



Original Article

Effect of the Happy Mom Application on Pregnant Women's Knowledge of Fetal Development

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ABSTRACT

Background: Stimulation is crucial for development during the first 1,000 days; a lack of stimulation can lead to developmental delays. Parents' knowledge influences the stimulation they provide. One way to improve mothers' knowledge of fetal development is to provide education to pregnant women. With advances in technology, mobile apps have emerged as innovative solutions for prenatal education. Based on a survey of pregnancy apps around 2020, most of them were iOS-based. Meanwhile, the majority of users in Indonesia are Android users. Happy Mom is an Android app. The aim is to assess the impact of the education provided through Happy Mom on mothers' knowledge.

Methods: The design was a quasi-experimental, one-group pre-post test design. The sample consisted of all pregnant women who checked in at PMB Teti Herawati Palembang in 2021, were present at the time of the study, and met the inclusion and exclusion criteria. The sampling technique was non-probability sampling. Purposive sampling. The sample is 34 respondents.

Results: Of the 34 respondents (100%), there is a difference of 3 points in the median score between pre- and post-test knowledge. The maximum score increased by 1 point. The results of the statistical test show a p-value of 0.001. Education via the Happy Mom app has an effect on the knowledge of pregnant women.

Conclusion: The Happy Mom app has the potential to improve knowledge of expectant mothers. It is recommended that further studies with a more robust design be conducted.



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INTRODUCTION

One of the major challenges facing lower-middle-income countries is delayed child development; approximately 250 million children under the age of 5 are at risk of failing to reach their full developmental potential (Black et al., 2017). Various primary studies have found a prevalence of developmental delay of approximately 18.8% (95% CI: 15.5–22.1) in young children (including the cognitive and general development domains) (Wondmagegn, et al., 2024). Developmental disorders often manifest in socio-emotional patterns across various stages of early childhood, not just in cognitive aspects (Anunciacao, et al., 2026). Children are a vital element for the survival of a nation and state; therefore, fostering an exceptional generation from an early age is absolutely essential (Suharyanto, 2020).

Child development is a complex process that begins in the prenatal period and continues into adulthood (Hasanah, et al., 2020). Stimulation is crucial for development during the first 1,000 days; a lack of stimulation can lead to developmental delays (Ernawati & Solikhah, 2024). A

lack of stimulation in the early years of life can hinder the achievement of developmental milestones, so it is important to provide stimulation from the prenatal period through to a child's early years (Ratnawati, et al., 2025). Early stimulation is stimulation that begins as soon as a baby is born (ideally even from the sixth month of pregnancy) and is carried out daily to stimulate all the sensory systems (hearing, sight, touch, sense of touch, and taste) (Anggraeni, et al., 2023). Stimulation from pregnancy and the early years of life strengthens a child's ability to develop to their full potential (Hibana & Nayla, 2024).

Parental stimulation, such as a supportive home environment and positive interactions, is crucial for early cognitive development (Zain & Iswinarti, 2024). The role of parents in early childhood development is essential, as they provide the affection, support, and stimulation needed for children's optimal growth. They are key in creating a safe and supportive environment that is crucial for a child's physical, emotional, and cognitive development (Ratnawati et al., 2025).

Stimulation provided by the mother during pregnancy can influence the baby's behavioral responses after birth. This study notes that when mothers apply their knowledge of fetal stimulation (for example, through communication, music, or sensory stimulation), this correlates with changes in the neural responses of newborns, supporting the idea that stimulation from the womb influences a child's early development (Valiani & Hadialijanvand, 2021). The stimulation provided by the expectant mother to the fetus influences the emotional bond between mother and fetus, which is a vital part of the early relationship and supports the child's development even before birth (Apriani, et al., 2024).

Parents' knowledge influences the stimulation they provide, and this helps to stimulate the child's brain function, enabling it to develop more effectively (Wulandari et al., 2025). A thorough understanding enables mothers to monitor their child's development effectively and provide appropriate stimulation in line with the child's stage of development (Khairunnisa, et al., 2024).

One way to improve mothers' knowledge about fetal development is by providing education to pregnant women. Antenatal education is an important part of prenatal care. Effective education not only increases a mother's knowledge but also influences her attitudes and behaviors regarding prenatal visits, a healthy lifestyle during pregnancy, and preparation for childbirth (Zaman et al., 2025).

