holistic understanding of patient engagement and adherence.

However, much of the existing research remains dominated by quantitative methodologies that emphasize outcome metrics such as glycemic control, app usage frequency, or behavioral compliance. While such data are important, they often fall short in capturing the nuanced, context-bound meanings patients assign to their interactions with technology. Feelings of anxiety, digital fatigue, or empowerment are difficult to quantify, yet they significantly influence how patients relate to and make use of health applications.

This methodological limitation has left a gap in our understanding of how mobile health tools are experienced on a day-to-day basis. Most prior studies have failed to explore the emotional and existential dimensions of digital self-care, particularly in culturally diverse and resource-constrained settings. Without deeper insight into these subjective realities, the development of patient-centered technologies remains incomplete and potentially misaligned with user needs.

Phenomenology, as a research approach, offers a pathway to address this gap. By centering inquiry on how individuals experience, interpret, and ascribe meaning to a given phenomenon, phenomenology enables the uncovering of essential structures of experience that are often invisible to purely instrumental analysis. This is especially crucial in digital health, where technology intersects with deeply personal domains of identity, autonomy, and well-being.

The widespread adoption of mobile health applications for diabetes management has primarily been supported by practical approaches that emphasize measurable outcomes, such as improved glycemic control, adherence to treatment protocols, and increased self-monitoring frequency1. These approaches, often grounded in behavioral and clinical frameworks, rely heavily on quantitative data and predefined metrics to evaluate effectiveness. While useful for assessing general efficacy, they frequently fail to account for the individual's lived experience—how users emotionally, cognitively, and socially interact with these digital tools in the context of their everyday lives.

This limitation is particularly significant in the context of chronic disease management, where emotional responses, identity negotiation, and perceived agency are integral to long-term engagement. Studies such as those by Archer et al. (2019) and Mort et al. (2021) have highlighted the psychological and relational complexities experienced by users of health applications, yet these dimensions remain insufficiently explored, especially in culturally diverse or low-resource settings where experiences of digital health may vary widely23.

Existing research thus presents a fragmented understanding—focused more on outcomes than meaning. Without a deeper inquiry into how patients interpret and internalize their interactions with technology, the development of mHealth solutions risks being functionally effective but experientially misaligned. What is missing is a method capable of accessing the richness of subjective experience and uncovering the essence of how individuals live with and through health technologies.

Phenomenology provides such a methodological alternative. By shifting the focus from external behaviors to internal meanings, phenomenology enables researchers to explore how patients construct personal significance around digital tools in their everyday struggle with illness. This study addresses the gap by employing a phenomenological lens to investigate how individuals with type 2 diabetes experience mobile health applications—not as passive users, but as meaning-making agents situated within unique sociocultural and emotional contexts.

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Previous research has increasingly acknowledged the value of exploring patients' lived experiences in digital health contexts. Studies by Greenhalgh et al. (2020) and Mort et al. (2021) have shown that patients often assign emotional and social meaning to their use of mobile health technologies, especially when managing chronic illnesses like diabetes. These studies highlight the need to examine beyond clinical outcomes and explore how individuals relate to digital tools in their daily lives. However, such studies remain limited in scope, particularly in non-Western and resource-limited settings. This research builds on these insights by focusing on subjective experiences in the Indonesian context.

This study adopts a descriptive phenomenological approach to explore how individuals with type 2 diabetes experience the use of mobile health applications for glucose self-monitoring. This approach was selected to access the essence of patients' experiences without imposing pre-existing assumptions or theoretical frames. By allowing themes to emerge directly from participants' narratives, the study answers the central question raised earlier: how do patients interpret and live through digital self-care in their daily routines? Phenomenology offers a method to uncover the emotional, relational, and cultural meanings that shape engagement with health technologies. This approach is particularly appropriate for understanding the inner experiences often overlooked in outcome-driven studies.

The article is structured in several sections. The introduction outlines the general and specific background of the research, followed by the identification of the knowledge gap. The method section presents the descriptive phenomenological design, participant criteria, data collection procedures, and thematic analysis approach. The results section presents the core themes that emerged from participants' narratives, supported by direct quotes. The article concludes with a discussion of the findings, implications for digital health development, and a reflection on the limitations and directions for future research.

RESEARCH METHODS

Study Design

This study employed a descriptive phenomenological approach, rooted in the philosophical tradition of Edmund Husserl. The method was selected to explore and describe the lived experiences of individuals with type 2 diabetes in using mobile health applications for self-monitoring of blood glucose. Phenomenology, as a qualitative research design, focuses on how individuals perceive and make meaning of their experiences. By adopting this approach, the study was able to uncover the essential structures of meaning embedded in participants' everyday interactions with digital health technologies.

