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The Effectiveness of *Pre-Mommy* Applications to Improving Knowledge, Behavior, and Psychological Conditions in The Preconception Period Women of Reproductive Age

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ABSTRACT

Introduction: Preconception care plays a pivotal role in mitigating adverse risk factors that could impact fetal growth and development. Effective preconception education is essential to empower women with the necessary knowledge and awareness. In this context, mobile applications offer a promising avenue for delivering practical preconception education.

Objective: This quantitative research study aimed to investigate the effectiveness of providing preconception education through the Premommy application in enhancing the knowledge, behavior, and psychological well-being of women during the preconception period.

Methods: Employing a pre-experimental design with a one-group pre-test and post-test approach, the study was conducted at the Religious Affairs Office in Padang City and involved a cohort of 50 participants.

Results: Results show an increased percentage of respondents with high knowledge (22%), good preconception behavior (16%), and mild anxiety levels (16%) after the intervention. Analysis test with Wilcoxon obtained p-value <0.05.

Conclusion: The study underscores the potential of mobile applications as effective tools for delivering preconception education, ultimately contributing to better-informed decisions and improved preconception health outcomes for women. This research serves as a valuable step towards harnessing digital technology to optimize preconception care.

Keywords: *knowledge, education, behaviour, psychological condition, maternal health*

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INTRODUCTION

Preconception care, a fundamental aspect of women's health, is bestowed upon individuals of reproductive age and their partners. It transcends pregnancy status and encompasses a holistic approach to optimizing the health and well-being of women, newborns, and offspring. However, existing preconception care paradigms need to be revised to adequately address the intricate needs of this population (Demisse et al., 2019).

The significance of preconception care has prompted comprehensive health promotion efforts driven by the imperative to avert adverse health outcomes for maternal and neonatal health (Harper et al., 2023). Commencing preconception care early, particularly during the formative years of adolescence, endows women with the strategic ability to navigate their reproductive journey. This includes judiciously determining optimal childbearing timing, deliberation over offspring quantity, and adopting strategies to forestall undesired pregnancies (Sainafat et al., 2020).

Acknowledging the extent of knowledge disparities among women of reproductive age, it is pivotal to emphasize that a substantial segment of this cohort—approximately 28.63%—possesses a discernible understanding of preconception care. Encouragingly, 84.58% of respondents exhibit commendable knowledge levels (Lemma et al., 2022). Furthermore, the efficacy of preconception interventions, including rudimentary measures such as folic acid/multivitamin supplementation, immunization, lifestyle modifications, and the judicious avoidance of teratogens, merits recognition. These interventions, often involving assessments or screenings followed by concise interventions or counseling, consistently manifest enhancements in targeted variables (Cassinelli et al., 2023).

The advent of technology-mediated risk assessment interventions has ushered in a transformative era in preconception care. These interventions, while extending their reach to a diverse demographic, adeptly safeguard the privacy of individuals when divulging risky behaviors (Cassinelli et al., 2023). A noteworthy example hails from Italy, where a preconception counseling initiative has effectively heightened awareness and inculcated preconceptional behaviors, including the prudent consumption of folic acid supplementation (Burrows et al., 2022).

Furthermore, the ambit of preconception care stands poised for a revolutionary overhaul through the conception, execution, and evaluation of innovative technological facets encompassing social media, mobile applications, and other avant-garde digital solutions (Burrows et al., 2022). The Premommy application emerges as a pioneering electronic media innovation within this transformative landscape. It aspires to serve as a pivotal instrument for health education and promotion, aiming to enhance the cognitive, behavioral, and psychological dimensions of expectant mothers within the preconception phase. This meticulously outlined Introduction sets the stage for an in-depth exploration into the efficacy of the Premommy application in ameliorating preconception health outcomes. It underscores the pivotal role of technology in advancing preconception care, addressing knowledge disparities, and empowering women and their partners to make informed choices regarding their reproductive journey.

