

Conference Paper

The Benefits of Smartphone-Based Health Applications in Increasing Knowledge About Preconception Care: A Research and Development Study

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ABSTRACT

Background: Knowledge influences the use of preconception care. The purpose of developing the application in this study is to obtain health promotion media that can increase knowledge and attitudes about preconception care. Methods: A development study using the Four-D model was carried out in Metro Indonesia from November 2021 to January 2022. Using an experimental design with 60 young women selected in a limited-scale trial. Divided into two groups randomly, where the treatment group has access to utilize information media in the application. Data obtained from pre-test and post-test. Furthermore, the analysis was carried out using the SPSS software version 25.0 using an independent t-test. Result: Application adoption reached 96.67%. The results of the t-test are known, there is a difference of 6.25 in the knowledge variable from the results of the pre-test (41.50) and post-test (47.25), with a t value of 6.542, a significance of 0.001. There is a difference of 1.417 in the attitude variable from the results of the pre-test (36.42) and post-test (37.83), with a value of $t = 1.535$. Significance of 0.130. Conclusion: There is strong evidence that the media produced has a good performance in increasing knowledge, but has not been able to improve attitudes. For this reason, it needs to be refined to more optimal results.

Keywords: Preconception, knowledge, attitude

Introduction

Knowledge is one of the predisposing factors that contribute to the use of preconception care (Munthali et al., 2021). Preconception care is currently a policy direction that is implemented to improve the health status of women in dealing with the process of pregnancy. This policy was implemented considering that many women delay their pregnancy until their thirties and lifestyle shifts that can affect pregnancy (ACOG, 2017). Preconception care focuses on early detection, health promotion, and intervention (Nypaver et al., 2016). In addition to carrying out early detection, the purpose of preconception care is to increase the knowledge of prospective mothers (Carrasquillo, 2013) so that they can behave healthily to obtain optimal health status (Robbins et al., 2014).

Previous studies have stated that preconception care has an impact on good pregnancy outcomes including suppressing the incidence of congenital defects (Braspenningx et al., 2013). However, the preconception care program in Indonesia has not been well socialized for expectant mothers and their partners. The contributing factors are lack of socialization (Sori et al., 2021), low knowledge (Wegene et al., 2022), not having enough time to utilize preconception care (Habte et al., 2021), and not having access to services, and high costs (Mazza et al., 2013). For this reason, it is necessary to find effective solutions to increase knowledge as well as socialize the preconception care program.

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Today's digital resolution allows wider use of technology for society. The utilization of technology provides opportunities to increase access to various information, including in the health sector. Furthermore, technology is also able to act as a medium in health promotion to enrich knowledge and change positive behavior (Bacigalupe, 2011; Leonita & Jalinus, 2018). Empirical evidence states that the use of media based on the mHealth application can increase knowledge (Chang et al., 2020; Leonita & Jalinus, 2018), reach more targets, and be able to cut space and time (Deldar & Froutan, 2021). In addition, media based on health applications have great potential in disseminating information and health behavior interventions (Payne et al., 2015). This is the basic goal of developing health promotion media about preconception care. It is hoped that this media will be able to increase knowledge and attitudes, as well as cut time and cost.

Material and Methods

Study design and respondents

This development study applies the Four-D model and is currently in the limited-scale trial phase. The experimental design was applied in carrying out the limited trial phase. The study was conducted in Metro City, Indonesia, from November 2021 to January 2022. Based on Rescou's opinion, a total of 60 young women aged 15–19 years participated voluntarily in this study (Sekaran & Bougie, 2016). In practice, the research subjects were divided into two groups, where the treatment group and the control group each amounted to 30 respondents. The division of group members is determined at simple random through a lottery.

Application of preconception care applications

The application that has been developed is applied to both groups. The intervention is in the use of information about preconception care. Only the treatment group had access to the use of information features, while the control group was locked. The utilization of this application is depicted in figure 1.