Descriptive phenomenology emphasizes the intentional suspension of assumptions (epoché) to allow the phenomenon to reveal itself through the voices of participants. This design was particularly suited to addressing the research question, which sought to understand subjective experiences in a nuanced and in-depth manner, beyond observable behaviors or clinical outcomes.

Reflexivity was maintained throughout the research process. The primary researcher, who has prior clinical experience with diabetes management but no direct relationship with participants, engaged in regular memo writing to bracket personal biases and expectations. This was essential to ensure that the interpretation of findings remained grounded in participants' accounts rather than shaped by the researcher's assumptions.

Data analysis was supported by NVivo software, which facilitated the systematic organization and coding of interview transcripts. Thematic derivation followed a step-by-step process: initial reading for holistic understanding, identification of meaning units, transformation of those units into psychological expressions, and synthesis into overarching themes. These steps were iteratively revisited to ensure consistency and depth, with coding decisions documented in analytic memos to enhance transparency and auditability.

Participants

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Participants in this study consisted of individuals diagnosed with type 2 diabetes who had used mobile health applications for self-monitoring blood glucose for a minimum period of three months. Participants were selected using purposive sampling to ensure relevance and richness of experience in relation to the phenomenon under investigation. Inclusion criteria required participants to be adults (aged 30 years or older), capable of verbal communication, and having regular access to a mobile health application. Exclusion criteria included individuals with cognitive impairments or comorbid conditions that could affect their ability to reflect on and communicate their experiences.

A total of 10 participants were involved in the study, comprising 6 females and 4 males, with an age range between 33 and 66 years (mean age: 52 years). All participants resided in urban or semi-urban settings and had varying levels of digital literacy. These demographic variations enriched the contextual understanding of the phenomenon.

Data Collection

Data were collected through in-depth, semi-structured interviews conducted face-to-face at locations selected by the participants to ensure comfort and privacy. An interview guide was used to facilitate the exploration of participants' experiences, with open-ended questions designed to elicit narratives related to their daily use of the mobile health application, perceived benefits and challenges, emotional responses, and changes in behavior.

Each interview lasted between 45 and 75 minutes and was audio-recorded with the participants' consent. Field notes were also taken to capture non-verbal cues and contextual factors. The interviews were conducted in the participants' preferred language and transcribed verbatim for analysis. To maintain a natural and open atmosphere, interviews were conducted in community health centers, homes, or quiet public spaces, depending on participants' preferences.

Data Analysis

Data were analyzed using thematic analysis informed by descriptive phenomenology. The analysis followed a systematic sequence: transcripts were first read repeatedly to gain familiarity with the data, followed by initial coding of significant statements. These codes were grouped into meaning units, which were then clustered into themes that captured the essence of participants' lived experiences.

NVivo software was used to support data organization and facilitate coding and theme development. The process involved constant comparison across transcripts to ensure consistency and depth. Essential themes were identified through a process of reduction and synthesis, remaining faithful to the descriptive nature of the participants' narratives while abstracting broader meanings relevant to the phenomenon.

Ethical Considerations

Ethical approval was obtained from the appropriate institutional ethics review board prior to data collection. All participants were informed about the purpose, procedures, and voluntary nature of the study. Written informed consent was obtained from each participant before the interview. Anonymity and confidentiality were strictly maintained throughout the research process, with all identifying information removed from transcripts. The study adhered to the ethical principles outlined in the Declaration of Helsinki and relevant national ethical standards.

RESULTS

Enhanced Sense of Guidance and Self-Control

Most participants reported that the use of mobile health applications for daily glucose monitoring provided them with a structured routine and a greater sense of self-management. They perceived the application not merely as a tool, but as a digital companion that offered reminders, encouragement, and reassurance.

"I feel more confident because whenever my glucose level is high, the app immediately gives a notification and suggestions on what to do. It's like having a personal nurse inside my phone." (P4)

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"I used to forget things easily, but now I'm more organized because the app reminds me when to take my medication and eat. I don't feel like I'm alone anymore." (P1)

These findings suggest that the application contributed to a psychological sense of support, empowering users through daily interactions and fostering accountability in their diabetes self-management.

