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The Impact of Microinteractions on User Experience in Hospital Mobile Apps: Findings from UEQ-S Evaluation

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Abstract

The development of hospital mobile applications requires attention not only to functional performance but also to the quality of user experience (UX), particularly in supporting efficient and clear interactions. Microinteractions have been widely recognized as design elements that can enhance system responsiveness, interaction clarity, and user engagement. This study aims to evaluate the impact of microinteraction implementation on user experience in a hospital mobile application prototype. The study employed a quantitative, post-test–only evaluation design using a single application prototype developed with integrated microinteraction features. User experience was assessed through questionnaire-based evaluation using the User Experience Questionnaire Short version (UEQ-S), complemented by task-based testing using the Maze platform to capture interaction behavior. A total of 14 respondents participated in the questionnaire evaluation, with a subset of respondents involved in the task-based testing. The findings indicate that the implemented microinteraction elements contribute positively to user experience by supporting task efficiency, interaction clarity, and system responsiveness. Task-based results further demonstrate that users are generally able to complete key interaction flows successfully, while also revealing specific interaction points that can be refined to improve usability. This study confirms that well-designed microinteractions play an important role in enhancing user experience in hospital mobile applications and highlights the value of combining subjective and behavioral evaluation methods in early-stage prototype assessment.

Keywords: microinteraction, user experience, hospital mobile applications, UEQ-S, task-based evaluation

1. Introduction

The use of information technology, particularly through mobile applications, has become a vital element in the transformation of healthcare services. Hospitals rely on user-friendly information systems to ensure optimal patient care [1], [2]. In this context, User Experience (UX) has emerged as a critical factor influencing the success and acceptance of mobile applications, especially in the fast-paced hospital environment [3], [4].

Along with the advancement of digital technology, design strategies that focus on improving user interaction are increasingly utilized to analyze user behavior patterns, personalize services, and improve system responsiveness [5]-[7].

Despite the importance of UX, many hospital mobile applications still face challenges in optimizing interface design and interaction quality [8], [9]. Limitations in usability, clarity, and interaction flow can affect users' ability to complete tasks efficiently. Therefore, improving UX in hospital mobile applications has become an urgent need that requires innovative design solutions [10], [11].

As shown in Figure 1, Indonesia ranks third globally in health app utilization according to the Statista Global Consumer Survey 2020 [12], reflecting the high adoption and public acceptance of health technology. This achievement marks the crucial role of mobile health apps in meeting healthcare needs in Indonesia, particularly in the face of the impact of the COVID-19 pandemic. This success also opens up opportunities for

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developing more adaptive systems through the use of data analytics and machine learning-based approaches to improve user interaction quality and satisfaction.

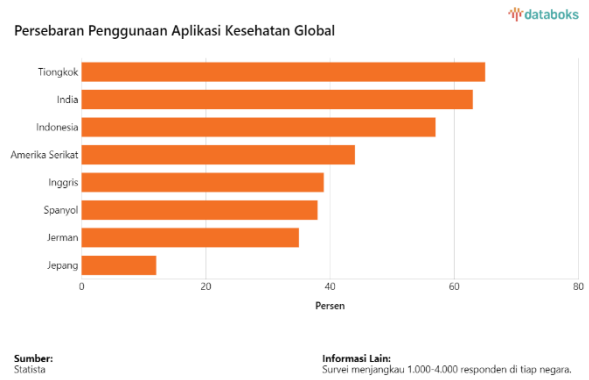

Figure 1. Distribution of Global Health App Usage (*source :* https://www.statista.com/chart/23161/health-app-usage-country-comparison/)

The application of microinteractions is considered an innovative approach with the potential to improve user experience [13], [14]. Microinteractions emphasize small details in interface design, such as animated feedback, notifications, or visual transitions, that can enrich the user experience [15], [16]. From an intelligent systems perspective, microinteractions can also be understood as valuable interaction data points to further analyze to understand user behavior [17]. However, while this research focuses on the application of the microinteraction concept, its existence remains relevant in the broader application development ecosystem that emphasizes personalization and adaptation.

