Available online at
https://journal.uitm.edu.my/ojs/index.php/IJAD/index

e-ISSN: 2710-5776

International Journal *of* Art and Design 10(1) 2026, 35–47

International Journal *of* Art and Design

User Interface Design Factors Influencing Perceived Usability in Digital Health Platforms

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ARTICLE INFO

Article history:
Received 20 January 2026
Revised 18 March 2026
Accepted 1 April 2026
Online first
Published 03 April 2026

Keywords:
Digital health platforms
Perceived usability
Technology Acceptance Model
User interface design
Visual interactive

DOI:
10.24191/ijad.v10i1.dpc0vf22

ABSTRACT

Digital health platforms have become a primary channel for delivering healthcare services, yet many mobile and web applications continue to exhibit usability issues that limit user growth and time-on-task. Given that user interface (UI) design quality fundamentally shapes perceptions, behaviours, and experience, this study identified the key UI attributes that drive perceived usability from a user-centred, design-oriented standpoint. A quantitative design was adopted, using a structured survey administered to users of mobile and web-based digital health applications. Guided by the Technology Acceptance Model (TAM), the framework examined relationships between perceived usability and UI factors, including visual clarity, layout consistency, navigation structure, colour and typography, and feedback mechanisms. Descriptive statistics profiled respondents and usage patterns, while inferential analyses tested the significance of associations among constructs. Findings indicate that visual clarity, simple navigation, and interface consistency are the strongest predictors of perceived usability, while aesthetic appeal supports user confidence and reduces interaction difficulty. Timely feedback cues and readable typography further contributed, especially during common tasks such as appointment booking, teleconsultation, medication tracking, and viewing personal records. These results underscore the central role of UI design in shaping usability judgements in digital health contexts. Well-designed interfaces not only make functions easier to learn and execute, but also cultivate positive perceptions that enable sustained acceptance and adoption of digital health platforms. The study recommends that healthcare application designers and developers prioritise evidence-based, user-centred UI decisions and pursue innovative yet consistent interaction patterns to meet users' expectations for effective, user-friendly digital health services.

1. INTRODUCTION

Digital technologies have come a long way in a very short period of time and they have completely changed the healthcare industry. One of the major impacts being the acceptance of digital health platforms like mobile health (mHealth)

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applications, telemedicine systems, and electronic health services. These platforms are gaining more and more popularity for a variety of medical services, such as consultations, health monitoring, patient education, and even clinical decision-making. With the digitization of health care services, the destiny of digital health platforms is at the mercy of not only technical aspects but also user interaction and experience quality. In this light, user interface (UI) design has become a prime factor that will have far-reaching implications on how users view, recognize, and eventually get to use digital health apps ((Norman, 2013; Zhang & Adipat, 2005)).

Nevertheless, the plethora of digital health solutions does not prevent many applications from still undergoing low user retention, limited engagement, and usability-related issues. Earlier studies have indicated that users find it difficult to navigate through health applications due to complex structures, inconsistent layouts, unclear visual hierarchies, and inadequate feedback mechanisms ((Bastien, 2017; Schnall et al., 2016)). Such users may vary significantly in terms of age and technological skills. For instance, a user may be a young person who is very digitally literate and another may be an old patient who is not familiar with technology at all. Poorly designed user interfaces can cause a lot of problems including misunderstanding, data input errors, loss of trust, and eventually, the user uninstalling the app ((Holden & Karsh, 2010)).

The usability factor is at the core of determining the success of the digital health platforms. To make it short, ISO 9241-11 gives the definition of usability as the degree to which a system is able to be used by specified users to obtain specified goals with effectiveness, efficiency, and satisfaction in a particular use context. In the case of healthcare applications, the usability perceived by the user takes on even greater significance since the user's subjective evaluation is often the key factor in the acceptance and continuous use of the digital system. The perceived usability is an indication of the users' cognitive and emotional responses toward the design of the interface elements such as visual clarity, interaction flow, and interface consistency ((Hornbæk, 2006)). So, knowing the factors that influence perceived usability is vital in enhancing the efficiency of the digital health platforms.

When it comes to the design standpoint, the user interface (UI) design is the main channel that allows users to interact with the digital health system. UI design includes the visual as well as the interactive components of the system such as the layout structure, color schemes, fonts, icons, user navigation patterns, and feedback cues. These components together determine the users' initial perception, influence user actions, and affect the ease of access to and the understanding of information (Moshagen & Thielsch, 2010). In a healthcare environment, good UI design is not only a matter of looks but also a requirement for the smooth and efficient processing of information and the reduction of cognitive load (Sweller, 2024).