Emotional Burden and Digital Fatigue

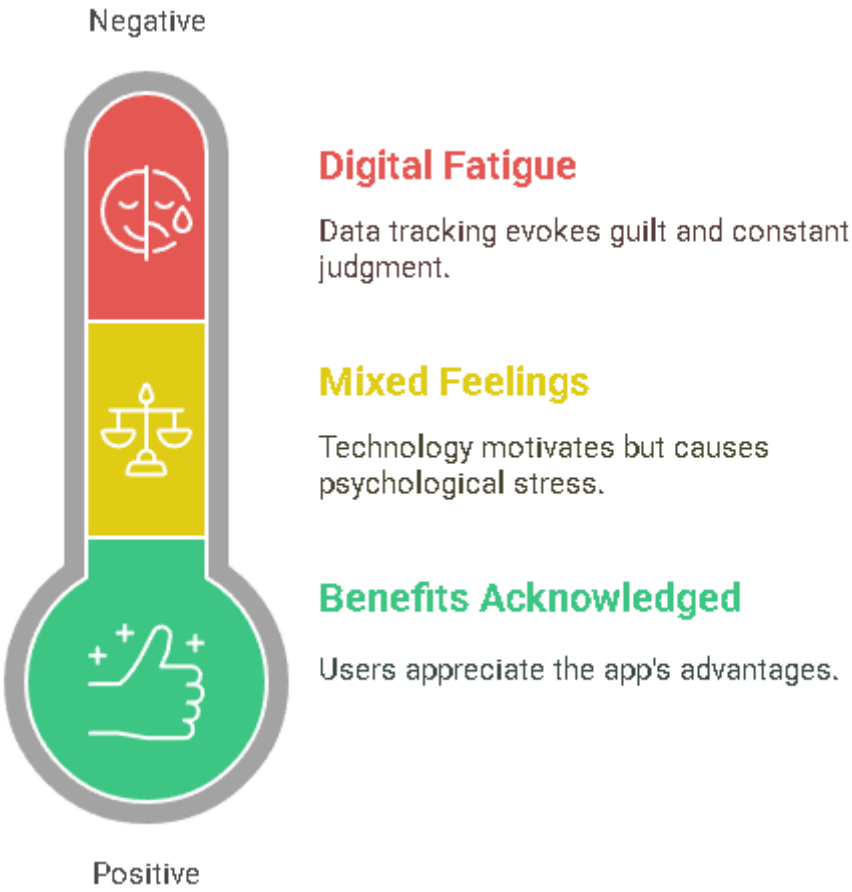
While participants acknowledged the benefits of the app, several also described emotional distress and digital fatigue, particularly when they perceived themselves as failing to meet daily goals suggested by the system. The frequent exposure to data and self-tracking sometimes evoked guilt and pressure.

"Sometimes when the number is high, I immediately feel guilty. Even though I've tried to eat properly, the app still makes me anxious." (P7)

"Opening the app every day and seeing the numbers go up and down gets tiring. It feels like I'm constantly being judged." (P5)

These insights highlight the ambivalence experienced by users—while the technology serves a motivational role, it can also generate unintended psychological stress, especially when users internalize data as personal success or failure.

Balancing motivation and stress in digital self-tracking experiences.



Digital Literacy Barriers and Gradual Adaptation

Several participants expressed initial difficulty in using the application due to limited digital literacy. However, with time and support from family members or health workers, they gradually became more comfortable and independent in operating the app.

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"At first, I was very confused because everything was in English. But my son taught me step by step. Now I can do it on my own." (P2)

"If the app is simple, I can manage. But sometimes when it updates, the whole display changes and I get confused again." (P3)

These responses underscore the importance of intuitive design in health applications, especially for older adults or individuals with limited technological experience. They also point to the value of social support in the technology adoption process.

Transformed Relationship with Healthcare Providers

Some participants reported a shift in their interactions with healthcare providers. By using the app, they felt more informed and confident during medical consultations. They were able to share data from the application, which enhanced mutual engagement and recognition from professionals.

"During my check-up at the clinic, I showed the doctor my app's chart. He was pleased and said I was doing well. That really motivated me." (P6)

"I understand my condition better now. So when I see the doctor, I can ask more questions instead of just listening like before." (P9)

These experiences suggest that digital tools may play a significant role in strengthening patient-provider relationships by fostering shared understanding and active participation in care.

The four emergent themes from this study reveal the multifaceted experiences of individuals with type 2 diabetes in using mobile health applications for glucose monitoring. While the technology enhances users' sense of control, motivation, and engagement in care, it also introduces emotional and usability challenges that must be addressed. These findings emphasize that the effectiveness of digital health tools extends beyond technical performance—it lies in how users perceive, interpret, and incorporate these tools into their daily lives.

This study reveals that individuals with type 2 diabetes perceive mobile health applications not merely as functional tools, but as emotionally significant aids that influence daily routines, perceptions of autonomy, and healthcare decisions. Participants shared that the apps offered a sense of structure and support, helping them feel more in control of their condition. For example, instead of quoting long excerpts, one participant described feeling "less anxious" when checking their glucose levels regularly through the app, indicating emotional reassurance. Others expressed both relief and frustration—relief from reminders that kept them disciplined, and frustration when the technology felt intrusive or difficult to navigate.

