

THE DEVELOPMENT OF AN APPLICATION FOR LEARNING HOW TO USE COMBINED HORMONAL CONTRACEPTIVE PILLS

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ABSTRACT

Unintended pregnancy has been a significant global health issue. This study aimed to develop an application for learning how to use combined hormonal contraceptive pills and examine the application's quality and learning satisfaction. The application was developed in four stages: 1) reviewing the evidence-based practice, 2) designing the structure, 3) developing the application, and 4) checking the application's accuracy. The quality of the application was tested through questionnaires. A convenience sampling of 40 women aged 20-40 years were selected. The respondents were women who used combined hormonal contraceptive pills and had no previous experience using them in the urban community of Phitsanulok, Thailand, between January and April 2022. Descriptive statistics were used. Consultants and experts checked the research findings and revealed that the application was accurate. The computer and information technology quality of the application for learning based on the Android operating system was high (\bar{X} = 4.00, S.D. = 0.31). The content quality of the application and the satisfaction were also at a high level (\bar{X} = 4.10, S.D. = 0.36; \bar{X} = 4.33, S.D. = 0.52). The findings demonstrated that developing an application for learning how to use combined hormonal contraceptive pills can enhance the effectiveness of contraceptive knowledge and use.

Keywords: *Application; combined hormonal contraceptives pills; unintended pregnancy*



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INTRODUCTION

Unintended pregnancy is a significant public health issue in Thailand. An unintended pregnancy is either unwanted and unplanned or a mistimed pregnancy. A mistimed pregnancy refers to when the pregnancy occurs earlier than desired (Yazdkhasti et al., 2015). The incidence rate of unintended pregnancy is increasing worldwide, especially in developing regions. Unintended pregnancy can negatively impact the health of pregnant women (Birgisson et al., 2015; Troutman et al., 2020). The offspring can have socioeconomic consequences, such as malnutrition and violence. Statistics from 36 countries indicated that two-thirds of women who have sexual activity avoid contraception due to concerns about the side effects, health conditions, and misunderstanding about contraception (World Health Organization (WHO), 2019). A United Nations Population Fund (UNFPA) report found that nearly half of all global pregnancies, around 121 million per year, are unintended

pregnancies (UNFPA, 2022). This figure illustrates that the gaps in family planning are linked to the rise in the rate of unintentional pregnancies.

One common strategy employed to decrease the rate of unintended pregnancy is promoting preconception health as part of family planning to avoid incorrect use and contraceptive failure, especially with the combined hormonal contraceptive pills (Centers for Disease Control and Prevention (CDC), 2021). A combined hormonal contraceptive pill (CHC) contains two synthetic hormones, i.e., estrogen and progesterone, for preventing pregnancy (Faculty of Sexual & Reproductive Healthcare (FSRH), 2019).

In Thailand, the CHC is more commonly used rather than an Intrauterine device (IUD) or implant because the CHC is relatively easy to obtain from a pharmacy or drugstore without

a prescription. In addition, the dosage regimen for CHC is different from other medicines regarding when to start using it, continuously taking it, and its following side effects (Fitzpatrick et al., 2023). The CHC is generally started in the first five days of the menstruation period and is taken continuously at the same time every day for 21 or 28 days based on the type of CHC (WHO, 2016; Department of Health, 2021).

A study of the effects of drug reminder applications and manual reminders to improve adherence to oral contraceptive pills discovered that women of reproductive age between 15 and 49-year-olds choose oral contraceptives because it is convenient to use (68.8%) and easy to obtain (65.6%). Surprisingly, the findings in this study indicated that only 53.6% of the respondents correctly used oral contraceptives. They illustrated the following problems: incorrect taking of the pills for the first time and misuse of pills when missing their doses. Nearly one-tenth of them expressed that they do not know how to take it after missing or forgetting the pills. Most of them claim they know how to use oral contraceptive pills, but some women may misunderstand how to use them correctly (Kanjanasilp et al., 2018). These results align with a study of knowledge and attitude toward using combined hormonal contraceptive pills among reproductive Thai women. The study found that around two-thirds (66%) of the respondents knew about the accurate use of the pills (Sae-lim et al., 2019). Therefore, women of reproductive age should learn to correctly use and take oral contraceptive pills, including knowing the starting date, handling missing pills, their advantages and disadvantages, and their side effects (Chuemongkon et al., 2019).

