International Journal of Health Literacy and Science 4 (1) (2026)
International Journal of Health Literacy and Science
https://ihelis.com

Factors Influencing the Acceptance of the Hallobumil Application in Semarang City

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Article Info

Article History

Submitted: October 14, 2025

Revised: November 28, 2025

Accepted: April 1, 2026

Keywords:
Hallobumil Application; Intention to Use; Pregnant Women: Self-Efficacy; Technology Acceptance Model

Abstract

The Maternal Mortality Rate (MMR) in Semarang City increased from 67.25 per 100,000 live births in 2022 to 68.5 per 100,000 live births in 2023. The HalloBumil application is designed to support maternal health through education and relevant information. This study aims to analyze the factors influencing the acceptance of the HalloBumil application in Semarang City. A quantitative research design with a cross-sectional approach was employed. The variables measured were based on the Technology Acceptance Model (TAM), including Self-Efficacy, Perceived Usefulness, Perceived Ease of Use, Attitude, and Behavioral Intention. Data were collected through face-to-face interviews using questionnaires with 390 pregnant women receiving antenatal care at 15 community health centers in Semarang City. The research locations were selected using stratified random sampling. Data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS) with SmartPLS 4. The results showed that the majority of respondents were aged 35–50 (76.4%), had completed senior high school (57.0%), were housewives (58.5%), earned more than the regional minimum wage (63.65%), and received health information from healthcare workers (73.8%). Self-efficacy had a significant effect on perceived usefulness ($\beta = 0.788$; $p < 0.001$). Perceived usefulness significantly influenced behavioral intention to use the HalloBumil application ($\beta = 0.318$; $p < 0.001$). These findings indicate that self-efficacy and perceived usefulness are key factors influencing pregnant women's acceptance of the HalloBumil application in Semarang City. Enhancing self-efficacy and perceived usefulness may increase the acceptance of mobile health applications such as HalloBumil, potentially leading to improved maternal health outcomes.

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pISSN 2964-2035
eISSN 3025-9258

Introduction

Maternal mortality remains a serious public health problem, particularly in low-income countries, where the maternal mortality ratio (MMR) reaches 430 per 100,000 live births, significantly higher compared to high-income countries, which report only 13 per 100,000 live births. In Indonesia, the MMR is reported at 189 per 100,000 live births (Badan Pusat Statistik, 2020). In Semarang City, the MMR increased from 67.25 in 2022 to 68.5 per 100,000 live births in 2023, indicating an upward trend (Dinas Kesehatan Kota Semarang, 2022)(Dinas Kesehatan Kota Semarang, 2023). This rising trend highlights the urgency of addressing maternal health issues in Semarang, making the city a strategic location for this study. One contributing factor to the high maternal mortality rate is the limited knowledge of pregnant women regarding antenatal and maternal health. Inadequate access to reliable health information may reduce their intention to maintain health during pregnancy. The HalloBumil application is designed to support maternal health by providing education and information for pregnant women. Therefore, applications such as HalloBumil are expected to enhance maternal knowledge during pregnancy.

HalloBumil is the first pregnancy application in Indonesia, designed to accompany mothers during pregnancy preparation, throughout pregnancy, and into child development. The application is presented in the Indonesian language and delivers information in an engaging format. Its features include a fertility calendar that helps record menstrual cycles, estimate fertile periods, and provide pregnancy tips; a pregnancy timeline that offers daily updates according to gestational age; and expert-guided information relevant to maternal and child health (Hallobumil, 2024). As of November 2024, the number of downloads of HalloBumil on the Google Play Store has reached 1 million. With 19,000 user reviews, the majority of which are positive, the application has received a rating of 4.0 out of 5.0 (Google Play Store, 2024). The high number of downloads and positive reviews indicate the strong potential of this application to continue developing and providing increasingly relevant features for a broader range of users. Figures 1 and 2 show the user interface of the HalloBumil application.