Interactive usability and user experience (UX) have been the core of the human–computer interaction (HCI) studies that the last few years have been dedicated to. High-quality UI design and usability are inseparable partners in the digital world. (Tuch et al., 2012) and (Bargas-Avila & Hornbæk, 2012) cited that the interfaces with a good visual organization along with a consistent design pattern could increase users' perceived ease of use and satisfaction significantly. The digital health programs, displays, and navigation that are visually clear and intuitive have been linked to high task completion rates and fewer user errors (Maramba et al., 2019). (Kaber et al., 2006) additionally indicated that interactive feedback elements like confirmations, progress indicators, and error notifications are vital in building user confidence and trust, especially in health-related interactions where accuracy is crucial.

A widely accepted Technology Acceptance Model (TAM) has been extensively used to justify the users' acceptance, including digital health technologies, of the information systems. TAM states that the two main factors that are critical in technology acceptance are perceived usefulness and perceived ease of use (Davis, 1989). Over the past few years, the researchers have widened TAM to the inclusion of usability and design-related concepts, affirming that interface quality directly impacts users' perceptions of ease of use and system acceptance (Venkatesh Viswanath & Bala, 2008). In the case of digital health facilities, perceived usability is the link that connects UI design characteristics and users' behavioral intentions to adopt health technologies (Holden & Karsh, 2010).

https://doi.org/10.24191/ijad.v10i1.dpc0vf22

Usability and technology acceptance in healthcare systems have been the subject of numerous studies but most of them were spot on the technical performance issue or the system efficiency and clinical outcomes. The number of studies that take account of user interface design factors from a visual and interactive design perspective with considerable relations to perceived usability is comparably smaller. The existing researches are mostly treating the user interface as a secondary component that is determined by the central design variable that shapes user perception and experience (Lazar et al., 2017). This is especially true in the area of the research where the impact of visual aesthetics, interaction patterns, and interface consistency on users' subjective evaluations of usability in digital health platforms is being ignored.

Moreover, users of digital health applications, therefore, are totally different from the users of general consumer applications. Health-related tasks demand very high cognitive resources due to the presence of sensitive information, and they also impose emotional considerations such as anxiety or stress. Hence, UI design for healthcare applications must compromise between clear function and visually inviting as well as velvety interaction (Wilcox et al., 2010). Not addressing these design requirements may destroy the user trust and deprive the users of the anticipated benefits of the digital health technologies. Thus, there arises a need for special attention to design-oriented research which straightforwardly looks into how particular UI design factors determine perceived usability in the healthcare context.

The present study is motivated by the above-stated need and aims at developing a systematic investigation into user interface design factors affecting perceived usability in the context of digital health. It is hoped that the research employing the quantitative method and integrating the UI design factors within a TAM-based framework will result in the establishment of the empirical evidence on the links between visual and interactive design components and the users' usability perception. Focusing on perceived usability means getting closer to users' subjective experiences which are crucial for the long-term adoption and effective use of digital health apps.

This research study has threefold contributions. It first of all, enriches the academic thinking in the UI and UX area by demonstrating clearly the importance of visual and interactive design components in determining perceived usability in the case of healthcare applications. It secondly opens up a new avenue for the use of the Technology Acceptance Model by considering the UI design aspects to be the primary reasons for the perceived usability. Finally, it provides the designers, developers, and healthcare stakeholders involved with practical insights into the designing of the user-centered digital health platforms that meet the needs and expectations of the users. The present study by making clear the nexus between design, usability, and healthcare technology, has positioned UI design as a critical factor in the creation of efficient and resilient digital health solutions.

2. LITERATURE REVIEW

2.1 Visual Aesthetics in Digital Health User Interfaces

Visual aesthetics denote the visual traits of an interface that sway users' views, feelings, and thinking during interaction. The digital health platforms have the visual appeal as one of the major factors along with clarity, trust, and easy processing of information. Earlier works in human–computer interaction have verified that attractive user interfaces are in most cases judged as more efficient, even if the system's performance is unchanged (Moshagen & Thielsch, 2010; Tuch et al., 2012). This issue is of significance in healthcare situations where users usually connect visual quality with system credibility and reliability.