Technological evolution has changed and transformed global healthcare. This innovation impacts health behaviors and health-promoting activities (Muljo et al., 2019). According to statistics, internet usage in all age groups dramatically increased from 2017 to 2020. In 2020, the number of online users were particularly high for people aged 15-24 (98.4%). Ages 25-34 years and 35-49 years actively use the internet, around 97.3% and 90.6%, respectively. Meanwhile, the daily internet use rate is 89.3% and around 10% for once a week. Almost all online users use a smartphone to access the internet (99.2%) (National Statistical Office Thailand, 2021). These figures show the impact of technology on our lifestyle. Smartphone technology has rapidly developed, improving internet and social media access. Moreover, smartphone ownership in Thailand is growing rapidly due to its low cost and prevalent use in society (Hincharoen, 2019).

Therefore, this study aims to develop an application for learning how to use the combined hormonal contraceptive pills for reproductive women. The application was designed for convenience, open accessibility, and ease of use, to minimize mistakes, to save time and costs, and to include an alert system. The advantages of the application are that it will enhance the users' knowledge, increase the correct use of the CHC, and reduce the mistakes or missing pills to improve family planning and reduce the rate of unintended pregnancy.

METHOD

Study Design

The research and development design was used to develop an application to learn how to use the combined hormonal contraceptive pills (CHC) and determine its quality in terms of content, technology, and learning satisfaction.

Sample

This study's population was reproductive women at least twenty years old who sought services to use combined hormonal contraceptive pills. Implants were used for women under twenty years old due to Thai Government policy. A total of 40 women, aged between 20 and 40 years old, were selected by convenience sampling. The respondents used combined hormonal contraceptive pills and had no experience using combined hormonal contraceptive pills in the urban community of Phitsanulok, Thailand (Billingham et al., 2013).

Women interested in participating were given complete information by the researcher. The researcher obtained written consent from the respondents. The participants were screened based on the following inclusion criteria: women who can read, speak, and understand the Thai language; women who use a smartphone or tablet; and women with no contraindications, complications, or severe side effects while using combined hormonal contraceptive pills were excluded. This study was conducted at the Faculty of Nursing, Naresuan University, Thailand, over four months from January to April 2022.

Instruments

The questionnaire consisted of content evaluation, information technology evaluation, and users' learning satisfaction with the application designed with a rating scale of 0 to 5. A score of 0 means "I really disagree with this item" and 5 means "I really agree with this item." The content quality evaluation questionnaire consisted of 10 items (Table 1) that cover content and language. The information technology quality evaluation questionnaire consisted of 13 items (Table 3). It was divided into four parts: screen design, pictures, information system, and utility. The content validity was proved by three experts based on the index of concurrence (IOC) at 0.7-1.0 points (Taber, 2018). The learning satisfaction questionnaires included 15 items (Table 3), and its reliability was tested with thirty reproductive women aged between 20 and 40 years old through *Cronbach's Alpha Coefficient* of 0.81.

Intervention

The application for learning to use combined hormonal contraceptive pills (CHC) was developed by the research team. It included two researchers and three information technology (IT) support members with experience in developing software and smartphone applications for at least five years. The application was developed in 4 stages: 1) reviewing the evidence-based practice, 2) designing the structure and learning approaches, such as writing the layout of the application, making the storyboard, designing alphabet size and font, matching the contents and pictures, trying out the color of the application, 3) developing the application, and 4) checking its accuracy by the consultants and experts. The application consists of five parts in the Thai language based on the Android operating system (Picture 1). The first part contains the concept of combined hormonal contraceptive pills (CHC) that provides benefit and mechanism of action for contraception. The second part demonstrates how to use the CHC in terms of efficacy and perfect use, such as when missing the pill or taking the pills late. The third part consists of the adverse effects and contraindications. The fourth part contains the side effects and signs and symptoms that need to be met by healthcare professionals. The last part consists of the alert for the pill's reminder. The three experts in

reproductive healthcare and contraception checked and tested the application's accuracy.