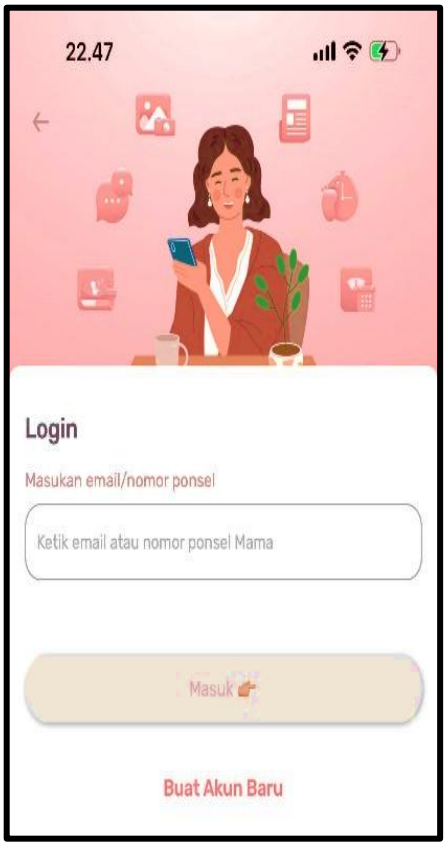

Figure 1.
Login or Register Page

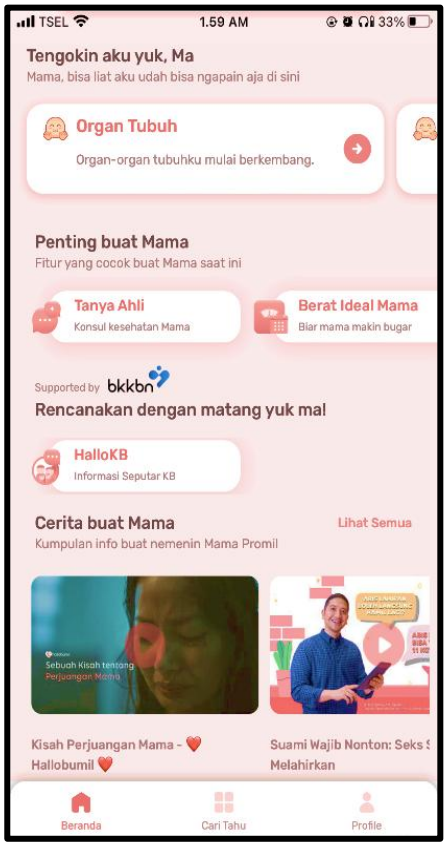

Figure 2.
Home Screen of the HalloBumil Aplication

Previous studies on the HalloBumil application have examined user satisfaction levels and their influence on the psychological condition of pregnant women after using the application. The findings

revealed that aspects of usefulness, information quality, and service interaction within HalloBumil positively affected user satisfaction. Moreover, the interactive features of the application were shown to help reduce anxiety levels experienced by pregnant women (Rahayu et al., 2020)(I. Sari et al., 2023). However, these studies mainly focused on user satisfaction, while little is known about the factors influencing user acceptance based on the Technology Acceptance Model (TAM). This study extends prior research by examining the roles of self-efficacy, perceived usefulness, perceived ease of use, and attitude in shaping pregnant women's intention to use HalloBumil in Semarang City.

In line with this, a study conducted in Jayapura Regency, Papua Province, employed the Technology Acceptance Model to evaluate telescreening innovations for high-risk pregnant women. The study found that 77% of respondents perceived the technology as useful (perceived usefulness), and 76% reported a strong intention to use it, emphasizing that maternal technology acceptance is strongly influenced by perceived usefulness (Kurniawan & Al Farabi, 2024). Nevertheless, the effectiveness of HalloBumil ultimately depends on the extent to which pregnant women can accept the technology, perceive its benefits, and engage with it.