Visual aesthetics in healthcare applications include color schemes, fonts, spacing, icons, and the overall visual harmony. Findings from the studies conducted in the past indicated that soothing color palettes, high contrast writings, and easy to read fonts help in decreasing the cognitive load and at the same time, enhancing the understanding of medical

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information (Bonnardel et al., 2011; Mackay, 2013). On the other hand, poorly balanced visual aspects may lead to an increase in user tension and a decline in perceived usability especially among the elderly and the users with little digital literacy(Holden & Karsh, 2010).

New research points to the fact that visual aesthetics should be from the outset understood as a functional element rather than a merely decorative one. In the case of digital health platforms, aesthetic consistency allows users to grasp the interface patterns and to foresee the system's actions which, in turn, increases the perceived ease of use (Sonderegger & Sauer, 2010). Also, visual uniformity among various screens has been associated with greater user satisfaction and trust which strengthens the beauty of aesthetic harmony in health-related interfaces. (Kollmorgen et al., 2025)

Table 1. Visual Aesthetic Elements and Their Usability Implications in Digital Health UI

Visual Element	Description	Usability Impact
Color scheme	Use of calm and consistent colors	Enhances trust and readability
Typography	Font size and legibility	Improves information comprehension
Visual hierarchy	Layout and spacing	Reduces cognitive load
Consistency	Uniform visual patterns	Increases perceived ease of use

2.2 Navigation Design and Perceived Usability

Navigation design refers to the structural organization and pathways that enable users to move through an interface and access information efficiently. In digital health platforms, effective navigation is critical, as users often need to locate specific health information quickly and accurately. Poor navigation design has been identified as one of the primary causes of usability failure in healthcare applications (Maramba et al., 2019; Zhang & Adipat, 2005).

Research in usability and UX consistently shows that simple, predictable navigation structures enhance users' sense of control and reduce interaction errors. Clear menus, logical information grouping, and minimal navigation depth contribute to improved task completion rates and user satisfaction (Bastien, 2017). In contrast, overly complex navigation hierarchies may overwhelm users, particularly those experiencing stress or cognitive fatigue due to health-related concerns (Schnall et al., 2016).

Navigation design also interacts closely with perceived usability through users' mental models. When navigation structures align with users' expectations, interfaces are perceived as easier to use, even if the system offers complex functionality (Norman, 2013). In digital health contexts, intuitive navigation is essential for supporting diverse user groups, including patients, caregivers, and healthcare professionals. Studies indicate that navigation clarity significantly predicts perceived ease of use within TAM-based healthcare models (Venkatesh Viswanath, 2003).

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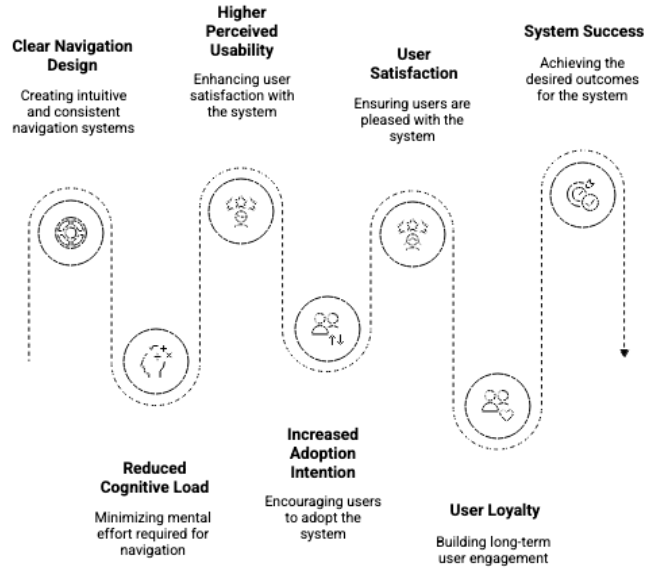

Fig. 1. Relationship Between Navigation Design and Perceived Usability
Source: Author, 2026

2.3 Visual Interactive Design in Healthcare Applications

Visual interactive design combines visual presentation and interactive components like buttons, gestures, animations, feedback, and system responses. The visual interactive features in digital health platforms act like the means of communication through which the users are guided, and the system status is confirmed. In addition, the visual interactivity supported by the immediate and meaningful feedback is also a good way of user engagement and usability strengthening (Kaber et al., 2006).

