

Effectiveness of a Nurse-led Program to Enhance Self-efficacy of Pregnant Adolescents and Reduce their Fear of Childbirth: A Randomized Controlled Trial

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Abstract: Fear of childbirth is a common feeling experienced by pregnant women, and it can occur before, during, or after childbirth. Intense fear has a detrimental effect on physical and psychological statuses of the pregnant women. The aim of this randomized controlled trial was to examine the effectiveness of a nurse-led program together with the mobile phone application to enhance pregnant adolescents' childbirth self-efficacy and reduce their fear of childbirth. The sample was pregnant adolescents receiving antenatal care in a regional hospital in Southern Thailand. Using the minimization procedure, pregnant adolescents were assigned to either an experimental group receiving the program (n = 64) or a control group receiving routine care (n = 64). The instruments used for data collection consisted of a demographic characteristics form, the Fear of Childbirth in the Third Trimester Questionnaire, and the Thai Childbirth Self-Efficacy Inventory. Data were analyzed using descriptive statistics, paired t-test, and independent t-test.

The results showed that after completion of the intervention program, the participants in the experimental group had a significantly higher mean score on childbirth self-efficacy and lower fear of childbirth than before the intervention. When comparing the two groups after completion of the program, results showed a significantly higher childbirth self-efficacy mean score, and lower fear of childbirth mean score in the experimental group than those in the control group. The results indicate that application of childbirth self-efficacy enhancement program can increase self-efficacy and reduce fear of childbirth in pregnant adolescents. Therefore, it is a promising program for caring pregnant adolescents but needs to be tested with other samples before implementation in practice.

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Introduction

Currently teenage pregnancy exceeds the expected rate worldwide and has become a significant global problem. In 2021, the live birth rate was 31.30 per 1,000 adolescents aged 15–19 years. In addition, there were one million births per year among adolescents

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under the age of 15 years.¹ African countries had the highest birth rate at 99.10 per 1,000 adolescents per year. Asian countries had a birth rate of 33 per 1,000

adolescents per year.² Most developing countries had higher birth rates. The World Health Organization projects that the increased teenage birth rate will be the same in 2030.² In Thailand the adolescent birth rate in 2021 was 28.23% and the repeat birth rate in this group was 7.80%. In addition, there was an average of 7 births per day among adolescents aged 10–14 years.³ In Songkhla Province, the live birth rate among adolescents aged 15–19 years was 23.70% in 2021.⁴ This evidence showed that the teenage pregnancy rate is still higher than expected, which is a major health and social problem. Teenage pregnancy affects adolescents physically, psychologically, and socioeconomically and has a negative impact on the babies' health.⁵

Early teenage pregnancy leads to various psychosocial problems. The psychological dimension of pregnant adolescents can lead to stress and anxiety, which in turn can trigger depression.⁶ Childbirth can also be a crisis situation with an unpredictable outcome for a pregnant adolescent in labor. Pregnancy in adolescents can trigger fear of childbirth,⁵ but fear of childbirth is a negative perception for pregnant women. It causes them feel insecure. They worry about what will happen in the future and suspect that it will be a threat or danger.⁷ According to one study, 43.08% of pregnant adolescents had fear of childbirth.⁸ Another study found that lack of experience and knowledge about childbirth among pregnant adolescents was a leading cause of fear of childbirth.⁹ Fear of childbirth was found to correlate with prolonged labor¹⁰ as well as with increased frequency of surgical obstetric procedures.¹¹

A review of the literature showed that pregnant women who had high self-efficacy in childbirth had less fear of childbirth.¹² To date, there are various programs designed to reduce fear of childbirth, such as a childbirth support program,¹³ childbirth preparation program,^{14,15} mindfulness program,¹⁶ childbirth psychoeducation programs,^{17,18} and personal counseling program.¹⁹ Recently, obstetrics nurses employed digital applications to enhance childbirth self-efficacy in

pregnant women, e.g., a mobile game application,²⁰ and a website.²¹ The method of education through digital applications is an appropriate approach in the time of the COVID-19 outbreak and is consistent with the care of pregnant adolescents since they often use smartphones in their daily lives.