In this context, this study aims to explore the potential of implementing microinteractions to improve the user experience in hospital mobile applications. By understanding and analyzing the impact of integrating these concepts, it is hoped that this study can provide design guidelines that can be adopted by healthcare application developers to achieve sustainable UX improvements, while also opening up further development opportunities towards adaptive systems based on intelligent analytics.

2. Research Methods

2.1 *Research Stages*

This study uses a quantitative approach to collect and analyze data.

2.1.1 *Problem Identification & Research Focus*

This stage focuses on identifying UX issues in hospital mobile applications, particularly related to interface design and user interaction flow. The research emphasizes evaluating microinteractions as the primary variable influencing user experience.

2.1.2 *Literature Review*

A literature review was conducted to obtain in-depth understanding of UX concepts and microinteractions in mobile healthcare applications [18], [19]. The review also includes best practices in interaction design and usability evaluation.

2.1.3 *Design and Testing*

This stage is crucial in evaluating the effectiveness of microinteraction implementation.

2.1.3.1 *Sampling and Respondent Recruitment*

This study employed a purposive sampling technique to recruit respondents who were relevant to the research objectives. Participants were selected based on their potential or actual experience in interacting with mobile applications, particularly hospital appointment booking applications.

Respondents were recruited through online distribution of questionnaires and voluntarily participated in evaluating the proposed application interface. This approach ensured that the collected data reflected user perceptions derived from realistic interaction contexts.

The inclusion criteria for respondents were defined as follows: individuals aged between 17 and 40 years, individuals who had either prior experience or no prior experience using hospital appointment booking applications, and individuals acting as end-users or patients. Furthermore, these criteria were established to capture diverse user perspectives while maintaining relevance to the application domain.

A total of 14 respondents participated in this study. The sample size was considered sufficient, as this research focused on user experience evaluation using the UEQ-S instrument, which is commonly applied in exploratory and formative usability studies.

In user experience research, a relatively small number of participants is adequate to identify dominant usability and experience patterns, particularly when the goal is to evaluate interaction quality rather than to perform statistical generalization. Therefore, the selected sample size was deemed appropriate for achieving the research objectives.

2.1.3.2 *Experimental Design and Procedure*

This study employed a post-test–only experimental design using a single mobile application prototype. The evaluation was conducted after the implementation of microinteraction elements, without administering a pre-test measurement. This design was chosen to focus

on users' immediate perceptions after interacting with the prototype and is commonly used in exploratory user experience evaluation studies.

The object of evaluation was a hospital appointment booking mobile application prototype developed using Figma. The prototype incorporated several microinteraction elements, including animated feedback, visual transitions, and responsive interface behaviors.

During the evaluation session, respondents were first introduced to the application context and objectives. They were then asked to interact with the prototype following predefined tasks. After completing the interaction session, respondents filled out the User Experience Questionnaire Short version (UEQ-S) to evaluate their experience with the application.

2.1.3.3 *Task Design and Evaluation Metrics*

Respondents were instructed to perform a set of predefined tasks designed to simulate typical user activities in a hospital appointment booking application. These tasks included navigating the main interface, accessing appointment scheduling features, and observing system feedback during interaction. The tasks were designed to ensure that respondents experienced the microinteraction elements embedded in the interface.

User experience evaluation was conducted using the User Experience Questionnaire Short version (UEQ-S). The instrument measures two primary dimensions of user experience, namely Pragmatic Quality, which reflects usability and task support, and Hedonic Quality, which reflects emotional and aesthetic aspects of interaction. An overall user experience score was also calculated based on these dimensions.

The collected data were analyzed quantitatively to assess users' perceptions of the prototype following the implementation of microinteractions.

2.1.3.4 *Data Collection*

Data collection includes benchmarking existing applications, capturing user perception data through the UEQ questionnaire, and performing task-based testing. The collected data is analyzed using descriptive statistics based on UEQ-S output..