OBJECTIVE

The primary objective of this study is to conduct a rigorous investigation into the utility of the Premommy Application for women during the preconception period. The

central focus is to determine whether the application effectively serves as a valuable resource for enhancing women's preconception health and well-being.

Through a comprehensive research approach, this study aims to assess the application's impact on the knowledge, behaviors, and psychological conditions of women within the preconception phase. By systematically examining the effectiveness of the Premommy Application, this research aspires to make a substantive contribution to the field of preconception care, providing valuable insights into its potential as an innovative digital tool empowering women to optimize their reproductive health.

METHODS

The method section you have provided outlines the research design, participant selection, data collection procedures, and instruments used in the study. Here is a critique with suggestions for improvements: Clarity of Research Design: The study is described as a "pre-experimental type with a one-group pre-test and post-test design.

" While this provides a basic understanding of the design, it would be beneficial to elaborate further. Mentioning the specific type of pre-experimental design (e.g., one-group pretest-posttest design) and explaining its rationale would enhance clarity. Participant Selection: It's mentioned that the study population consists of women of reproductive age who came to register their marriage and intended to get pregnant immediately after marriage.

Clarify the age range considered for "reproductive age" to provide a more precise definition. The method mentions quota sampling, but it would be helpful to specify the criteria used for quota sampling and how participants were selected to ensure representativeness. Informed Consent: While it's mentioned that participants signed informed consent, it would be beneficial to briefly describe the content of the informed consent form and the ethical considerations taken into account.

Data Collection Procedures: Provide more details about the data collection process, such as the duration of the pre-test, the specific information accessed through the Premommy application, and the nature of the behavioral questionnaire (developed by Maeda) in terms of its content and items. Frequency of Application Usage: Mentioning that respondents were asked to access the application at least three times in one week is informative. However, it would be useful to explain the rationale behind this frequency requirement and how it relates to the research objectives.

Measurement Instruments: The instruments used for measuring preconception health knowledge, behavior, and psychological condition are mentioned, along with their references. However, provide a brief overview of each instrument's content and how it aligns with the research questions. Include information about the reliability and validity of these instruments to establish their credibility in measuring the intended constructs. Ethical Approval: It's mentioned that ethical approval was obtained from the research ethics commission of the Faculty of Medicine, Universitas Andalas. Provide additional information on the ethical considerations addressed in the study and any steps taken to ensure the well-being and rights of the participants. In summary, while the method section provides an overview of the study's design and procedures, adding more details and clarifications will enhance the comprehensibility and transparency of the research methodology. Additionally, providing information about the reliability and validity of measurement instruments and ethical considerations strengthens the rigor of the study.

RESULTS
UNIVARIATE ANALYSIS

Table 1. Frequency Distribution of Levels of Knowledge, Behavior, and Psychological Conditions of Respondents Before and After Intervention

Variable	Pre-test		Post-test	
	F	%	f	%
Level of Knowledge				
High	2	4	13	26
Low	28	56	14	28
Medium	20	40	23	46
Total	**50**	**100**	**50**	**100**
Behavior				
Good	2	4	10	20
Not Good	48	96	40	80
Total	**50**	**100**	**50**	**100**
Total	**50**	**100**	**50**	**100**
Psychological condition (T)				
Mild anxiety	4	8	15	30
Moderate anxiety	45	90	35	70
Severe anxiety	1	2	0	0
Total	**50**	**100**	**50**	**100**

Based on Table 1 it is known that the knowledge level of respondents before the intervention using the *Premommy* application was at a high level of knowledge, namely 4%, medium 40%, and low 56%. After the intervention, respondents had a high level of knowledge of 26%, moderate 46%, and low 28%. Behavior of respondents before the intervention 4% with good behavior, and 96% with unfavorable behavior. After the intervention, respondents with good behavior were 20%, and 80% with bad behavior. The respondent's current psychological condition (State) before the intervention was 6% mild anxiety, 92% moderate anxiety, and 2% severe anxiety. After the intervention, psychological conditions were obtained with 22% mild anxiety, 78% moderate anxiety, and 0% severe anxiety. For psychological conditions that are usually felt by respondents (Trait) before the intervention was obtained at 8% mild anxiety, 90% moderate anxiety, and 2% severe anxiety. After the intervention, 30% had mild anxiety, 70% moderate anxiety, and 0% severe anxiety.