Four major themes emerged: (1) Enhanced Self-Control, (2) Emotional Burden, (3) Digital Adaptation Challenges, and (4) Shifts in Patient-Provider Relationships. These themes reflect the complex, often ambivalent emotional landscape of living with a chronic condition while negotiating digital tools.

DISCUSSION

These findings offer a deeper insight into how users emotionally and cognitively engage with mobile health technologies in the context of chronic illness. Rather than passively using the apps, participants actively assigned personal meaning to their use—experiencing them as sources of motivation, but also as triggers for guilt or anxiety when unable to meet self-imposed health goals. This reflects the internal moral dynamics involved in chronic disease management.

Importantly, the study demonstrates that the success of digital health tools depends not only on usability and technical accuracy, but on how well they resonate with users' emotional needs and cultural expectations. The emotional 'companionship' offered by these apps is not metaphorical—it reflects a real relational dynamic where patients feel seen, guided, or even judged by the digital interface. Such

human-technology interactions underscore the importance of designing applications that are empathetic, flexible, and culturally attuned.

By integrating phenomenological insights into design thinking, digital health innovation can move beyond functionality to support the existential and affective dimensions of self-care. This human-centered perspective is vital for achieving more ethical and effective health technology adoption.

The findings are consistent with prior research that acknowledges the emotional and psychosocial complexity of digital health usage. For instance, Greenhalgh et al. (2020) observed that patients interpret digital interventions in ways shaped by personal narratives, trust, and social context. Similarly, Mort et al. (2021) identified a shift in how patients relate to healthcare systems when digital monitoring becomes embedded in daily life. This study extends those insights by offering a culturally situated view from an Indonesian population, where digital literacy, familial support, and socio-economic factors intersect with technology use. While previous studies emphasized usability and outcomes, the current findings foreground meaning, context, and the subjective texture of technology adoption. The theme of digital fatigue also aligns with Lupton's (2016) critique of self-tracking culture, underscoring that constant monitoring can shift from empowerment to pressure when not matched with supportive design and communication frameworks.

Implications of the Findings

The findings of this study carry important implications for both practice and policy in the field of digital health. On a social and cultural level, the study reveals that mobile health applications are experienced not just as technical innovations, but as emotionally charged and culturally mediated tools. For patients with type 2 diabetes in Indonesia, technology becomes meaningful when it aligns with personal values, social support, and a sense of agency. These insights suggest that future design and implementation of mobile health solutions should prioritize adaptability to users' emotional needs, literacy levels, and contextual realities. Healthcare providers and developers should view technology not as a replacement for human care, but as a bridge to more empathetic, personalized, and inclusive patient engagement.

Limitations of the Study

While this study provides rich and contextually grounded insights, several limitations must be acknowledged. The sample size, though appropriate for phenomenological research, limits the generalizability of the findings beyond the studied population. Additionally, participants were drawn from urban and semi-urban settings with access to smartphones, which may not reflect the experiences of those in rural areas or with limited digital infrastructure. The reliance on self-reported narratives also introduces the potential for recall bias or selective memory. Nevertheless, these limitations are intrinsic to qualitative inquiry and highlight the need for cautious interpretation rather than broad generalization.

Prospective Directions for Future Research

Future research can build upon these findings by exploring experiences in diverse demographic and geographical settings, particularly among populations with limited access to digital resources. Longitudinal studies may also provide insight into how meanings evolve over time as patients continue to engage with mobile health tools. In addition, interdisciplinary research combining phenomenological approaches with design science could contribute to the development of emotionally intelligent health technologies. As digital health becomes increasingly integrated into chronic disease management, understanding the lived realities of users will remain essential to ensuring its relevance, acceptance, and ethical implementation.

CONCLUSION

This study revisited the central research question: How do individuals with type 2 diabetes experience the use of mobile health applications for glucose self-monitoring? The findings revealed four key thematic contributions—enhanced self-control, emotional burden, digital adaptation

challenges, and evolving patient-provider relationships. Together, these themes illustrate how users interpret, internalize, and emotionally respond to digital health technologies in their everyday lives.

Rather than viewing mHealth apps as neutral tools, participants experienced them as emotionally charged agents that influence motivation, self-perception, and healthcare interactions. This study contributes to the literature by shifting attention from clinical efficacy to the lived, sociocultural dimensions of digital self-care. The insights offer practical implications for the design of more empathetic, context-sensitive digital health solutions that resonate with users' realities. Future research may build on these findings by engaging broader populations and employing interdisciplinary frameworks to deepen understanding of digital health engagement across diverse settings.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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