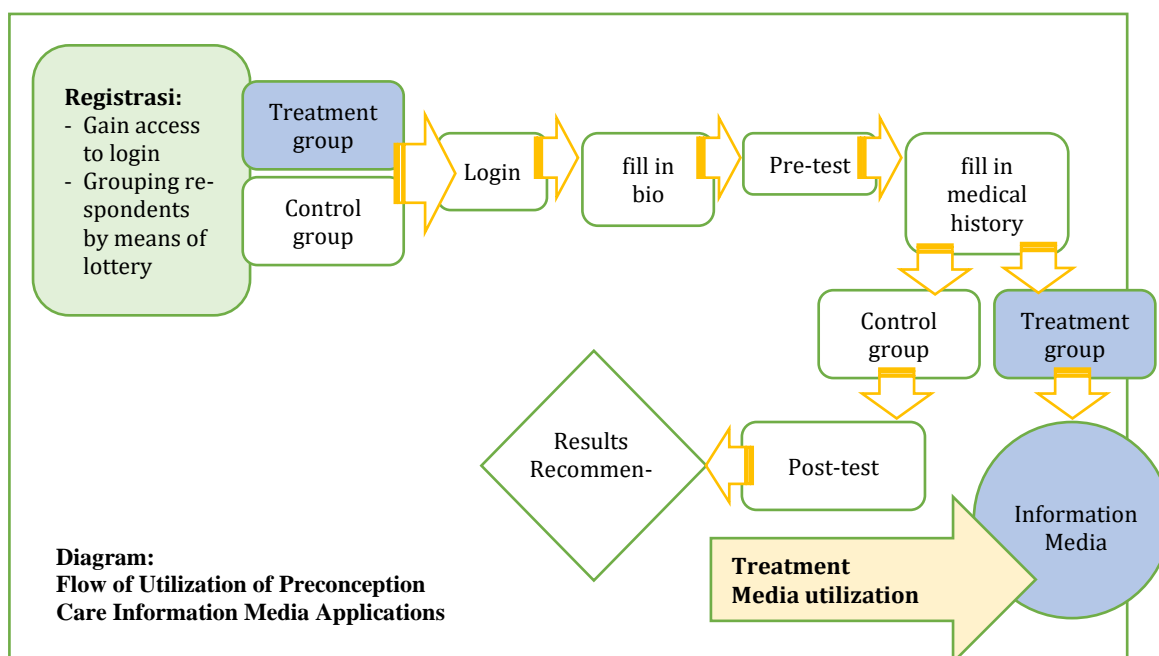


Figure 1. Flow of utilization of preconception care information media

The difference in the prevailing treatment was in the treatment group. Members of this group can take advantage of information features related to preconception care. While the control group

cannot access this feature because it is locked. Based on this treatment, it is expected that the developed media can function to measure user knowledge and attitudes through pre-test and post-test.

Substantially, starting from the pre-test and post-test material, information about preconception care and a questionnaire assessment of the previous application were tested for validity based on the results of the analysis of the corrected item to total correlation and reliability based on Cronbach's alpha value. The results of the analysis state that the instruments compiled are valid and reliable as a whole. In terms of knowledge, 22 items have an r-count value of more than the r-table of 0.404 and a Cronbach's alpha value of 0.746. As for the attitude material, the 17 statement items have an r count > r table that is 0.444, and Cronbach's alpha value is 0.887.

Statistical analysis using SPSS software version 25.0. An independent t-test was applied to assess the mean difference between the two groups. The ethical approval was obtained from the Health Polytechnic Ethics Commission of the Tanjungkarang Ministry of Health number 260/KEPK-TJK/XI/2021.

Results and Discussion

The success of using the application as a media function reached 96.67%. A total of 2 respondents from 60 respondents experienced errors when using the application. Based on the results of statistical tests, it is known that there is an increase in the average knowledge from 41.50 in the pre-test to 47.75 in the post-test. This finding shows that the average knowledge of young women is at a good level (point scale of 0 – 60). There was an increase in the mean value of attitudes, namely 36.42 in the pre-test to 37.83 in the post-test (point scale 1-60).

Table 1. Results of pre-test and post-test descriptive analysis

Variable	Pre-test		Post-test	
	mean	± SD	Mean	± SD
Knowledge	41.50	4.81	47.75	7.88
Attitude	36.42	5.37	37.83	4.45

n = 60.