2.1.3.5 *Design Prototype*

A prototype implementing microinteractions was developed using Figma. The added microinteractions include animated feedback, visual transitions, and responsive UI elements.

The microinteraction elements implemented in the application prototype focused on providing immediate feedback, improving interaction clarity, and supporting smooth task completion. The implemented microinteractions include button animation feedback, loading indicators, selection highlight feedback, and form input feedback [20].

Each microinteraction was triggered by user actions or system responses and was designed with a specific user experience objective, particularly to enhance pragmatic quality by improving usability, clarity, and efficiency during the appointment reservation process. Table 1 presents the operationalization of the implemented microinteraction features.

Table 1. Operationalization of Microinteraction Features

No	Feature	Interface Location	Trigger	UX Objective
1	Button animation feedback	Action buttons (e.g., *Next*, *Confirm*, *Boo k Appointment*)	User taps a button	To provide immediate feedback that user input has been registered, reducing uncertainty and improving perceived system responsiveness
2	Loading indicator	Data loading and appointment confirmation screens	System processes user request	To communicate system status during waiting time and prevent user confusion
3	Selection highlight feedback	Polyclinic, doctor, schedule, and payment option lists	User selects an option	To clearly indicate selected items, reduce misselection, and support efficient task completion
4	Form input feedback	Appointment and payment selection forms	User completes or changes form input	To guide users through the reservation process and enhance clarity during data entry

2.1.3.6 *Test Tool Development*

The primary instrument is the UEQ, which measures attractiveness, clarity, efficiency, and overall user satisfaction (Hinderks et al., 2019; Schrepp et al., 2014)
.

2.1.3.7 *Testing*

Testing was conducted after implementing microinteractions, involving 14 randomly selected participants. Data was analyzed quantitatively to understand changes in user perception.

2.1.4 *Discussion and Presentation of Results*

Data analysis focuses on comparing user experience perceptions after microinteractions are implemented.

2.1.5 *Conclusions and Recommendations*

Conclusions are based on the effectiveness of microinteractions in improving UX and recommendations for further interface design enhancement.

2.2 *Research Ethics*

All user data was analyzed in aggregate and anonymously.

3. Results and Discussion

3.1 *Respondent Characteristics*

A total of 14 respondents participated in this study after the data screening process. Based on age distribution, most respondents were in the 26–40 years age group, accounting for 10 participants (71%), while the remaining 4 respondents (29%) were aged between 17–25 years.

In terms of gender, the respondents consisted of 9 females (64%) and 5 males (36%). Regarding prior experience with hospital appointment booking applications, 9 respondents (64%) reported having used similar applications, while 5 respondents (36%) had no prior experience.

Table 2. Respondent Characteristics

Characteristic	Category	Frequency
Age	17–25 years	4
	26–40 years	10
Gender	Female	9
	Male	5
User Role	Patient / End-user	14
Experience with Similar Hospital Apps	Experienced	9
	Not Experienced	5
Total Respondents		**14**

All respondents in this study were categorized as patients or end-users, as the evaluation focused on user experience in interacting with a hospital mobile application prototype. This respondent profile indicates that the collected data is appropriate and relevant for assessing the impact of microinteraction design on user experience in hospital mobile applications.

3.2 *Data Collection*

Benchmarking of GoJek and GoPay applications showed that microinteractions act as instant feedback mechanisms that help clarify system status and improve user engagement.