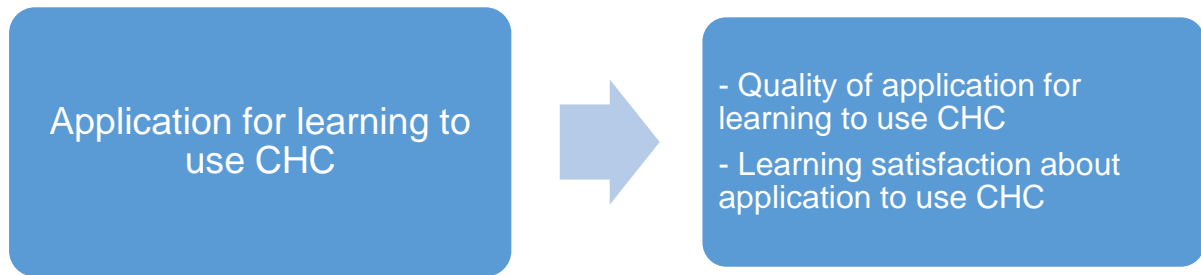
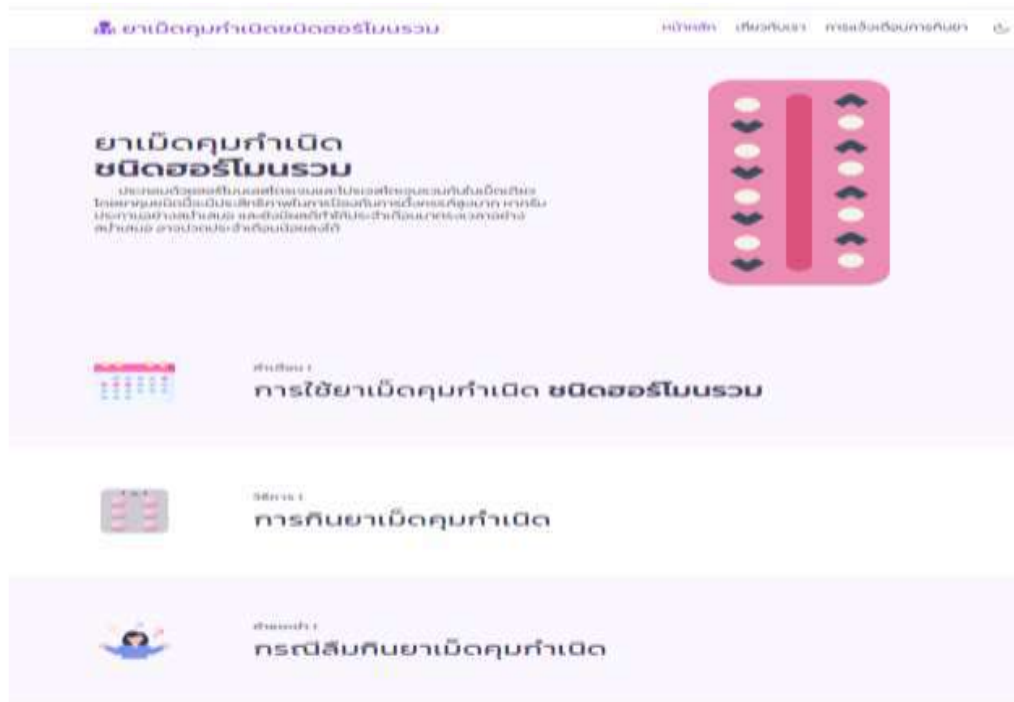


Figure 1: Conceptual framework



Picture 1: The application for learning to use combined hormonal contraceptives pills

Data Collection

The data were collected from women through questionnaires. The learning satisfaction results were collected from the respondents after they used the application. The first step of the data collection process was having the respondents obtain CHC from pharmacies. Then, the respondents contacted the researcher through phone or e-mail. Next, the researcher sent the application's link via message to the respondent's smartphone. Then, the respondents registered and logged in to the application. After that, the respondents learned how to use the CHC on their own time through the application until they finished the first pack of the combined hormonal contraceptive pills. The last step was the researcher sending the learning satisfaction form through Google Form. The form took around 20 minutes to complete.

Data Analysis

The data were analyzed by using SPSS 17.0 for Windows. The data were reported as descriptive numbers, percentages, frequency, mean, and standard deviation.

Ethical Consideration

Ethical approval for the study was obtained from the Naresuan University Institutional Review Board (IRB No. P3-0176/2564), Naresuan University, Thailand, dated from December 23, 2021, to December 23, 2022.

RESULTS

The application's content quality was evaluated through three experts in reproductive healthcare and contraception with at least five years of experience with reproductive women. All items on average were high (\bar{X} = 4.10, S.D. = 0.36). The appropriation and ordering the contents from easy to complicated contents obtained the highest score (\bar{X} = 5, S.D. = 0). The lowest score was for the easily understood language item, which was moderate (\bar{X} = 3.33, S.D. = 0.58) (Table 1).