However, educational efforts that have traditionally relied on conventional methods such as health education sessions at healthcare facilities, leaflets, or in-person lectures have their limitations. Factors such as time, distance, and the availability of healthcare workers often limit pregnant women's access to comprehensive and up-to-date information (Roch et al., 2018).

With advances in technology, mobile apps have emerged as innovative solutions for prenatal education, providing instant access to expert-backed content, personalized reminders for prenatal check-ups, interactive symptom tracking, and tailored resources based on each stage of pregnancy. These tools help improve expectant mothers' knowledge, encourage healthy behaviors, and support health literacy, monitoring, and early risk detection during pregnancy. Recent studies show that the use of mobile apps in prenatal education can improve expectant mothers' knowledge, encourage healthier behaviors, and provide easy access to information at any time via smartphones. Prenatal education apps have been shown to improve health literacy among expectant mothers, facilitate health monitoring, and aid in the early detection of risk signs during pregnancy (Purba A, et al., 2021).

Based on a survey of pregnancy apps around 2020, most of them were iOS-based. However, the vast majority of Indonesia's 170.4 million smartphone users in 2020 used Android-based devices (due to Android's dominant market share of approximately 91% in the same year) (Muslim, 2024).

Happy Mom is an Android-based app developed in 2020. Media and content experts have evaluated the app's suitability, and it has undergone testing on both small and large groups. This app is intended for pregnant women. Happy Mom provides information on fetal development on a weekly basis. Calculate the gestational age Happy Mom also provides education to pregnant women. The app also includes audio hypnosis for Trimesters I, II, and III (Komariah N & Wahyuni, 2021). The objective of this study is to analyze differences in pregnant women's knowledge regarding fetal development before and after using the Happy Mom app.

METHODS

This study was conducted at the Teti Herawati Maternal and Child Health Clinic in Palembang. This is a quantitative study employing a quasi-experimental design. The design to be used is one group pre- and post-test design without a control group. It assesses pregnant women's knowledge of child development before and after receiving education via the Happy Mom app. By using a design without a control group, the researcher can utilize time efficiently during the study. Consequently, the research focus is centered on the single group under investigation. The intervention provided in this study is the delivery of education via the "Happy Mom" app.

The target population comprised all pregnant women who attended antenatal check-ups at the Teti Herawati Maternity Clinic Palembang in 2021. The sample in this study consisted of all pregnant women who visited the Teti Herawati Maternity Clinic Palembang in 2021 during the study period and met the inclusion and exclusion criteria. The sampling technique used was purposive sampling. Inclusion Criteria: willing to participate as a respondent, having a normal pregnancy. Exclusion Criteria: lacking an Android smartphone and being illiterate. The sample size was 34 people, although the initial target was a minimum of 30 people. This increase in the sample size was carried out to strengthen the results of the analysis and ensure the accuracy of the data. The method of sampling in the field was as follows: when a pregnant woman had attended an ANC session, she was given a questionnaire on her characteristics. Subsequently, it was determined whether she met the inclusion criteria and did not meet any exclusion criteria; if so, she was included as a research sample.

In this study, the independent variable is education provided through the Happy Mom app, which is operationally defined as the delivery of information on fetal development via the Happy Mom app, while the dependent variable is knowledge, specifically encompassing basic facts, theories, and information about fetal development. Method of measurement using a questionnaire.

The measurement tool used in this study was a questionnaire comprising respondent characteristics and a questionnaire on the knowledge of pregnant women, consisting of 16 questions. This study utilized a questionnaire whose validity had been tested, with a calculated $R > \text{table } R (>0.361)$. Of the 16 valid questionnaire items, reliability was tested with a result of 0.771, indicating that all items were reliable (>0.6). The knowledge questionnaire in this study was used to measure respondents' knowledge regarding fetal development. One of the questions is "In which week does the fetus begin to hear?". This questionnaire uses multiple-choice questions. The maximum score is 16. Assessment was conducted via pre-test and post-test to evaluate the extent to which new information had been understood and applied. Conducting both tests on the same day can be a sound methodological strategy when the research objective is to measure the direct impact of education, ensuring valid results with minimal external interference. Particularly in populations such as pregnant women, research often utilizes the timing of routine evening health visits or during health education sessions. Conducting the pre-test and post-test in a single session minimizes dropouts or absences on the following day. Many public health studies use this approach to ensure participants remain engaged until the end of the session.

