



Exploring the Lived Experience of Using Wearable Cardiac Monitoring Devices Among Older Adults Living Independently at Home in Urban Java, Indonesia

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ABSTRACT

The integration of wearable health technologies has transformed patient care by enabling real-time monitoring and promoting self-management, especially among older adults. However, current research has primarily focused on clinical outcomes and usability metrics, offering limited insight into the lived experiences of elderly users. Despite the growing adoption of cardiac monitoring devices, little is known about how older adults interpret and emotionally engage with these technologies in daily life. This study adopts a descriptive phenomenological approach to explore how older individuals experience wearable cardiac monitoring devices at home. Using Colaizzi's method, in-depth interviews were conducted with eight older adult participants aged 65 and above, recruited from urban and semi-urban communities in Indonesia. The findings revealed four central themes: emotional vulnerability in solitary use, cautious navigation of technology, privacy concerns, and evolving empowerment through continued use. These results illustrate how wearable devices become embedded not just in health routines but in users' identities, fears, and sense of agency. The study highlights the importance of user-centered design that addresses emotional and existential concerns of elderly populations. These insights contribute to a deeper understanding of aging with technology and suggest directions for future research in human-centered digital health innovation.



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INTRODUCTION

In recent decades, the integration of digital health technologies into everyday life has transformed how individuals monitor, understand, and engage with their personal health (Fleming dkk., 2024; Gramaje dkk., 2021). Among these advancements, wearable medical devices have gained prominence, especially in the management of chronic conditions such as cardiovascular disease. These technologies promise not only real-time health tracking and data accessibility but also the potential to empower individuals through increased health awareness and autonomy (Taghavi dkk., 2021). Their growing popularity reflects a broader global trend toward personalized and preventive healthcare, aligning with the aging of populations in many parts of the world.

Within this shifting landscape, older adults represent both a key target group and a vulnerable population (Bent dkk., 2021; Binyamin & Hoque, 2020). The use of wearable cardiac monitoring devices among the elderly intersects with complex social and cultural factors, including aging, autonomy, trust in technology, and digital literacy. While these devices are typically evaluated based on clinical efficacy or technical reliability, they also shape and are shaped by users' lived realities—particularly those of older individuals navigating physical limitations, social isolation, or cognitive decline (Wurster dkk., 2024). For these users, the device is not merely a biomedical instrument but an object that mediates the experience of the body, the fear of illness, and the desire for connection and safety.

Given the intimate and often invisible nature of these interactions, there is a pressing need to understand how older adults make sense of such technology within their everyday lives (Nasr dkk., 2021; Punj & Kumar, 2019). This requires moving beyond technical assessments and exploring the subjective dimension of device use—how it is perceived, internalized, and embodied. Phenomenology, with its focus on lived experience and meaning-making, offers a powerful lens to access this depth of understanding (Maddeh dkk., 2023). By attending to the voices of older adults themselves, a more nuanced view of their engagement with wearable medical devices can emerge, one that honors the complexity of aging, technology, and personhood in contemporary healthcare contexts.

Research exploring individuals' lived experiences with healthcare technologies has become increasingly important in understanding how these tools are perceived, interpreted, and embedded within everyday life (Hasan dkk., 2019). In particular, the subjective experiences of older adults using wearable cardiac monitoring devices offer rich, yet underexamined, insights into how technology intersects with aging, vulnerability, and autonomy (Mulrooney dkk., 2022). These experiences are shaped not only by the functionality of the device but also by emotional, relational, and existential dimensions that remain largely invisible in traditional clinical or engineering evaluations.

Despite the growing interest in patient-centered design and user experience, much of the existing literature relies heavily on quantitative metrics such as usability scores, compliance rates, or device accuracy (Kalasin dkk., 2022; Tran dkk., 2019). While valuable in assessing outcomes and performance, these methods often fail to capture the nuanced and affective dimensions of device usage—especially among older adults who may experience technology through the lenses of fear, trust, resistance, or dependence. As a result, essential aspects of how technology is lived and embodied remain unspoken or misunderstood.