Table 1. The content quality evaluation of the application for learning to use combined hormonal contraceptives pills

Item	Expert			\bar{x}	S.D.	Level
	1	2	3			
1. Contents covers the objectives	4	5	4	4.33	0.58	High
2. Accuracy of contents	5	4	4	4.33	0.58	High
3. Appropriation and ordering the contents	5	5	5	5.00	0.00	Highest
4. Amount of contents are appropriate	4	4	3	3.67	0.58	High
5. Continuing the contents in each part	5	4	4	4.33	0.58	High
6. Language easy to understanding	4	3	3	3.33	0.58	Moderate
7. Accuracy of language	4	4	4	4.00	0.00	High
8. Contents according to picture	5	4	4	4.33	0.58	High
9. Appropriate between contents and pictures	4	4	4	4.00	0.00	High
10. Appropriation contents for users	4	4	3	3.67	0.58	High
Overall				4.10	0.36	High

The information technology quality was evaluated through three experts in computer and information technology who have experience with the software and application for at least five years. All items average were high (\bar{X} = 4.00, S.D. = 0.31). The overall utility part was higher than the information

system, screen design, and picture, respectively (\bar{X} = 4.17, S.D. = 0.15). The pill reminder alert was high (\bar{X} = 4.67, S.D. = 0.58). Meanwhile, the lowest score was for picture sharpness (\bar{X} = 3.33, S.D. = 0.58) (Table 2).

Table 2. The computer and information technology quality evaluation of the application for learning to use combined hormonal contraceptives pills

Item	Expert			\bar{x}	S.D.	Level
	1	2	3			
1. Designing screen						
1.1 Appropriate and stylish	4	3	4	3.67	0.58	High
1.2 Accessibility	5	4	4	4.33	0.58	High
1.3 Attractive	4	3	4	3.67	0.58	High
Overall				3.89	0.58	High
2. Picture						
2.1 Sharpness	3	4	3	3.33	0.58	Moderate
2.2 Appropriation for interpretation	4	4	4	4.00	0.00	High
2.2 According to picture	4	4	4	4.00	0.00	High
Overall				3.78	0.19	High
3. Information system						
3.1 Convenience to use	5	4	5	4.67	0.58	Highest
3.2 Easy to search content	3	4	4	3.67	0.58	High
3.3 Appropriate about content bulk	4	4	4	4.00	0.00	High
Overall				4.11	0.39	High
4. Utility						
4.1 Alert for pills reminder	5	4	5	4.67	0.58	Highest
4.2 Download data speed	4	4	4	4.00	0.00	High
4.3 Imaged use	4	4	4	4.00	0.00	High
4.4 Accuracy ratio of picture for use	4	4	4	4.00	0.00	High
Overall				4.17	0.15	High
Overall				4.00	0.31	High

The respondents were aged between 20 and 40 years. All of them used smartphones. The respondents were women without any complications and contraindications and severe side effects when using combined hormonal contraceptive pills. However, some had minimal side effects when using combined pills, such as nausea, vomiting, headache, and

mood swings during their period. The overall learning satisfaction after using the application was high (\bar{X} = 4.33, S.D. = 0.52). They were mostly satisfied about the display speed of data and picture (\bar{X} = 4.71, S.D. = 0.51). The satisfaction of the color on the application screen was lowest (\bar{X} = 3.78, S.D. = 0.51) (Table 3).

Table 3. The learning satisfaction of the application for learning to use combined hormonal contraceptives pills (n = 40)

Item	\bar{x}	S.D.	Level
1. Contents is interesting and attractive	4.21	0.44	High
2. Topics are clearly division	4.54	0.52	Highest
3. Contents order clearly and easy to understand	4.67	0.58	Highest
4. The amount of contents are appropriate	4.53	0.50	Highest
5. The introduction of contents is interesting and attractive	3.96	0.55	High
6. Color on the application screen is interesting	3.78	0.51	High
7. Font is appropriate and easy to read	4.22	0.61	High
8. Picture are attractive	3.84	0.52	High
9. Easy to accessibility	4.58	0.51	Highest
10. Speed of display the data and picture	4.71	0.51	Highest
11. Review the content by yourself and gain my understanding	4.54	0.48	Highest
12. Time for learning is appropriate	4.37	0.59	High
13. Appropriate between level of contents and users	4.05	0.49	High
14. Gain my knowledge about CHC after learning the application	4.45	0.48	High
15. Alert for pills reminder	4.63	0.50	Highest
Overall	4.33	0.52	High

DISCUSSION.

The application consists of five parts. The first part describes the benefit and mechanism of action for the contraception. The second part demonstrates how to use the CHC in terms of efficacy and perfect use, such as when missing the pills or taking the pills late. The third part consists of the adverse effects and contraindications of CHC. The fourth part contains the side effects and signs and symptoms that require a visit to healthcare professionals. The last part consists of the pill reminder alerts. The application's development was processed in 4 stages, from reviewing the content until the stage of checking accuracy based on evidenced-based practice (FSRH, 2019) and from a Thai context. This process was useful for developing the application to include healthcare promotion, which is linked to globalization and global healthcare in terms of need, time, accessibility, and satisfaction (National Statistical Office Thailand, 2021).