BIVARIATE ANALYSIS

Bivariate analysis to compare the scores of the level of knowledge, behavior, and psychological condition of respondents before and after intervention using paired t-test and Wilcoxon test. The data is processed and computerized to prove the hypothesis in the study. Before testing the hypothesis, the data normality test was carried out first using the Kolmogorov-Smirnov test. After the data normality test was carried out, the data obtained was not normally distributed ($p < 0.05$), for this reason, the data were analyzed using the Wilcoxon test.

Table 2. Wilcoxon Test Results Level of Knowledge, Behavior, and Psychological Conditions

Characteristic	Pretest		Posttest		p-value
	Median	SD	Median	SD	
Level of knowledge	16	3,765	14,00	4,004	0,000
Behavior	4,00	1,278	5,00	1,542	0,000
Psychological condition (S)	47,00	4,987	46,00	5,856	0,000
Psychological condition (T)	46,00	4,701	46,00	5,645	0,001

From Table 2 the results of the statistical analysis of p-value <0.05 mean that the use of the *Premommy* application influences knowledge, behavior, and psychological conditions in entering the preconception period in WUS.

DISCUSSION

The average score of knowledge before using the *Premommy* application increased after the intervention. Respondents who had high knowledge before the intervention were 4% and experienced an increase after the intervention to 26%. It can be interpreted that providing information about the preconception period can make better knowledge of responses. The result of this study was supported by other research, the use of the halodoc application can affect meeting the health information needs of the community to increase public knowledge (Meylani et al., 2021). It is different from the research by Fransen, which found that women with low health knowledge are generally able to be active in preconception counseling (Fransen et al., 2018). The absence of previous pre-conceptional education, especially from health workers, and the lack of promotion of care during the preconception period may be the cause of the lack of knowledge of respondents before treatment. The technology is influencing almost everything in the world from the past few decades. In the past, education was only associated with money. With time, things have changed, and there has been an innovation in the education system around the world. The world has witnessed a revolutionary way to impart education. This system of education has changed with the invention of mobile educational apps. It has accommodated a new pattern of learning. Mobile education apps have changed the face of Education by introducing a new way of learning. Here is how mobile education apps are improving the education system in the world.

Most of the respondents had bad behavior during the preconception period (80%). The cause is probably the inadequate knowledge about preconception care that the respondents have. In addition, the absence of experience in the preconception period can result in behavior that is not optimal for respondents. This can be seen from the characteristics of the respondents, most of whom have never experienced pregnancy. The insignificant change in the behavior of the respondents during the preconception period after the intervention could be caused by various things. There is a sequential process that a person must go through before adopting a new behavior. The process is awareness, interest, the process of considering, starting to try, and new behavior. In addition, several factors influence behavior originating from within and outside a person (Musgrave et al., 2023).

In the present study, there was a decrease in the incidence of anxiety levels in the respondents. Respondents with moderate levels of anxiety experienced a decrease after the intervention (14% on state and 20% on trait). Likewise respondents with a high level

of anxiety before the intervention, to mild anxiety after the intervention (2%). Conducted to other studies 74% of respondents who had received treatment in the form of preconception counseling did not experience changes in anxiety levels (Burrows et al., 2022). A good psychological condition for the mother in dealing with pregnancy is very beneficial for preventing malnutrition, preparing the body for changes during pregnancy, reducing stress and preventing obesity, reducing the risk of miscarriage, premature labor, low birth weight, and sudden fetal death, and preventing the effects of problematic health conditions during pregnancy. Therefore, the mild anxiety experienced by mothers in dealing with the preconception period can be overcome with a good support system from their families.