The data collection method involved primary data obtained through questionnaires on respondent characteristics and knowledge of pregnant women. The study began with the distribution of questionnaires for respondents to complete prior to receiving health education, which commenced with an explanation of the study's objectives and the researcher presenting a consent form for signature. Respondents were given 20 minutes to complete the questionnaire. The researcher obtained permission to conduct the study at this location after completing the ethics process. An ethics approval letter was obtained from the Health Research Ethics Committee (KEPK) of the the Health Ministry Polytechnic of Palembang, Indonesia as a commitment to maintaining the confidentiality of respondents who had given their informed consent (No. 0001/KEPK/Adm2/I/2022).

Data analysis was carried out in two stages: the first stage involved descriptive analysis, namely the median, minimum, and maximum values, whilst the second stage involved bivariate analysis. Prior to conducting the univariate analysis, a normality test was performed on the data.

Univariate analysis was carried out on each variable; as the data were not normally distributed, the Wilcoxon test was used.

RESULTS

A total of 34 pregnant women met the eligibility criteria and completed both the pre- and post-tests. No participants withdrew from the study during data collection. The respondents' sociodemographic and obstetric characteristics, together with their knowledge levels before and after receiving education through the Happy Mom app, are presented in Table 1.

Table 1. Respondent's Characteristic

Characteristics	n	%
Mother's Age		
< 35 years	30	88.2
≥ 35 years	4	11.8
Mother's Education		
Elementary School	3	8.8
Junior High School	4	11.8
Senior High School	23	67.6
College	4	11.8
Mother's Occupation		
Housewife	31	91.2
Employed	3	8.8
Gestational Age		
First Trimester	1	2.9
Second Trimester	5	14.7
Third Trimester	28	82.4
Pregnancy Status		
Primigravida	13	38.2
Multigravida	21	61.8
Knowledge before education		
Insufficient	27	79.4
Adequate	7	20.6
Knowledge after Education		
Insufficient	9	26.5
Adequate	16	47.0
Good	9	26.5

Table 1 shows that the majority of mothers were under 35 years of age (88.2%), most had completed upper secondary education, and 91.2% were housewives. The majority of respondents were in their third trimester, and more than half were multiparous. Regarding knowledge prior to the education session, 79.4% had insufficient knowledge, while after the session, nearly half (47%).

Table 2. Descriptive analysis

variables	Median	Minimum	Maximum
Knowledge before education	8	3	14
Knowledge after education	11	3	15

Table 2 shows that the median score for knowledge before the education program was 8, while after the program it was 11. There is a difference of 3 points in the median score. The maximum knowledge score increased by 1 point compared to the previous figure. Furthermore, the impact of the education provided via the Happy Mom app on pregnant women's knowledge of fetal development can be seen in Table 3 below:

Table 3. Knowledge Before and After Education Through Happy Mom

	n	Median (Minimum-Maximum)	p*
Knowledge before education	34	8 (3-14)	0,001
Knowledge after education	34	11(3-15)	

*Wilcoxon test

Table 3 shows that the p-value of 0.001 is less than 0.005, indicating that education provided through Happy Mom affects pregnant women's knowledge.

DISCUSSION

The research findings indicate that pregnant women's knowledge scores showed an increase in both the maximum and median values following education via the Happy Mom app. The Happy Mom app features weekly content of fetal development. This content is presented in the form of engaging illustrations rather than text alone (Komariah N & Wahyuni, 2021). Effective learning occurs when information is conveyed through a combination of visual (images/illustrations) and verbal (text/explanations) elements. Images not only enrich the material but also help the audience organize knowledge schemas in their minds and reduce cognitive load when learning new information (De Angelis, et al., 2018). A review of the literature on modern health promotion indicates that visual media such as posters, infographics, illustrations, and digital images play a crucial role as engaging, easily understandable communication channels that enhance public understanding of health information, compared to text-only media (Safrudin et al., 2026).

Other studies indicate that visual-based interventions, particularly images and videos, are effective in facilitating the understanding of health messages and improving health literacy. Well-designed visuals are capable of forming stronger mental associations for the audience, making it easier to apply the information in real life (Galmarini, et al., 2024). This is consistent with Taqwin's 2023 study, which found that health education using audiovisual media (an approximately 8-minute animated video) significantly improved pregnant women's knowledge of stunting prevention from the pre-test to the post-test. The results showed a significant increase in knowledge scores ($p < 0.05$), confirming that audiovisual media is effective as a health education tool (Taqwin, et al., 2022).