The Technology Acceptance Model (TAM) has been widely used to understand the factors influencing technology adoption. The core constructs of TAM include Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, and Behavioral Intentions to Use (Scherer et al., 2019). In this study, TAM was extended by incorporating self-efficacy as an external variable, referring to an individual's belief in their ability to use the HalloBumil application. This extension aligns with Davis (1985), who stated that external variables could influence perceived usefulness (PU) and perceived ease of use (PEOU). Therefore, self-efficacy is positioned as a variable that affects both perceived usefulness and ease of use, which subsequently shape attitudes and intentions toward application use.

This conceptual framework is supported by recent research findings indicating that self-efficacy is a critical factor influencing both perceived usefulness and perceived ease of use, which in turn drive user attitudes and intentions (Andriani & Winarno, 2022)(Muslichah, 2018)(Al Darayseh, 2023). Accordingly, this study aims to analyze the influence of self-efficacy, perceived usefulness, perceived ease of use, and attitude on pregnant women's intention to use the HalloBumil application in Semarang City.

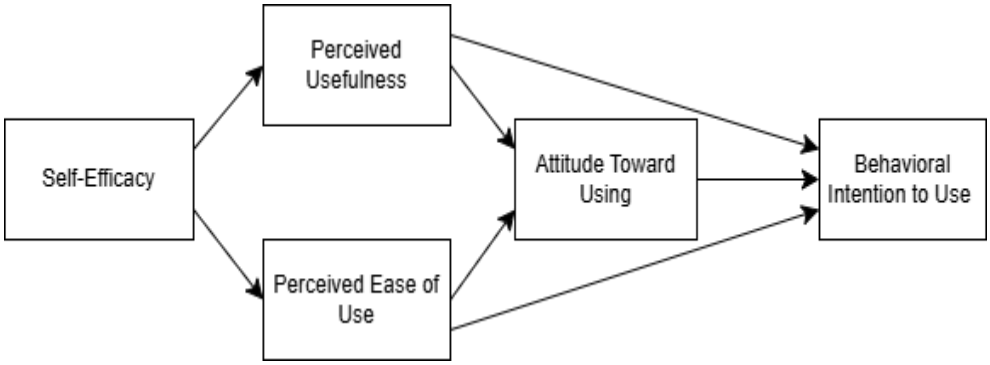

Figure 3. Conceptual Framework (Davis, 1985)

Methods

This study employed a quantitative research design using a cross-sectional survey. The study was conducted from January to March 2025 in Semarang City. The sampling method used for determining the research locations was stratified random sampling. The study population consisted of all pregnant women in Semarang City, totaling 21,375 individuals, based on the 2023 Health Profile of the Semarang City Health Office (Dinas Kesehatan Kota Semarang, 2023). A total of 390 respondents were selected using the Isaac and Michael table, with a 95% confidence level and a 5% margin of error.

The inclusion criteria for this study were pregnant women residing in Semarang City, attending antenatal care at one of the 15 selected public health centers in Semarang City, having used the HalloBumil application at least once, and willing to participate in a structured interview based on the prepared questionnaire. The exclusion criterion was pregnancy, as specific health conditions prevented women from participating in the interview process. Data collection was carried out through face-to-face interviews using a structured questionnaire that had been tested for validity and reliability.

This study applied the Technology Acceptance Model (TAM) framework, including Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, and Behavioral Intention to Use. In addition, Self-

Efficacy was added as an external variable. The questionnaire instruments were adapted from previously validated instruments. The Self-Efficacy instrument referred to (Schwarzer, 1995), translated by (Novrianto et al., 2019)Construct validity tests yielded t-values greater than 1.96 for all items, indicating that the instrument is valid for measuring self-efficacy comprehensively. This instrument consisted of 10 items. The Perceived Usefulness instrument was adapted from Davis 1989, translated by Jogiyanto in his book Sistem Informasi Keperilakuan (Jogiyanto, 2007), and consisted of 12 items. The Perceived Ease of Use instrument was also based on Davis 1989, translated by (Jogiyanto, 2007), with 12 items. The Attitude Toward Using the Instrument was adapted from (Moon & Kim, 2001), proven to be of high quality with a factor loading value of 0.50, indicating that each item significantly contributes to measuring attitudes, and a Cronbach's alpha value of 0.8755, indicating excellent reliability. This instrument consisted of 8 items. Finally, the Behavioral Intention to Use instrument was adapted from (Lai & Li, 2005), which demonstrated good reliability with a Cronbach's alpha of 0.94 and confirmed validity. This instrument consisted of 6 items.