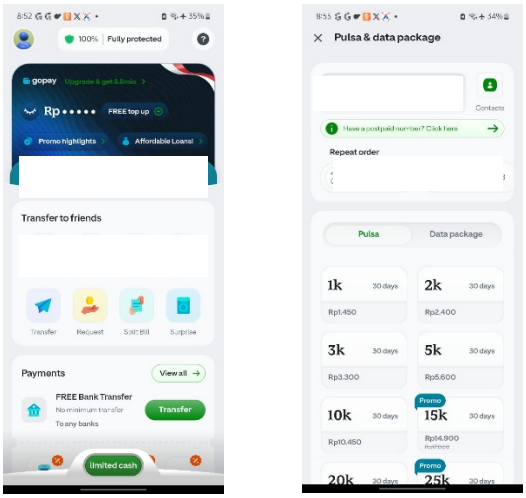

Figure 2. Example of GoPay Mobile Application that implements Microinteraction

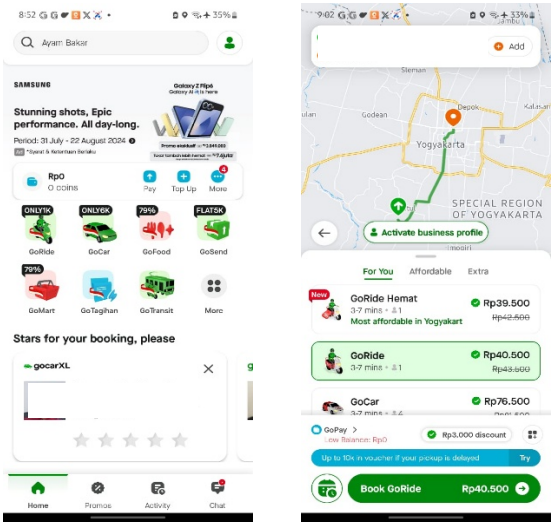

Figure 3. Example of GoJek Mobile Application that implements Microinteraction

3.3 *Prototype Design*

The prototype included microinteractions such as button animations, loading transitions, and subtle motion feedback, which help users understand system responses intuitively.

Therefore, although this research focuses on quantitative UX evaluation using UEQ, the developed microinteraction design remains relevant within the framework of developing future data-driven adaptive systems.

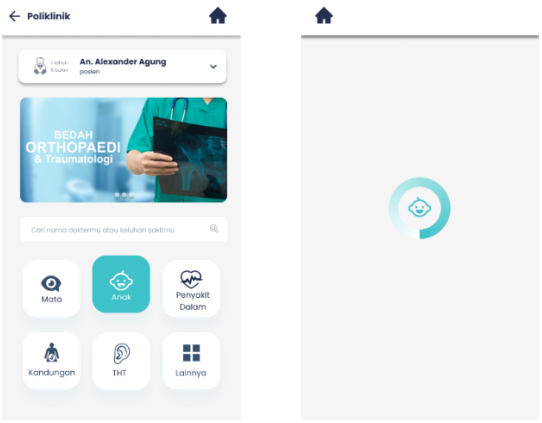

Figure 4. Prototype results with the addition of Microinteraction

3.4 *Test Tool Development*

UEQ-S was used to evaluate Pragmatic and Hedonic qualities based on 14 respondents. Variation in mean and standard deviation indicates the range of user perceptions.

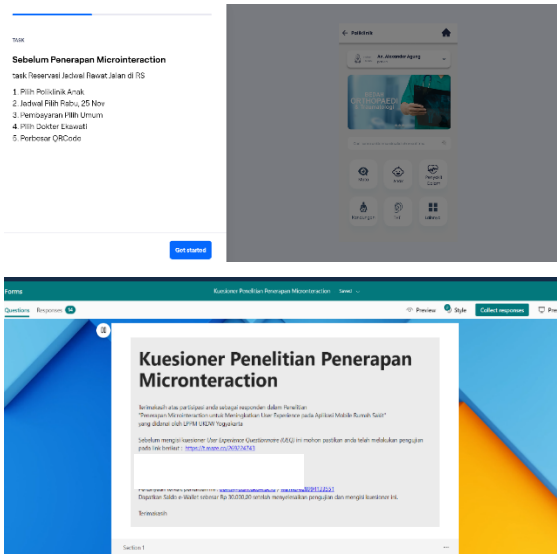

Figure 5. Maze Testing Tool and Short UEQ Questionnaire

3.5 *Testing*

The testing involved 14 participants, from a data-driven analytical perspective, variations in variance and standard deviation values for each item indicate heterogeneity in user perceptions. From a data-driven UX perspective, this variation may indicate the existence of several distinct user experience groups for example, a group with very positive perceptions and a group with moderate perceptions. Thus, although this study used conventional statistical analysis, the resulting data has the potential for further analysis using classification or clustering techniques to identify more granular UX patterns.