This methodological gap reveals the limitations of conventional approaches in fully grasping the essence of the phenomenon. Without attending to the users' voices and meaning-making processes, research risks oversimplifying the complex realities of aging with technology (Albahri dkk., 2019; Xie dkk., 2021). Descriptive phenomenology, therefore, offers a compelling alternative—one that centers on the subjective and existential significance of the experience itself, allowing researchers to access layers of meaning that are typically obscured in surface-level evaluations. Through this lens, the study aims to explore not just what older adults do with wearable cardiac devices, but how they live through them.

Current responses to the integration of wearable cardiac monitoring devices among older adults have primarily emphasized pragmatic solutions—ranging from interface simplification and user training to performance optimization and patient adherence strategies. While these practical interventions offer valuable improvements in usability and compliance, they are typically rooted in quantitative or surface-level assessments that overlook the deeper experiential dimensions of technology use (Gramaje dkk., 2021). Such approaches tend to conceptualize older adults as passive users rather than meaning-making individuals whose interactions with technology are shaped by fear, agency, memory, and social context.

These conventional methods often lack the conceptual tools to uncover the affective and existential meanings embedded in the lived experience of health technology use (Chong dkk., 2019; T. He & Lee, 2021). For example, metrics such as adherence rates or alert responses may reveal what users do with a device but fail to explain how they feel, interpret, or internalize these interactions. Consequently, there remains a critical gap in understanding the essence of the phenomenon: what it truly means for older individuals to live with, and through, wearable cardiac devices in the privacy of their homes.

A phenomenological approach, particularly one grounded in descriptive inquiry, offers a compelling alternative (Chung & Park, 2019; Zhang dkk., 2020). Rather than seeking generalizable patterns or statistical correlations, it prioritizes the unique, embodied experiences of individuals, enabling the identification of essential themes and meanings. By illuminating how older adults construct meaning around their use of wearable cardiac technologies, phenomenology can enrich both

theoretical understanding and practical design, ultimately leading to more empathetic, responsive, and human-centered innovations in digital health.

Previous studies have examined the use of wearable health technologies in older populations, primarily focusing on usability, clinical outcomes, or device adherence. While some research has touched on user perception, few have investigated the deeper emotional and existential experiences that shape how older adults relate to these devices. For instance, studies by Fleming dkk. (2024) highlighted user preferences and psychological effects, but lacked exploration of personal meaning and embodied experience (Azbeq dkk., 2022; K. He dkk., 2020). Theoretical perspectives such as user-centered design and technology acceptance models offer partial insight, yet do not fully account for the lived realities of aging with medical technology. Therefore, there is a need to complement existing literature with experiential data grounded in phenomenological inquiry.

This study adopts a descriptive phenomenological approach to explore how older adults experience wearable cardiac monitoring devices in their daily lives (Ed-daoudy & Maalmi, 2019; Sharma dkk., 2021). The method was selected to address the gap in understanding the essence of users' experiences beyond technical performance. By using Colaizzi's method, the analysis focuses on capturing themes of meaning that arise directly from the participants' narratives (Baldassano dkk., 2020). This approach offers a way to hear and honor the voices of older adults, revealing their perceptions, fears, and sense of control when engaging with digital health technologies. The findings provide a response to the earlier question about what remains unexamined in user experience with wearable cardiac devices.

The article is structured as follows: The introduction outlines the research background, knowledge gap, and motivation for a phenomenological approach (Li dkk., 2021; Sankhala dkk., 2022). The next section details the methodological foundation, including the rationale for using descriptive phenomenology and the procedures for data collection and analysis. Results are presented thematically, highlighting the participants' lived experiences and supporting them with direct quotations. The discussion section interprets the findings in relation to existing literature and theoretical implications. Finally, the article concludes by summarizing the key insights and offering recommendations for practice and future research.