The collected data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) to test the research hypotheses. SEM-PLS was employed to assess predictive relationships among variables by evaluating associations or influences between constructs. This method was chosen over Covariance-Based SEM (CB-SEM) because it is better suited to exploratory research.

Results

The results showed that 390 respondents participated in this study. Table 1 presents the characteristics of the respondents (age, education, occupation, income, and sources of health information) in this study.

Table 1. Respondent Characteristics (n=390)

Variabel	Category	Frequency (F)	Percentage (%)
Age	16-20 years	9	2,3
	20-34 years	83	21,3
	35-50 years	298	76,4
Education	Elementary School	11	2,8
	Junior High School	54	13,8
	Senior High School	224	57,4
	University	201	25,9
Occupation	Laborer	1	0,3
	Housewife	228	58,5
	Private Employee	134	34,4
	Civil Servant	6	1,5
	Entrepreneur	21	5,4
Income	< Rp 3.454.827,00	142	36,4
	≥ Rp. 3.454.827,00	248	63,6
Information Access Source	Health Workers	288	73,8
	Print Media	2	0,5
	Electronic Media	1	1
	Social Media	98	26,2

The characteristics of respondents based on Table 1 show that the majority were aged between 35–50 years, comprising 298 individuals (76.4%) out of a total of 390. Most respondents had a senior high school education, with 224 individuals (57.4%). The majority were housewives, totaling 228 respondents (58.5%). In terms of income, most respondents earned ≥ Rp3,454,827.00 per month, accounting for 248 individuals (63.6%). Furthermore, the majority of respondents obtained health information through healthcare professionals, totaling 288 individuals (73.8%). Table 2 presents the coefficient of determination values for the measured variables.

Table 2. Coefficient of Determination (R^2)

	R Square	Description
Behavioral Intention to Use	0.580	Medium
Perceived Usefulness	0.621	Medium
Perceived Ease of Use	0.445	Low
Attitude Toward Using	0.570	Medium

There are three criteria for interpreting the R^2 values, namely 0.75 as strong, 0.50 as moderate, and 0.25 as weak (Hair et al., 2014). Based on Table 2, the R^2 value for Behavioral Intention is 0.580, which falls into the moderate category. This means that 58% of the variance in Behavioral Intention can be explained by other variables in this research model. The R^2 value for Perceived Usefulness is 0.621, which is categorized as moderate, indicating that 62.1% of the variance in Perceived Usefulness is explained by the model. The R^2 value for Perceived Ease of Use is 0.445, placing it in the moderate category; 44.5% of the variance in Perceived Ease of Use is explained by the model, though it is considered relatively low. Meanwhile, the R^2 value for Attitude Toward Using is 0.570, which is considered moderate, indicating that 57% of the variance in Attitude Toward Using is explained by this research model.

Table 3 presents the Cross-Validated Redundancy (Q^2) values, which indicate the predictive relevance of each measured variable.

Table 3. Cross-Validated Redundancy (Q^2)

	Q^2 (=1-SSE/SSO)
Behavioral Intention to Use	0.323
Perceived Usefulness	0.349
Perceived Ease of Use	0.269
Attitude Toward Using	0.319

A Q^2 value greater than 0 indicates that the model has good predictive relevance (Hair et al., 2014). Based on Table 3, the results of the Q^2 test show that all Q^2 values for each variable exceed 0. According to this criterion, the model possesses predictive relevance. Table 4 presents the F^2 values to determine the influence of variables.