The results showed that there was a significant increase in knowledge before and after the intervention. This is evidenced by a p-value of 0.000 ($p < 0.05$). Smartphone applications can be used to provide information on health benefits to the public. As a health promotion medium, smartphone applications on an Android basis have the advantage of being easy to use and access at any time and providing a variety of interesting features with attractive visuals and audio (Meedya et al., 2021). The *Premommy* application can be accessed anywhere and anytime with or without an internet connection. This application adds insight to women of childbearing age regarding information about preconception so that it is effective in increasing knowledge. The use of social media and applications can increase the role in pregnancy care because the costs are low and access is easy regardless of time and geographic location (Chan & Chen, 2019). A person's knowledge can be related to the education he gets. From the characteristics of the respondents, it can be seen that the majority of respondents have tertiary education. The higher the level of one's knowledge, the easier it will be to receive information that can be conveyed in various ways including the use of Android-based applications.

There was an increase in behavior before and after the intervention. Before the intervention, respondents with good behavior were 4% and became 20% after the intervention. The results of data analysis using the Wilcoxon test obtained a p-value of 0.000 ($p < 0.005$) which proved that there was an influence of the intervention using the *Premommy* application on the behavior of women of reproductive age. Interventions using smartphone technology have many advantages and potential for implementing behavior change. The use of this application can be used in both developed and developing countries, thereby expanding access to information at all levels of society (Veggiotti et al., 2021). In another research, an increase in the average score of mothers' attitudes of 7.84 which proves that knowledge influences a person's attitude and will also influence exclusive breastfeeding behavior. Positive knowledge and attitude will encourage the formation of better health behavior (Juhanida Lestari et al., 2020). After the intervention was carried out in this study, most of the respondents still had bad behavior. This could be because the majority of respondents were at a relatively young age and had no previous pregnancy experience. Age is one of the factors that can influence a person's behavior. It can be interpreted that the older a person is, the more experience, the more knowledge, and the wiser in decision-making (Juhanida Lestari et al., 2020).

The present study found that the majority of respondents (State) who had moderate anxiety before the intervention was 92% and decreased to 78% after the intervention. The results of data analysis using the Wilcoxon test obtained a p-value of 0.000 ($p < 0.005$) which proved that there was an influence of the intervention using the *Premommy* application on the psychological condition of women of childbearing age.

Most of the respondents (Trait) who had moderate anxiety before the intervention was 90% and decreased to 70% after the intervention. The results of data analysis using the Wilcoxon test obtained a p-value of 0.001 (p <0.005) which proved that there was an influence of the intervention using the *Premommy* application on the psychological condition of women of reproductive age.

The results showed that more than half of the respondents had moderate anxiety about the preconception period. Anxiety by respondents can be caused by feelings of future conditions that are not yet clear. So there is a feeling of worry whether the period that will be experienced in the future will pass safely, including her pregnancy. The form of anxiety experienced by respondents is a psychological symptom, namely physiological reactions such as feelings of tension, confusion, and lack of confidence.

CONCLUSION

"In conclusion, our study demonstrates that preconception education delivered through the application has a notable positive impact on the knowledge, behavior, and psychological well-being of expectant mothers. Our findings reveal a statistically significant increase in knowledge scores, observable improvements in health-related behaviors, and a reported enhancement in psychological condition among participants. These outcomes hold significant implications for the field of preconception care, suggesting that technology-mediated education can play a vital role in empowering expectant mothers to make informed choices about their reproductive health. While our study provides valuable insights, it is important to acknowledge the need for further research to explore the long-term effects and potential variations in outcomes. Nonetheless, our findings underscore the potential of digital applications in promoting preconception health and well-being."

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CONFLICT OF INTEREST STATEMENT

Disclosure The authors have nothing to disclose.

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