RESEARCH METHODS

Study Design

This study employed a descriptive phenomenological approach rooted in the philosophical tradition of Edmund Husserl. This design was selected to explore the lived experiences of older adults using wearable cardiac monitoring devices within their home environments (Daly, 2007; Murphy & Dingwall, 2017). Phenomenology was deemed appropriate due to its focus on capturing the essence of subjective experiences as directly described by individuals, without imposing theoretical interpretations (Amoon dkk., 2020). The descriptive orientation emphasized intentionality, bracketing, and reduction to understand how participants experienced and assigned meaning to the use of such medical technologies in their daily lives. This approach allowed for a rigorous and in-depth investigation into the emotional, cognitive, and relational aspects of interacting with wearable cardiac devices among elderly users.

Participants

Participants were selected using purposive sampling, ensuring they possessed direct and meaningful experience with the phenomenon under study (Fenton & Baxter, 2016). Inclusion criteria required participants to be aged 65 or older, residing independently, and having used a wearable cardiac monitoring device at home for a minimum period of three months. Individuals with severe cognitive impairments or those under institutionalized care were excluded (Blonigen dkk., 2023). A total of eight participants were included in the study, comprising five females and three males, with an average age of 71.4 years. All participants had varying levels of technological literacy and were

managing chronic cardiac conditions. The diversity in device usage contexts and personal backgrounds contributed to the richness of the experiential data.

Data Collection

Data were collected through in-depth, semi-structured interviews conducted in person at the participants' homes or at a designated community health center, depending on individual preferences. An interview guide was used to ensure consistency while allowing flexibility for participants to elaborate on their lived experiences (Clair, 2003; Kawamura, 2020). Interviews lasted between 45 and 70 minutes and were audio-recorded with consent. The environment was arranged to be private and comfortable, fostering openness and psychological safety. Field notes were taken during and after each session to capture non-verbal cues and contextual observations. All interviews were transcribed verbatim for analysis. The interview protocol was adapted from validated instruments on user experience in healthcare technology, with minor modifications to suit the geriatric context.

Data Analysis

The transcribed data were analyzed using Colaizzi's seven-step method, a well-established technique for descriptive phenomenological inquiry. The process began with repeated readings of transcripts to gain a holistic understanding, followed by the extraction of significant statements related to the phenomenon. Meaning units were then formulated and clustered into thematic categories. These themes were refined and integrated into comprehensive descriptions that captured the core essence of participants' experiences. To facilitate coding and theme development, NVivo 12 software was used (Role dkk., 2021). The final step involved validation through member checking, wherein selected participants reviewed the thematic interpretations to ensure accuracy and authenticity. This method allowed for a systematic transformation of rich textual data into meaningful insights about the lived experience of using cardiac wearable technology.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board (IRB) of the affiliated university (Fife, 2020). All participants received written and verbal explanations of the study's objectives, procedures, risks, and confidentiality measures. Written informed consent was obtained from each participant prior to data collection. Anonymity was maintained through the use of pseudonyms and by removing any identifiable information during transcription. The study adhered to international ethical standards for human subjects research, including the Declaration of Helsinki and relevant national guidelines on biomedical ethics.

RESULTS

Anxiety and Emotional Vulnerability in Solitary Use

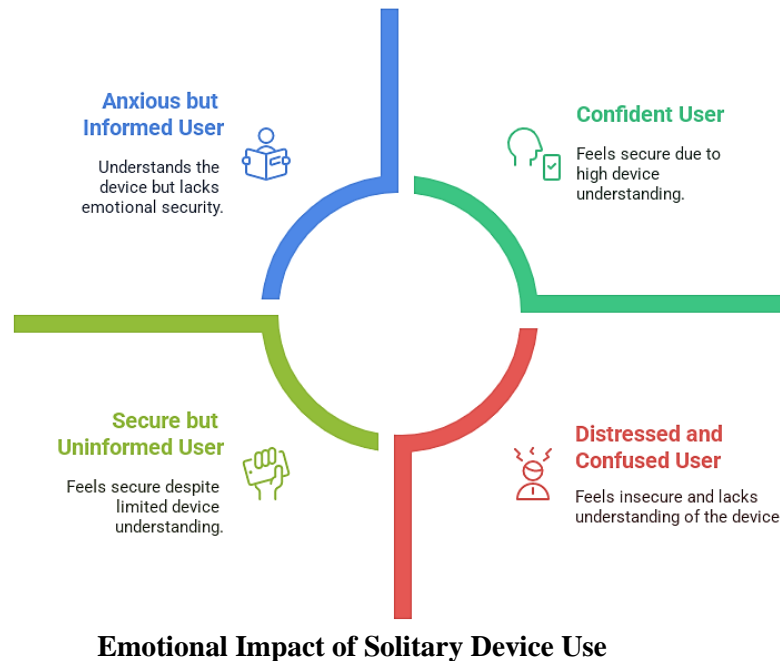
Participants frequently expressed a sense of emotional insecurity and fear associated with using the device alone, particularly at night. The constant presence of a device monitoring their heart rate evoked mixed feelings of dependence and anxiety.