Interaction design studies show that the visual interactive features act as a language between the user and the system whereby the user can learn about the system—aided through the reduction of doubts (Norman, 2004). The health applications, for instance, feedback indicating the progress during data entry or confirmation messages are seen as critical for user confidence, preventing errors, and building user trust (Lazar et al., 2017). When it comes to medication adherence, for instance, the user error due to misunderstanding of the input interface may result in serious consequences, and hence these features (i.e., interactive feedback) are very important.

The recent findings point out that visual interactive design is the factor contributing to emotional usability by creating a feeling of control and reassurance. Micro-interactions, subtle animations, and responsive feedback can make digital health platforms feel more approachable and human-centered (Bargas-Avila & Hornbæk, 2012). When users feel that the system is responsive and offers support, they are likely to view that the system is still usable and trustworthy (Schnall et al., 2016).

Table 2. Visual Interactive Elements and User Perception Outcomes

Interactive Element	Function	User Perception
Feedback messages	Confirm user actions	Increases confidence
Progress indicators	Show task status	Reduces uncertainty
Interactive icons	Guide interaction	Improves learnability
Micro-animations	Enhance responsiveness	Improves engagement

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2.5 Synthesis and Research Gap

The literature reviewed reveals that visual aesthetics, navigation design, and visual interactivity are interdependent factors that together determine perceived usability in digital health platforms. About that, previous studies admit the critical role of usability in healthcare systems but often focus their investigations on system efficiency or clinical performance with only limited consideration of UI design from a visual and interactive standpoint. The existing research has a tendency to analyze the different aspects separately instead of regarding these factors as integrated design elements that affect users' overall perception of usability. Moreover, there is a lack of empirical studies that directly connect visual interactive design elements to perceived usability through TAM-based frameworks in healthcare domains. The identified gap is a strong indication for conducting a study that is capable of systematically revealing the way UI design factors act as forerunners of perceived usability. It is really very important to solve this gap for the purpose of pushing design-oriented research in digital health and also for the great ministry of developing more efficient and user-centered healthcare applications.

3. METHODOLOGY

3.1 Research Design

The research implemented a quantitative explanatory research design to investigate the impact of user interface (UI) design factors on users' perception of the usability of the Zi. Care digital health application. The quantitative method was chosen in order to allow for the systematic measurement of user perceptions and the application of statistical tests for evaluating the links between UI design variables and the perceived usability aspect. The research model was a modified version of the Technology Acceptance Model (TAM) wherein perceived usability was the main dependent variable affected by the factors of visuals and interactivity of the UI.

The researchers chose Zi. Care as the testing ground because of its primary role as a digital health platform that combines access to health information, interaction between the patient and the doctor, and the navigation of services. Being a healthcare application, Zi. Care is an ideal candidate for testing the effectiveness of UI design in supporting usability, trust, and user engagement in the context of digital health environments.

3.2 Research Variables and Conceptual Framework

The research work was aimed at identifying three independent variables which were taken from UI design literature:

1. Visual Aesthetics
The users' views, which were purity of the picture, harmony of colors, legibility of typography, balance of layout, and overall aesthetic coherence of the Zi. Care interface, referred to the visual perception of the users.
2. Navigation Design
Navigation design covered all the aspects such as the structure of the menu, hierarchy of information, difficulty of switching between screens, and also the transparency of navigation cues within the application.
3. Visual Interactive Design
In this concept, the interaction between the user and the application was facilitated by the visual feedback - messages, icons, buttons, micro-interactions, and the responsiveness of interface elements during user interaction.

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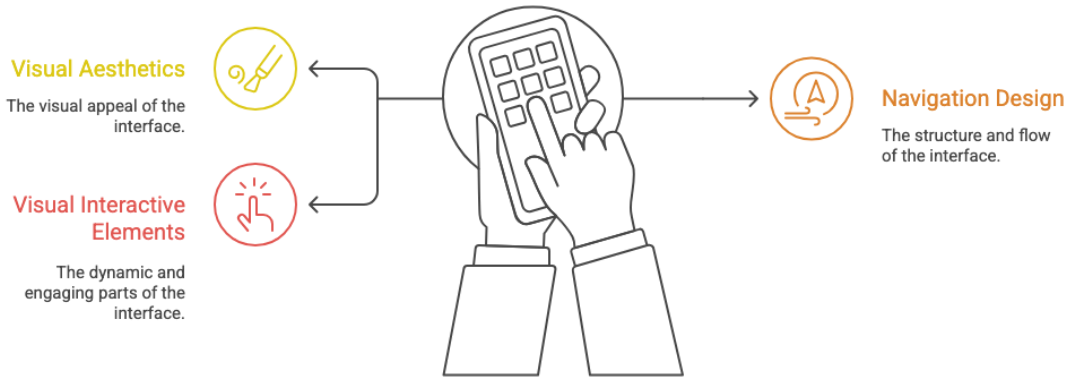