The findings indicated the overall of content and technology quality of the development of the application for learning to use CHC were high. This result may be because the application was developed by a research team that comprise experts in maternal and newborn nursing and informational technology. The application was checked for accuracy by experts in reproductive healthcare and contraception before testing. In addition, the application was developed following four processes from evidence-based and updated information about CHC.

This study's results align with Rungrawiwan et al.'s, (2021) study, which developed a mobile application for personnel management of the faculty of Management Science of Yala Rajabhat University. The efficacy of the application for personnel management was tested and found to be high (Rungrawiwan et al., 2021). Moreover, systematic reviews about healthcare applications of smartwatches found that most publications focused on healthcare monitor applications for aging, Parkinson's patients, and patients with cardiac arrest respectively (Lu et al., 2016). Therefore, the development of future applications will consider global and technological changes from globalization. In addition, the application can be used in smart watches, smart glasses, or other devices.

This study found that overall learning satisfaction was high. The respondents expressed high satisfaction during learning and using the application as a valuable resource regarding content, convenience, accessibility, and ability to remind them to take their CHC (Kittipimpanon et al., 2023). The content about CHC met their requirements, was reliable, and was a useful resource about effectively using the combined hormonal contraceptive pills. They could review the content and learn how to use it when they had any questions or hesitation.

Furthermore, the application was convenient based on their context or need (Phola & Silapanilamarn, 2021). The accessibility can be adapted to their daily life because the application was installed on the respondents' smartphones, which they already use to enhance their day-to-day activities (Puttitaweewri et al., 2019). The application was designed to use tones, colors, and attractive fonts for women, including an alert for them to take their pills. It supported them to take their pills at the correct time and improve their effectiveness.

This study's findings align with Boonchom et al., (2020) study about developing an Android application for disseminating content on Thai cultural heritage in the lower southern provinces of Thailand. Their study found that the participants were highly satisfied with the Android application due to the reliability of the content and useful information for traveling, work, and study (Boonchom et al., 2020). The application developed in this study illustrates that the application can develop nursing practice in terms of healthcare education or nursing advocacy for all age groups. It might improve their access to useful health information for learning and change their attitude.

Nevertheless, this finding has limits due to the small sample size. It might not be representative of other groups of women. Aspects such as education level, divorce, and marriage status were not controlled. These aspects might impact the learning outcomes. Additionally, this application was limited to the Android operating system only. Future studies should develop the application for other operating systems, such as IOS (Lorwichit, 2016). Next, the duration of this study is limited to after women complete their first pack of CHC. A longer duration may be needed to follow the effectiveness and efficacy of using the application for learning, including the user's satisfaction. Future studies should also consider the contents of contraception, especially combined hormonal contraceptive pills (CHC), as they should be updated and developed based on globalization and evidence-based findings from a national and international level. In addition, the question and answer (Q&A) should be improved and developed in the next application version.

CONCLUSION AND RECOMMENDATION

The finding demonstrated that using an application for learning how to use combined hormonal contraceptive pills can enhance the effectiveness of contraceptive pills in reproductive women. The application was developed and designed based on evidence-based practices, and consultants and experts checked its accuracy. The application operated on Android smartphones and could allow users to gain knowledge and enhance their attitude about using a combined hormonal contraceptive pill. Such an application can support a decrease in the rate of unintended pregnancy worldwide, including in developing countries. Future studies should develop version II of the application to overcome the limitations faced in this study and improve the design to cater to teenage women or specific groups.

CONFLICT OF INTEREST

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Psychosocial factors, especially distress and perceived family support, significantly influence dietary behavior in T2DM patients. Therefore, efforts to improve diabetes self-management behavior, especially diet, must consider psychosocial factors, especially aspects of distress and perceptions of family support. Nurses and other health workers can make efforts to reduce distress and increase family support so that people with T2DM can perform optimal dietary behavior. It certainly has a positive impact on improving self-management and the quality of life of people with T2DM.

Further researchers can re-identify the influence of psychosocial factors on dietary behavior, especially knowledge, coping, and perceived nurse support factors, to strengthen this study's results. Further research using other designs (cohort study, experimental study, and others) can identify other factors influencing dietary behavior, such as sociodemographic factors, situational treatment factors, and others.

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