"I was afraid the device might stop working while I was asleep. I kept waking up just to check if it was still blinking." (P4)

This emotional vulnerability was often intensified by a lack of immediate human support and limited understanding of how the device functioned. For some, the device represented safety; for others, it was a source of distress due to its unfamiliarity and perceived unpredictability.

"Sometimes I hear it beep, and I panic, thinking something is wrong with my heart, even if it's probably just a low battery." (P2)

These statements reveal that while the device offers potential clinical benefits, it also generates emotional uncertainty, particularly among elderly users who live alone.



Emotional Impact of Solitary Device Use

Navigating Technological Interfaces with Caution and Curiosity

Many participants discussed difficulties related to understanding and interacting with the device's interface. Small display sizes, unclear signals, and the lack of tactile feedback contributed to users' hesitancy and dependence on external assistance.

"I need my grandson to help me check the screen. The letters are too small, and I don't know what the symbols mean." (P6)

Despite these challenges, several participants showed a willingness to learn and adapt. Their curiosity became a driving force in overcoming technical barriers, though not without moments of frustration.

"It's strange, but also interesting. At my age, I never thought I'd wear something like this and learn how it works." (P3)

This theme underscores the duality of technology as both a barrier and a motivator, illustrating the participants' complex relationship with digital devices.

Perceived Intrusion and Privacy Concerns

A recurring concern among participants was the device's capability to collect and transmit sensitive health data. Some expressed a lack of control over their own medical information, leading to discomfort and hesitancy in fully trusting the technology.

"It feels like someone is always watching my heartbeat. Who gets to see this data? I don't really know." (P1)

Others emphasized the trade-off between health monitoring and privacy, questioning the transparency of data usage and security.

"If the data helps the doctor, I am okay with it. But I'd prefer to know where it goes and who reads it." (P7)

These insights highlight the importance of addressing ethical considerations and ensuring transparency in data management, especially for elderly users who value autonomy.

Reframing Health Monitoring as Empowerment

Amid the challenges, several participants described a gradual transformation in their perception of the device—from an unfamiliar tool to a source of reassurance and self-awareness.

"Now I feel more in control. I know if something goes wrong, the device will catch it before I even notice." (P5)

This sense of empowerment was often tied to a growing understanding of their own health conditions and the device's role in prevention and early detection.

"I never used to think about my heart. But now, I feel like I'm learning about myself. It gives me peace of mind." (P8)

The theme demonstrates how continued use and positive reinforcement from healthcare providers can foster a meaningful relationship between users and technology, ultimately contributing to a sense of agency and well-being.

The essence of the phenomenon revealed that the experience of older adults using wearable cardiac monitoring devices is characterized by a dynamic interplay between vulnerability and empowerment. While emotional distress, technological complexity, and privacy concerns were evident, these were met with a willingness to adapt, driven by a desire for autonomy, safety, and health awareness. These lived experiences emphasize the need for empathetic, user-centered design and ongoing support mechanisms tailored to the elderly population.