Table 4. Effect Size (F^2)

	Behavioral Intention to Use	Perceived Usefulness	Perceived Ease of Use	Attitude Toward Using
Self-Efficacy		1.640	0.802	
Perceived Usefulness	0.080			0.445
Perceived Ease of Use	0.046			0.028
Attitude Toward Using	0.109			

There are three criteria for interpreting F^2 values: 0.02 indicates a small effect, 0.15 indicates a medium effect, and 0.35 indicates a large effect (Hair et al., 2014). Based on the F^2 analysis results in Table 4, the effect of Self-Efficacy on Perceived Usefulness is 1.640, which falls in the large effect category. Similarly, the effect of Self-Efficacy on Perceived Ease of Use is 0.802, also classified as a large effect. The effect of Perceived Usefulness on Behavioral Intention to Use has an F^2 value of 0.080, which is considered small. Furthermore, the effect of Perceived Usefulness on Attitude Toward Using is 0.445, representing a large effect. The effect of Perceived Ease of Use on Behavioral Intention to Use is 0.046 and on Attitude Toward Using is 0.028, both considered small effects. Finally, the effect of Attitude Toward Using on Behavioral Intention to Use is 0.109, also categorized as a small effect. These results indicate that Self-Efficacy has a dominant influence on respondents' perceptions of the application's use, while the effects of other variables range from small to large.

Figure 4 presents the path analysis depicting the Path Coefficients in the Structural Equation Modeling (SEM) of this study. The path coefficient values and their significance between variables are presented in Table 5.