3.6 *UEQ-S Evaluation Results*

3.6.1 *Descriptive Statistics and Standard Deviation*

User experience was evaluated using the User Experience Questionnaire Short version (UEQ-S), which measures Pragmatic Quality and Hedonic Quality on a scale ranging from −3 to +3. Table 3 presents the mean scores and standard deviations for each dimension.

Table 3. UEQ-S Results

UEQ Dimension	Mean	Standard Deviation (SD)	Benchmark Category
Pragmatic Quality	**2.375**	0.507	Excellent
Hedonic Quality	**2.268**	0.683	Excellent
Overall UX	**2.321**	0.565	Excellent

The Pragmatic Quality dimension achieved a mean score of 2.375 with a relatively low standard deviation, indicating that respondents consistently perceived the application as efficient and supportive for task completion. Similarly, the Hedonic Quality dimension obtained a mean score of 2.268, with a moderate standard deviation, suggesting generally positive emotional and aesthetic impressions with some variation in user perceptions.

The relatively low variability across both dimensions indicates a stable and consistent user experience among respondents following the implementation of microinteraction elements.

3.6.2 *UEQ Benchmark Interpretation*

To further interpret the UEQ-S results, the mean scores were compared against the official UEQ benchmark. According to the benchmark classification, values above 1.5 indicate a positive user experience, while values above 2.0 are considered excellent.

The obtained Pragmatic Quality score (2.375) and Hedonic Quality score (2.268) both fall within the excellent category, indicating that the evaluated prototype performs very well compared to a large set of previously evaluated products. This result suggests that the implemented microinteractions effectively enhance both functional usability and emotional engagement in the hospital mobile application.

3.7 *Task-Based Evaluation Using Maze*

3.7.1 *Task Metrics Results*

The task-based evaluation focused on an outpatient appointment reservation scenario. While a total of 14 respondents participated in the questionnaire-based

evaluation, 9 respondents took part in the Maze task-based testing.

Table 4. Maze Task Metrics Results

Metric	Value
Total Respondents (Questionnaire)	14
Respondents Participating in Maze Task	9
Average Task Duration	32.3 seconds
Task Success Rate	88.9%
Drop-off Rate	11.1%
Misclick Rate	39.1%

The Maze results show an average task completion duration of 32.3 seconds and a task success rate of 88.9%, indicating that most participants were able to complete the reservation process successfully. A drop-off rate of 11.1% was observed, while the misclick rate reached 39.1%, suggesting that some interaction elements caused user hesitation or incorrect selections.

3.7.2 *Interpretation of Task Performance*

The task-based evaluation results provide behavioral insights that complement the questionnaire-based user experience assessment. The high task success rate (88.9%) indicates that most participants were able to complete the outpatient appointment reservation process successfully, suggesting that the overall interaction flow is understandable and supports task completion.

The average task duration of 32.3 seconds reflects a relatively efficient interaction process for a multi-step reservation task, indicating that users can navigate the interface without excessive time or effort. This finding aligns with the high Pragmatic Quality score obtained from the UEQ-S evaluation, which reflects perceived efficiency and task support.

However, the observed misclick rate (39.1%) suggests that certain interface elements or interaction cues may have caused user hesitation or incorrect selections. While these misclicks did not significantly affect overall task success, they indicate opportunities for further refinement, particularly in improving visual clarity, feedback timing, or affordance of interactive elements.

Overall, the Maze task metrics support the UEQ-S results by demonstrating that the implemented microinteraction elements facilitate successful task completion while highlighting specific interaction points that could be optimized to further enhance user experience.