Fig. 2 . Conceptual Research Framework
Source: Author, 2026

3.3 Participants and Sampling Technique

In this research, the active users of the Zi. Care applications were the study participants and they included patients as well as general users who had interacted with the application's core features. The researchers used a purposive sampling method in order to guarantee that the participants fulfilled the following prerequisites:

- The individuals had used the Zi. Care application for health-related purposes
- The persons had used the application interface at least twice
- The respondents had knowledge of the platform's basic navigation and visual features

The sample size was decided on the minimum requirements for statistical analysis in the areas of UI and usability studies. The researchers aimed at a total of [n = …] respondents to ensure the findings had adequate statistical power and reliability.

3.4 Research Instrument

Data were collected using a structured questionnaire designed to measure users' perceptions of UI design factors and perceived usability within Zi.Care. The questionnaire consisted of four sections:

1. Demographic Information
   Including age range, gender, frequency of application use, and general experience with digital health applications.
2. Visual Aesthetics Scale
   Items measured perceptions of color consistency, typography clarity, visual hierarchy, and aesthetic comfort.
3. Navigation Design Scale
   Items assessed ease of navigation, clarity of menu structure, and efficiency in locating health information.
4. Visual Interactive Design Scale
   Items evaluated system feedback, responsiveness, clarity of interactive elements, and perceived control during interaction.
5. Perceived Usability Scale
   Items measured ease of use, efficiency, satisfaction, and overall usability perception.

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All items were measured using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument was adapted from established UI, usability, and TAM-related studies, with wording adjusted to fit the Zi.Care context.

Table 3. Measurement Variables and Indicators

Variable	Indicators
Visual Aesthetics	Color clarity, typography, layout balance
Navigation Design	Menu structure, navigation flow, information access
Visual Interactive	Feedback, icons, responsiveness
Perceived Usability	Ease of use, efficiency, satisfaction

3.5 Data Collection Procedure

The data collection process was conducted in several stages. First, the questionnaire was pilot-tested with a small group of Zi.Care users to ensure clarity, relevance, and reliability of the measurement items. Revisions were made based on feedback to improve comprehensibility. Subsequently, the finalized questionnaire was distributed online to Zi.Care users through digital channels. Participants were informed about the purpose of the study and provided consent prior to completing the questionnaire. Responses were collected anonymously to ensure confidentiality and reduce response bias.

3.6 Data Analysis Technique

Data analysis was conducted using statistical software. The analysis process included:

1. Descriptive Analysis
   To summarize demographic characteristics and overall response patterns.
2. Reliability and Validity Testing
   Cronbach's alpha was used to assess internal consistency of measurement scales.
3. Inferential Analysis
   Multiple regression analysis or Structural Equation Modeling (SEM-PLS) was employed to examine the influence of visual aesthetics, navigation design, and visual interactive design on perceived usability.

Statistical significance was evaluated at a confidence level of 95%.

3.7 Ethical Considerations

Given the healthcare context of Zi.Care, ethical considerations were prioritized throughout the research process. Participation was voluntary, and respondents' identities were kept confidential. No sensitive personal health data were collected. The study adhered to ethical research principles related to digital health usability studies, ensuring transparency, data protection, and respect for user privacy.

4. ANALYSIS AND FINDINGS

4.1 Respondent Demographic Profile

From the active users of Zi. Care digital health application, 120 valid responses were gathered. The respondents were from different demographic backgrounds, thus showing the diversity of digital health users. The majority of the

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participants said that they used Zi. Care mainly for getting health information, appointment-related services, and general health monitoring.

Table 4. Demographic characteristics of respondents

Category	Description	Frequency (%)
Gender	Male	46.7
	Female	53.3
Age	18-25 years	22.5
	26-35 years	38.3
	36-45 years	25.0
	>45 years	14.2
Frequecy of use	1-2 times/week	41.7
	3-5 times/week	35.8
	>5 times/week	22.5

The demographic distribution revealed that the majority of Zi. Care users were young to middle-aged adults who showed moderate to high levels of engagement, thus making the sample appropriate for analysis of usability perception.