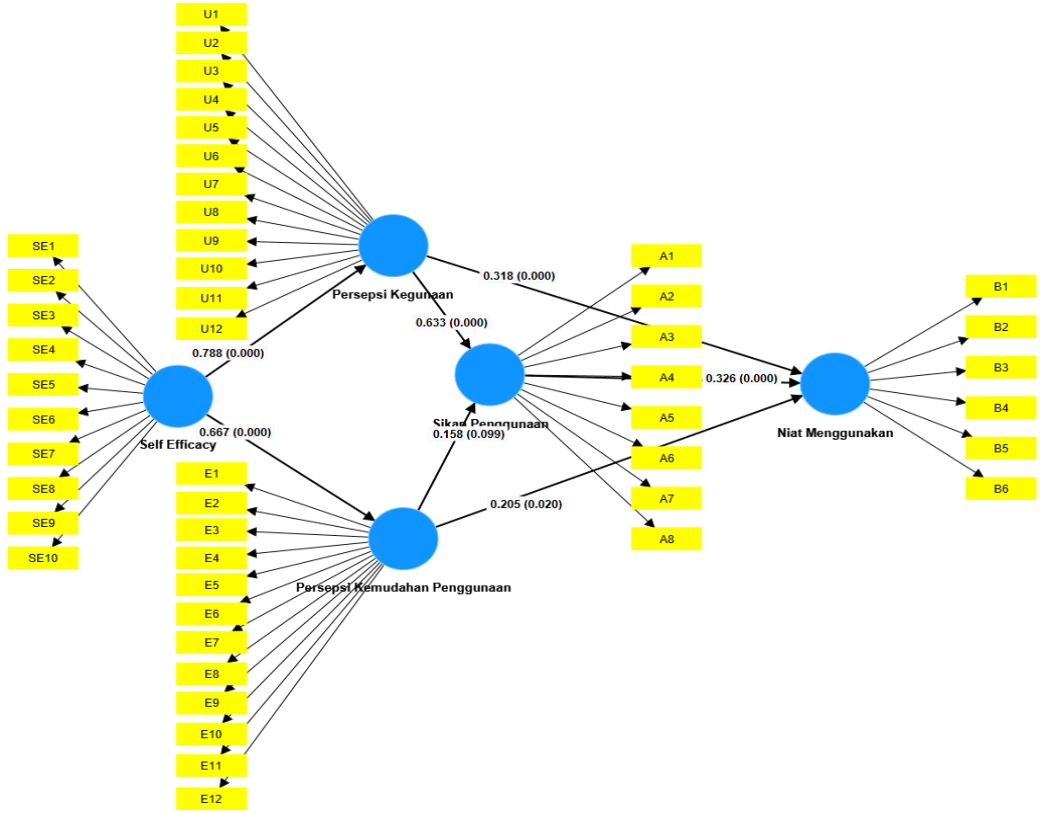

Figure 4. Path Coefficients

Table 5. Path Coefficients (Hypothesis Results)

		Original Sample (O)	*Sample Mean* (M)	*T Statistics* (|O/STDEV|)	*P Values*
H1	*Self-Efficacy* -> Perceived Usefulness	0.788	0.790	25.894	**0.000***
H2	*Self-Efficacy* -> Perceived Ease of Use	0.667	0.669	9.754	**0.000***
H3	Perceived Usefulness -> Behavioral Intention to Use	0.318	0.308	3.750	**0.000***
H4	Perceived Usefulness -> Attitude Toward Using	0.633	0.626	8.130	**0.000***
H5	Perceived Ease of Use -> Behavioral Intention to Use	0.205	0.208	2.332	**0.020***
H6	Perceived Ease of Use -> Attitude Toward Using	0.158	0.167	1.650	0.099
H7	Attitude Toward Using -> Behavioral Intention to Use	0.326	0.332	4.361	**0.000***
H8	Perceived Usefulness -> Attitude Toward Using -> Behavioral Intention to Use	0.205	0.208	3.509	**0.000***

**Significant at p < 0.05*

The hypothesis testing results indicate that most relationships between variables are statistically significant. Self-Efficacy has a positive and significant effect on both Perceived Usefulness and Perceived Ease of Use, while Perceived Usefulness significantly influences Behavioral Intention to use and Attitude Toward Using. Perceived Ease of Use is also found to have a positive and significant effect on Behavioral

Intention to Use, and Attitude Toward Using has a positive and significant effect on Behavioral Intention to Use. Furthermore, Perceived Usefulness significantly affects Behavioral Intention to Use through the mediation of Attitude Toward Using. Conversely, Perceived Ease of Use does not have a significant effect on Attitude Toward Using. Therefore, it can be concluded that the majority of the research hypotheses are supported, except for the relationship between Perceived Ease of Use and Attitude Toward Using, which is not significant.

Discussion

The Effect of Self-Efficacy on Perceived Usefulness

The results of the test indicate that self-efficacy has a significant effect on perceived usefulness ($t = 25.894$; $\beta = 0.788$; $p = 0.000$), which aligns with the findings of (Setyawan et al., 2022), stating that a high level of self-efficacy enhances the perceived usefulness of an application. The majority of respondents work as housewives (58.5%), giving them more flexible time to utilize technology-based applications (Brault et al., 2023). In addition, (57.4%) of respondents have completed senior high school, which supports their ability to understand digital information and use technology-based applications (Fan et al., 2024). The relationship between self-efficacy and perceived usefulness in this study is statistically significant and is further supported by previous research and the social characteristics of the respondents, reinforcing the importance of self-efficacy in shaping respondents' perceptions of the usefulness of the HalloBumil health application.