3.8 *Discussion*

This study examined the impact of microinteraction implementation on user experience in a hospital mobile application prototype by combining questionnaire-based evaluation (UEQ-S) and task-based testing (Maze). The findings indicate that microinteractions contribute positively to both perceived user experience and observed interaction performance [21], [22].

The excellent Pragmatic Quality score obtained from the UEQ-S evaluation suggests that the implemented microinteractions support task completion by providing clear feedback, improving interaction clarity, and reducing user uncertainty. These findings are consistent with prior studies highlighting the role of microinteractions in enhancing usability and perceived system responsiveness [23].

The Hedonic Quality score also reached an excellent level, indicating that users experienced positive emotional and aesthetic impressions while interacting with the prototype. However, the slightly lower hedonic score compared to pragmatic quality suggests that the primary strength of the current microinteraction design lies in functional support rather than emotional engagement. This indicates opportunities for further enhancement through more expressive or engaging interaction elements in future iterations.

The task-based evaluation using Maze complements the UEQ-S results by providing behavioral evidence of interaction quality. The high task success rate demonstrates that users were generally able to complete the outpatient appointment reservation process successfully, supporting the perceived efficiency reported in the UEQ-S results.

Nevertheless, the observed misclick rate indicates that certain interaction elements may still cause hesitation or incorrect selections. While these misclicks did not prevent task completion, they highlight areas where visual cues, affordances, or feedback timing could be refined. This finding underscores the importance of combining subjective and behavioral evaluation methods to obtain a more comprehensive understanding of user experience performance.

Overall, the integration of UEQ-S and Maze testing provides a triangulated view of user experience [24], showing that microinteractions enhance both perceived usability and actual interaction behavior. These results suggest that well-designed microinteractions play a meaningful role in supporting efficient, clear, and engaging interactions in hospital mobile applications.

3.9 *Research Output*

In addition to its contributions to the field of interaction design and UX, this research offers practical guidance for designing hospital mobile applications that emphasize clarity, responsiveness, and user engagement through microinteractions. The quantitative results provide evidence that carefully designed microinteractions such as animated feedback, smooth transitions, and responsive UI elements support better

task completion (pragmatic quality) and enhance positive feelings toward the interface (hedonic quality).

These findings can be used as design references and evaluation criteria for subsequent iterations in similar projects, particularly to determine which microinteraction elements most strongly influence perceived efficiency, clarity, and enjoyment. Future work can deepen these insights by expanding participant diversity, comparing different microinteraction patterns, and examining long-term usage effects on user satisfaction and retention.

4. Conclusion

This study investigated the application of microinteraction design in a hospital mobile application prototype and its impact on user experience. By combining questionnaire-based evaluation using UEQ-S and task-based testing using Maze, the study provides a comprehensive assessment of both users' perceived experience and observed interaction behavior.

The findings indicate that the implemented microinteraction elements contribute positively to user experience, particularly in supporting task efficiency, interaction clarity, and system responsiveness. Microinteractions such as button feedback, loading indicators, selection highlights, and form input feedback help reduce user uncertainty and support smooth task completion during the outpatient appointment reservation process. These results suggest that microinteractions function not merely as visual enhancements, but as meaningful interaction mechanisms that strengthen pragmatic aspects of user experience.

From a behavioral perspective, the task-based evaluation demonstrates that users are generally able to complete reservation tasks successfully, reinforcing the perception of usability identified through the UEQ-S evaluation. At the same time, the presence of interaction errors highlights that microinteraction design still requires careful refinement, particularly in terms of visual affordance and feedback timing, to further minimize user hesitation.

Overall, this study confirms that well-designed microinteractions play an important role in improving user experience in hospital mobile applications by enhancing clarity, responsiveness, and interaction flow. The combination of subjective and behavioral evaluation methods offers a robust approach for assessing interaction quality in early-stage prototypes.

Future research is recommended to explore more diverse microinteraction patterns, involve a broader range of users, and examine long-term usage scenarios. Further studies may also investigate adaptive or data-driven microinteraction designs to support personalization and continuous improvement of user experience in healthcare applications.

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