DISCUSSION

The study revealed that older adults experience wearable cardiac monitoring devices through a complex interplay of emotional vulnerability, cautious adaptation, privacy concern, and gradual empowerment (Minopoulos dkk., 2022). These findings address the central research question by illuminating how elderly users make sense of, emotionally engage with, and respond to the presence of health technology in their private living spaces.

The participants' experiences provide critical insight into how wearable cardiac devices are not merely tools for health monitoring but become part of a deeply personal process of negotiating safety, autonomy, and identity. The emotional distress associated with device malfunctions, the struggle to interpret interface cues, and the evolving sense of self-awareness all reflect an internal process of meaning-making that cannot be captured through quantitative metrics alone. This study, therefore, contributes a nuanced understanding of how older adults live with and through health technology, offering a meaningful answer to the initial inquiry on how they interpret and embody their interactions with such devices.

The findings align with and extend prior phenomenological studies such as Gous dkk. (2020), which recognized older users' emotional responses to health-tracking technologies but did not fully explore how these responses evolve over time or influence users' perception of self and care. This study supports existing literature in emphasizing the importance of empathy and personalization in device design, but it also highlights overlooked themes—such as perceived intrusion and the emotional labor of self-surveillance. Furthermore, it complements theoretical discussions on aging and technology that suggest the need to view older adults as active agents rather than passive recipients of care (Fahlevi dkk., 2022). The gradual reframing of the device from a source of anxiety to a tool of empowerment offers a unique addition to existing models of technology acceptance in elderly populations.

The findings of this study hold several practical and conceptual implications for the design and implementation of wearable health technologies for older adults. Socially, the narratives reflect a broader tension between aging, autonomy, and digital dependence, suggesting that health technologies must be framed not only as medical tools but also as socio-emotional companions. Culturally, the experiences underscore how older adults negotiate trust and control in an increasingly digitized healthcare environment, which may influence device adoption across diverse social contexts. Professionally, healthcare providers and technology designers must consider these lived meanings

when creating interventions or technologies for older populations. Tailoring device design to address emotional vulnerability, interface accessibility, and privacy concerns could significantly improve user engagement and long-term adherence.

Despite its contributions, this study is not without limitations. The sample was limited to eight participants within a specific geographic and cultural setting, which may restrict the transferability of the findings to broader populations. Additionally, while the phenomenological approach allows for deep exploration of lived experience, it does not seek to generalize but rather to understand meaning in context (Sirasakamol dkk., 2022). The study's reliance on self-reported data may also be influenced by memory bias or social desirability, although these concerns were mitigated through prolonged engagement and member checking. These limitations should be considered when interpreting the study's findings and their relevance beyond the study group.

Future research could build on these insights by exploring cross-cultural variations in the experience of aging with digital health technologies or examining how family dynamics influence elderly users' trust and engagement with devices. Longitudinal studies might reveal how these experiences evolve over time, offering a dynamic perspective on adaptation, resistance, and eventual normalization. Moreover, future inquiry could integrate phenomenological methods with participatory design approaches to co-create technologies that are not only functional but also emotionally and ethically attuned to the needs of older adults (Metz dkk., 2021). Such expansions would deepen our understanding of person-technology relations and contribute meaningfully to human-centered digital health innovation.

CONCLUSION

This study explored the lived experiences of older adults using wearable cardiac monitoring devices at home, with a focus on how they make sense of and emotionally respond to the presence of health technology in their daily lives. The findings revealed that participants experienced a mix of anxiety, cautious adaptation, privacy concerns, and gradual empowerment throughout their engagement with the device. These insights fill a critical gap in the literature by offering a deeper understanding of the emotional and existential dimensions of health technology use among the elderly. Unlike prior studies that emphasized technical efficiency, this research highlights the importance of user meaning-making and personalized support. The study demonstrates the value of phenomenology in uncovering rich, subjective experiences that can inform more empathetic and inclusive technology design. Future research may expand these findings by exploring diverse cultural settings or by integrating phenomenological insights into participatory design frameworks.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article. All procedures were conducted independently, and the study was carried out without any commercial or financial relationships that could be construed as a potential conflict of interest.

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