The Effect of Self-Efficacy on Perceived Ease of Use

The results of the test indicate that self-efficacy has a significant effect on perceived ease of use ($t = 9.753$; $\beta = 0.667$; $p = 0.000$), which is consistent with the findings of (Rosman et al., 2022), stating that the more confident individuals are in their abilities, the easier it is for them to use an application. The majority of respondents have a senior high school education background (57.4%), which enables them to better understand digital information and application features (Fan et al., 2024), Moreover, 63.6% of respondents have an income above the regional minimum wage, indicating that they are economically capable of accessing digital devices and services (Jasa Internet Indonesia, 2022). The relationship between self-efficacy and perceived ease of use is statistically significant and is supported by previous research as well as respondents' social factors, demonstrating that self-efficacy is an important factor in facilitating the use of HalloBumil

The Effect of Perceived Usefulness on Behavioral Intention to Use

The results of the test indicate that perceived usefulness has a significant effect on the behavioral intention to use the application ($t = 3.750$; $\beta = 0.318$; $p = 0.000$), which aligns with the findings of (Sanjaya, 2005), stating that the higher an individual's perception of an application's benefits, the stronger their intention to use it. The majority of respondents have a senior high school education (57.4%), enabling them to adequately understand the functions and benefits of the HalloBumil application (Fan et al., 2024), Additionally, most respondents are housewives (58.5%), indicating that they have more flexible time to utilize technology-based applications (Brault et al., 2023), The relationship between perceived usefulness and behavioral intention to use in this study is statistically significant and is supported by previous research as well as respondents' social factors, confirming the role of perceived usefulness in shaping the intention to use HalloBumil.

The Effect of Perceived Usefulness on Attitude Toward Using

The results of the test show that perceived usefulness has a significant effect on attitude toward using ($t = 8.130$; $\beta = 0.633$; $p = 0.000$), supporting the findings of (Setyawan et al., 2022)(Rosman et al., 2022)(Wulandari & Nugroho, 2025), which state that the greater the perceived benefits of an application, the more positive the users' attitudes toward the application. The majority of respondents have a senior high school education background (57.4%), enabling them to sufficiently understand the functions and benefits of the HalloBumil application (Fan et al., 2024), Furthermore, most respondents (73.8%) obtained health information from healthcare providers, which strengthens their trust and understanding of the use of HalloBumil. This finding aligns with the view that a person's attitude is influenced not only by personal experience but also by significant others (N. Sari & Mulasari, 2017). The role of healthcare providers in delivering education and recommendations has proven to be a crucial factor in promoting the use of digital technology in healthcare and in encouraging users' readiness to access and optimize application usage (Antony et al., 2021). The relationship between perceived usefulness and attitude toward use in this study

is statistically significant, supported by prior research and respondents' social factors, thereby reinforcing the importance of perceived usefulness in shaping attitudes toward using the HalloBumil health application.

The Effect of Perceived Ease of Use on Behavioral Intention to Use

The results of the test show that perceived ease of use has a significant effect on behavioral intention to use the application (t = 2.332; β = 0.205; p = 0.020), in line with the findings of (Tahar et al., 2020), which states that the easier an application is to use, the greater an individual's intention to use it. The majority of respondents have a senior high school education background, which enables them to adequately understand the functions and benefits of the HalloBumil application (Fan et al., 2024), Furthermore, most respondents are housewives (58.5%), indicating that they have more flexible time to utilize technology-based applications (Brault et al., 2023), The relationship between perceived ease of use and behavioral intention to use in this study is statistically significant and is supported by previous studies as well as respondents' characteristics, particularly their educational background. This reinforces the importance of perceived ease of use in shaping the intention to use the HalloBumil health application.

The Effect of Perceived Ease of Use on Attitude Toward Use

The test results show that perceived ease of use does not have a significant effect on attitude toward the application's use (t = 1.650; β = 0.158; p = 0.099). This study is consistent with several previous findings (Hisamuddin & Siregar, 2024), reported that perceived ease of use had no significant effect on attitude toward use, with p-values of 0.184 and t-statistics of 1.329. Similarly, (Aini et al., 2023), found no significant effect, with a p-value of 0.087 and a t-statistic of 1.361. These studies, along with the current findings, suggest that ease of use does not necessarily foster a positive attitude toward application usage. In the context of HalloBumil, this suggests that although the application may be easy to use, other factors, such as perceived usefulness or self-efficacy, may play a more dominant role in shaping user attitudes.