4.2 Descriptive Analysis of Research Variables

The researchers took the respondents' overall opinions on visual aesthetics, navigation design, visual interactive design, and perceived usability by calculating descriptive statistics. Mean values were analyzed according to a five-point Likert scale.

Table 5. Descriptive Statistics of UI Design Factors and Perceived Usability

Variable	Mean	Std. Deviation	Interpretation
Visual Aesthetics	4.18	0.52	High
Navigation Design	4.25	0.47	High
Visual Interactive	4.10	0.55	High
Perceived Usability	4.30	044	Very High

The findings showed that the interface of Zi. Care was perceived positively by the participants in general. Navigation design got the highest mean score which means that the users found the application's structure to be clear and easy to use. Perceived usability obtained the highest total score which is a sign of the users' strong belief in their being able to use Zi. Care up to the point of being very effective and comfortable.

4.3 Reliability Analysis

Reliability testing was carried out applying Cronbach’s alpha in order to check the internal consistency of measurement items. All constructs surpassed the suggested limit of 0.70, thus showing good reliability.

Table 6. Reliability Test Results

Variable	Number Of Items	Cronbach’s Alpha
Visual Aesthetics	5	0.86
Navigation Design	5	0.88
Visual Interactive	5	0.84
Perceived Usability	6	0.90

These results confirmed that the measurement instrument was reliable for analyzing UI-related perceptions in the Zi.Care context.

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4.4 Inferential Analysis: UI Design Factors and Perceived Usability

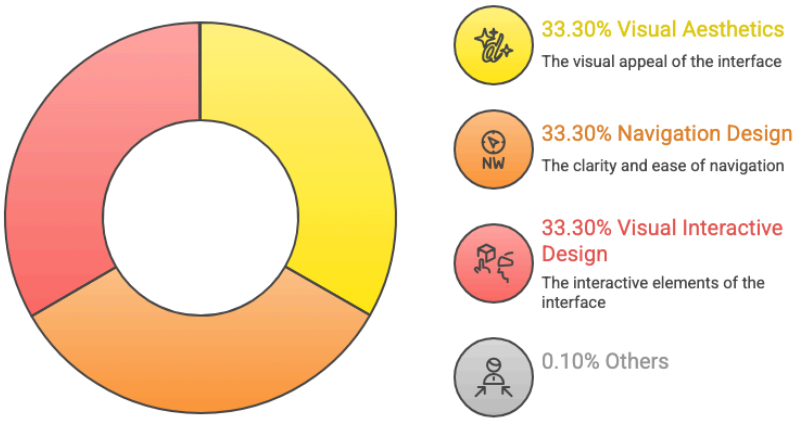

Fig. 3. Structural Model of UI Design Factors Influencing Perceived Usability
Source: Author, 2026

A conceptual path model that shows the interrelations between:

- Visual Aesthetics → Perceived Usability
- Navigation Design → Perceived Usability
- Visual Interactive Design → Perceived Usability

All paths are marked with the standardized beta coefficients (β), with navigation design being the most significant predictor, and visual aesthetics and visual interactive design following behind. The visualization made the statistical results more convincing by giving an easy and understandable depiction of the way UI design factors shared the impact on the perceived usability of the Zi. Care application.

4.5 Discussion of Key Findings

The research results indicated that UI design factors were the main contributors to perceived usability in the Zi. Care digital health platform. The navigation design emerged as the primary focus which meant that the users considered the ability to move around and the clarity of getting information as their main concerns in the use of the healthcare app. This finding was consistent with previous usability research highlighting navigation as one of the most important factors for determining perceived ease of use in complicated information systems.

The visual aesthetics were among the most important factors affecting perceived usability positively in that they made the interface more visually comfortable and less cognitively demanding. The results reinforced the view that the aesthetic quality of healthcare interfaces acts as a facilitator of usability rather than just a decoration. Consensus on this was already established among different researchers in the field when they claimed that visual interactive design was also a contributor to usability through building user trust by giving informative feedback and experiencing quick turnarounds during the performance of the health-related tasks.