When a pregnant woman opens the app and views engaging visual content, this constitutes an initial exposure to educational material. The brain then processes text and images in parallel, facilitating comprehension. This involves simultaneous visual and verbal processing (Mayer, 2024). Furthermore, images can explain complex concepts in a simpler way, thereby reducing the burden on working memory (Nurita, 2025). Reduced cognitive load: The combination of visuals and text helps information to be remembered more easily (Nahrowi et al., 2026), thereby strengthening long-term memory; as information is processed effectively, this can enhance knowledge (Tita, 2025).

The "Happy Mom" app is a simple app that uses plain language. Recent experimental research (2023) has revealed that when health information is presented in plain language rather than standard language, participants' understanding of health recommendations improves significantly. This suggests that simple language is more effective at improving the understanding of health messages than complex language (Elliott et al., 2023).

Plain language helps patients and the general public to understand health information more accurately, whilst reducing miscommunication and misinterpretation of medical information. This demonstrates that plain language is easier to understand than complex language, particularly for audiences with varying levels of health literacy (Hayani, 2025). Knowledge tends to be absorbed and retained more effectively when individuals are calm and emotionally stable, as this internal state facilitates concentration, information encoding, and long-term memory retention. Uninterrupted emotions and state-dependent learning create optimal conditions for processing of learning and information storage (Tyng, et al., 2017).

Emotions (including anxiety and stress) have a direct influence on cognitive processes such as memory encoding and retrieval. A more stable emotional state, or one with less stress, facilitates the learning process compared to a state of severe stress. This research shows that emotions not only affect mood but also the way information is processed and stored by the brain. When a person is in a calm state (with relatively stable emotions), focus and attention improve, thereby enhancing memory and information retention (Johnson, 2024).

Emotions also play a key role in the learning process. On the Happy Mom app, from the moment a pregnant woman logs in, she is greeted and presented with audio designed to put the listener into a hypnotic state. The Happy Mom app also features hypnoprenatal audio for each trimester. Hypnosis, based on suggestion, reduces anxiety, stress, and depression; suggestions act as mediators that facilitate emotional and cognitive changes (Almustofa & Azizah, 2026). Hypnotherapy helps individuals accept positive suggestions that enhance their emotional management skills. There is a significant improvement in emotional regulation following a hypnotherapy session compared to before the intervention (Chandra, et al., 2025). Hypnosis works when a person is in a calm and relaxed state, making the subconscious mind more receptive to positive suggestions. This helps reduce anxiety and negative emotions, whilst enhancing psychological coping strategies (Sartika, et al., 2025).

A limitation of this study is that the research design consists solely of a one-group pre-test-post-test design. This study lacks a control group, which poses a threat to its internal validity. Without a control group, it cannot be confirmed that the change observed in the post-test is attributable to the treatment, as they may have been influenced by other factors (history, maturation, testing effect.) (Bierer et al., 2025). The sample size in this study is small, comprising 34 participants. A small sample size results in wide confidence intervals and less precise parameter estimates, leading to a large margin of uncertainty in the results and making them less reliable. In the field of statistics and clinical research, it is explained that an inappropriate sample size can lead to research results that lack validity, statistical errors, and inaccurate interpretations, as well as difficulties in generalizing to a larger population (Serdar,et al.,2021).

In this study, the post-test was administered too soon after the intervention. The pre-test and post-test were conducted on the same day. Administering the pre-test allowed participants to become familiar with the instrument or questions. When the post-test is administered immediately afterwards, changes in scores often reflect learning from the test itself or the experience of completing the questions, rather than the actual effect of the intervention. This is known as the testing effect, a phenomenon whereby completing the pre-test improves performance on the post-test due to memory effects or short-term learning. The pre-testing effect demonstrates that the pre-test can influence post-test results because participants become accustomed to the content or test items (Pan & Carpenter, 2023).

CONCLUSION

The Happy Mom app has the potential to improve expectant mothers' knowledge. It is recommended that further studies with a more robust design be conducted. Midwives provide health education on fetal development and care during pregnancy using various media, including mobile apps.

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