The Effect of Attitude Toward Use on Behavioral Intention

The test results indicate that attitude toward use has a significant effect on behavioral intention to use the application (t = 4.361; β = 0.326; p = 0.000), consistent with the findings of (Elfirdaus et al., 2024), which states that the more positive an individual's attitude toward an application, the stronger their intention to use it. The majority of respondents were high school graduates (57.4%), which enabled them to sufficiently understand the functions and usage of the HalloBumil application (Fan et al., 2024), Furthermore, most respondents (73.8%) obtained health information from healthcare professionals, which reinforced their trust and understanding of using HalloBumil. This aligns with findings showing that a positive attitude among the community supports the emergence of appropriate health-related behaviors (Pramana et al., 2020). The role of healthcare professionals in providing education and recommendations has proven to be a key factor in enhancing the adoption of digital health technologies, as well as encouraging user readiness in accessing and optimally utilizing applications (Antony et al., 2021). Thus, the relationship between attitude toward use and behavioral intention is statistically significant, theoretically relevant, and reinforced by the respondents' social characteristics.

The Mediating Role of Attitude Toward Use between Perceived Usefulness and Behavioral Intention

The test results show that perceived usefulness has a significant effect on behavioral intention through the mediating variable of attitude toward use (t = 3.509; β = 0.205; p = 0.000), consistent with (Mulyati et al., 2023), who demonstrated that perceived usefulness exerts a positive and significant influence on the intention to use, mediated by customer attitudes. The majority of respondents were housewives (58.5%), indicating that they had more flexible time to utilize technology-based applications (Brault et al., 2023), In addition, most respondents had a high school education (57.4%), which enabled them to sufficiently understand the functions and usage of the HalloBumil application (Fan et al., 2024), Therefore, the relationship between perceived usefulness and behavioral intention mediated by attitude in this study is statistically significant, supported by previous research as well as respondents' social characteristics, thereby reinforcing the critical role of attitude in shaping behavioral intention to use the HalloBumil health application.

Conclusion

The findings of this study indicate that self-efficacy has a significant effect on perceived usefulness (β = 0.788; p = 0.000) and perceived ease of use (β = 0.667; p = 0.000). Perceived usefulness exerts a direct and positive influence on behavioral intention (β = 0.318; p = 0.000) and attitude toward use (β = 0.633; p

= 0.000), while perceived ease of use significantly affects behavioral intention (β = 0.205; p = 0.020) but not attitude (β = 0.158; p = 0.099). In addition, attitude significantly influences behavioral intention (β = 0.326; p = 0.000), and perceived usefulness also impacts intention through the mediating role of attitude (β = 0.205; p = 0.000).

Based on these findings, enhancing the usefulness of the HalloBumil application is crucial in supporting pregnant women in making informed decisions regarding their pregnancy, thereby encouraging their intention to continue using the application. A practical recommendation is to strengthen the consultation feature with healthcare professionals, allowing users to receive direct and reliable medical advice. This improvement is expected to reinforce users' perception of the application's usefulness and foster sustainable use. For future research, it is recommended to extend the model by incorporating other external variables, such as social and environmental factors, which may influence the intention to use the application.

Authors Contribution

This research article was prepared with contributions from both authors. Nabila Faradila Qutsin (NFQ), the first author, was responsible for conceptualization, methodology, data collection, data analysis, and drafting the initial manuscript. Respati Wulandari (RW), as the corresponding author, supervised the research process, provided critical input, and contributed to the review and editing of the manuscript. Both authors have read and approved the final version of this manuscript.

Funding

This research received no external funding.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board (Ethics Committee) of Dian Nuswantoro University (protocol code 01/EA/KEPK-FIKES/I/2025).

Acknowledgments

The authors would like to thank the committee of the 5th International Seminar and Workshop on Public Health Action (ISWOPHA 2025) for the opportunity and support in this publication process.

Conflicts of Interest:

The authors declare no conflict of interest.

Appendix

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