In conclusion, the study revealed that the perceived usability in digital health applications was caused by a mixture of functional clarity and visual-interactive quality. The combination of these UI elements was the cornerstone of user-friendly healthcare platforms that were able to provide both efficient service and a good user perception..

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5. CONCLUSION

This study investigated the influence of user interface design factors on perceived usability within the Zi.Care digital health application, with a particular focus on visual aesthetics, navigation design, and visual interactive elements. The findings demonstrated that all three UI factors significantly contributed to users' perceptions of usability, confirming the critical role of interface design in shaping effective user experiences in digital healthcare contexts. Among the examined variables, navigation design emerged as the strongest predictor of perceived usability, followed by visual aesthetics and visual interactive design. These results indicated that users prioritized clarity, structure, and ease of movement when interacting with health-related digital platforms.

From a theoretical perspective, this study extended the application of the Technology Acceptance Model by positioning perceived usability as a design-driven construct influenced by visual and interactive interface elements. By integrating UI design variables into a TAM-based framework, the research contributed to UI and UX scholarship by highlighting the importance of visual interactive design in healthcare applications. The findings supported existing usability theories that emphasize the interplay between aesthetic quality, interaction clarity, and user perception, particularly in high-stakes domains such as digital health. Practically, the results offered several design implications for the development and refinement of the Zi.Care application. First, navigation structures should be further optimized by maintaining shallow menu hierarchies, consistent navigation patterns, and clearly labeled pathways to essential health features. Second, visual aesthetics should prioritize calm and consistent color schemes, readable typography, and balanced layouts to reduce cognitive load and enhance visual comfort, especially for users accessing sensitive health information. Third, visual interactive elements—such as feedback messages, progress indicators, and responsive interface components—should be designed to clearly communicate system status and reinforce user confidence during interaction.

In the case of Zi. Care, these implications point out that UI design should be considered a strategic element of the healthcare service delivery process instead of just a secondary aesthetic. The improvement with visual interactivity and navigation is more user-friendly, thus, faster user interactions, fewer errors and better users' trust in the platform altogether. Such improvements become very essential for user retention and supporting the whole digital health service adoption process. Notwithstanding its merits, this piece of research came with some limitations. The study relied on subjective usability evaluations rather than direct clinical outcome measures or task performance, and the population was restricted to the active users of Zi. Care. One possible direction for further research is to conduct cross-sectional studies with other apps, qualitative methods for deeper user experiences, and so on. It may also be interesting for future research to examine the role of emotional and cognitive factors as mediators between UI design and usability perception. To sum up, this research has pointed out how crucial user interface design is to improve users' perception of the usability of digital health platforms. Along with visual aesthetics, navigation design and the very interactive elements, the study has practically and theoretically contributed to the user-centered healthcare applications design, viz. Zi. Care. The results have confirmed that a good UI design is a prerequisite for a usable, trustworthy and lasting digital health solution.

ACKNOWLEDGEMENTS/FUNDING

The authors are immensely thankful to all the study participants who contributed their insights through responses, and thus, they express their gratitude. To the Zi. Care development and management team, who collaborated with the authors and provided the main support during the data collection process, special gratitude is extended. The authors also hold the contribution of colleagues and academic peers who provided constructive feedback during the development of the research and instrument design up as their acknowledgments. This research was not backed by any specific grants from funders in the public, commercial, or not-for-profit sectors.

CONFLICT OF INTEREST STATEMENT

Authors declared that the research was done without any financial or commercial connection which may be conceived as a potential conflict of interest. The researchers also confirmed that there was no competing interest associated with this study.

AUTHORS' CONTRIBUTIONS

Rully Sumarlin: Conceptualization, methodology, formal analysis, investigation, writing – original draft. I Wayan Swandi: Conceptualization, methodology, validation, writing – review and editing. I Nyoman Suardina: Formal analysis, data curation, validation. Andreas Rio Adriyanto: Supervision, project administration, writing – review and editing.

DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

During the preparation of this work, the authors used ChatGPT (OpenAI) to improve language clarity and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the accuracy and integrity of the manuscript.

ETHICS STATEMENT

This study was reviewed and approved by the research ethics committee of PT.Jejaring Tiga Artha Approval Letter JTA-/005/EXT-PEN/I/2025. All procedures involving human participants were conducted in accordance with the ethical standards of the 1964 Helsinki Declaration. Informed consent was obtained from all participants prior to data collection, and data anonymity and confidentiality were strictly maintained throughout the study.

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