The results of the t-test on the knowledge variable showed that there was a difference between the pre-test and post-test of 6.25, and the t-value of 6.542 with a significance of 0.001 (<0.05). This significant difference proves the money application developed has a good performance to increase knowledge. Different for the attitude variable. There is a difference between the pre-test and post-test of 1.417, but a significant difference indicates a difference (t value = 1.535, sig 0.130). These results indicate that the developed application has not been able to improve attitudes. (Table 2).

Table 2. Differences in the Pre-test and Post-test mean scores

Variable	Paired Samples Correlations		Paired Difference Test					
			95% CI of The Difference				t	Sig (-tailed)
	Correlation	Sig	mean	Std. Dev	Lower	Upper		
Knowledge	0.403	0.001	6.250	7,400	4.338	8.162	6.542	0.001
Attitude	-0.050	0.703	1.417	7.148	-439	3.263	1.535	0.130

n=60.

The study of the development of information media on preconception care has completed the limited-scale trial phase. The results obtained at this stage stated that the developed media had a good performance. This is evidenced by the 60 respondents who used the application, and only 2 respondents who could not use the application completely in a limited-scale trial. In addition, the developed media can increase knowledge. Utilization of technology allows the dissemination of information widely on the intended target, can play a role and make a very good contribution to education (Wallace et al., 2012; Mosa et al., 2012) in addition to improving care services with remote monitoring (Cormick et al., 2012).

Cultivating healthy behavior habits, including the use of health services, requires a good knowledge about health so that it can foster a positive attitude, which in turn will give birth to healthy behavior naturally (Notoadmodjo, 2012). Therefore, the dissemination of information becomes an important role in building knowledge. Information technology can act as a tool for empowerment in education and knowledge dissemination (Oboegbulem & Ugwu, 2013). In addition, information technology is defined as a medium that can be used to communicate, disseminate and store and manage information (Karanja, 2018).

Health application is one form of utilization of information technology. This design that can be accessed via a smartphone is referred to as a cellular health program that functions as a health promotion medium (Lee Ventola, 2014). The convenience that can be obtained from the use of information technology in the form of health applications is that it can be accessed by users without space and time limits (Jatmika et al., 2019). Health applications that function as educational media are also able to increase knowledge (Novianty et al., 2021). When a mobile application is functioned as a promotional medium and paired with a learning video, it becomes a learning medium that can improve knowledge, attitudes, and practice skills that can help solve problems (Torkian et al., 2020).

Based on the results of this study, the application developed up to the limited-scale trial stage has been able to increase user knowledge. The features designed in the application can build new knowledge for users about preconception care. On the other hand, based on trial results, this application has not been able to improve user attitudes towards preconception care. This result is different from previous research which states that the use of health applications can improve attitudes towards an object (Novianty et al., 2021). It should be noted that health education is not meant to induce or motivate individual change (Jennie & Jane, 2010). So, even though attitudes have not been well formed from the results of this trial, if it is reviewed, there is an increase in the average value of attitudes, which is 1.417. This result is not significant, but it can be considered that this increase is an embryo for users to shape attitudes in the future. This is supported by the knowledge that is formed, the hope is that it can be the foundation for developing attitudes and giving birth to healthy behaviors.

Adolescents and young adults in this era have a high interest in the use of applications that support health-related behavior change (Laura et al., 2013). Previous surveys stated that the level of smartphone and tablet users is high among teenagers. And they take advantage of smartphone applications in the educational process (Lau & Kolli, 2017). Previous research has stated that the favorites in using health mobile applications are applications for health status, motivation, knowledge, and fitness (Bhuvan et al., 2021). This is one of the considerations in developing a health application that can function as a health promotion medium. Of course, this development is still being carried out considering that this application can only be accessed via an Android-based smartphone.

Conclusion

The resulting media has a good performance as a promotional media to increase knowledge and prepare for pregnancy during the preconception period. Therefore, this application needs to be refined to provide more optimal results.

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