However, these previous interventions have been conducted in pregnant women or first-time pregnant women of general age, but few of these interventions have ever been studied in pregnant Thai adolescents.^{22,23} Therefore, we were interested in examining the effect of a nurse-led program that incorporated digital applications to increase childbirth self-efficacy and reduce fear of childbirth in pregnant adolescents.

Review of Literature and Conceptual Framework

Fear of childbirth affects the mental health of pregnant adolescents during and after pregnancy.¹⁰ A study reported a high to very high level of childbirth fear in pregnant adolescents and the fear of childbirth increased when approaching labor. Lack of childbirth experience and incorrect childbirth perceptions induces fear of childbirth, leading to stress and anxiety and adversely affecting the physical and psychological health of pregnant adolescents.¹¹ According to Dick-Read's fear-tension-pain cycle,²⁴ labor pain triggers fear, and fear in turn triggers stress. In a study, pregnant adolescents expressed that the causes of their fear were: 1) fear of an unknown and unexpected future, 2) perceived childbirth as a frightening experience, 3) fear for the health of the child, 4) fear of the medical staff in the delivery room, 5) fear of labor pain, 6) fear of loss of self-control and self-determination, and 7) fear of abnormal labor or dangerous labor complications.⁸ Pregnant women who possessed a higher level of self-efficacy in childbirth had a lower level of childbirth fear. Providing childbirth knowledge and skill training can enhance self-efficacy in childbirth among pregnant women,¹² thus reducing their fear of childbirth.

A study reported that there is a strong relationship between self-efficacy and fear of childbirth, and pregnant women who possessed higher levels of childbirth self-efficacy had a lower fear of childbirth.¹¹ Obviously, mobile phones is now playing an important role in teenager life.²² It allows users to conveniently communicate and connect with the world through various digital networking.

The researchers were therefore interested in developing an enhancement program with mobile applications employing the childbirth self-efficacy concept of Lowe,²⁵ together with literature reviews on childbirth self-efficacy enhancement and fear of childbirth reduction interventions and the Cognitive Theory of Multimedia Learning of Mayer.²⁶ Lowe's concept of childbirth self-efficacy is based on Bandura's self-efficacy theory²⁷ to provide pregnant women with self-efficacy in childbirth. Perceptions of self-efficacy in childbirth have been derived from learning from four different sources: 1) verbal persuasion, 2) enactive attainment, 3) vicarious experience, and 4) visceral arousal.²⁵ A review of the literature found that various methods can improve self-efficacy in childbirth, such as providing knowledge about childbirth,¹⁴ performing exercises,²⁸ and managing labor pain.²⁹ In this study, researchers applied the auditory and visual learning process according to Mayer's Cognitive Theory of Multimedia Learning²⁶ through multimedia in the form of a childbirth self-efficacy application as a medium to convey messages or information to pregnant adolescents, as a basic concept to develop a nurse-led childbirth self-efficacy program together with the digital application. The intervention steps of this developed nurse-led childbirth self-efficacy program were as follows: educating pregnant adolescents about the basics of childbirth; exercise techniques; childbirth preparation and labor pain management skills; and promoting self-esteem by encouraging pregnant adolescents during exercise sessions and complimenting them on their good efforts. The mobile application interventions

were then implemented, consisting of the following sections: 1) learning from others' experiences by sharing video clips of adolescent mothers who have had positive experiences with pregnancy and childbirth, 2) a training game for coping with childbirth situations, and 3) promoting regular training on the application to improve self-efficacy in childbirth and reduce their fear of childbirth. The results of this study provide evidence for possible prenatal care that may improve the quality of maternal classes to prevent adverse childbirth outcomes in pregnant Thai adolescents during the COVID-19 pandemic.

Study Aim and Hypothesis

The purpose of this study was to compare self-efficacy in childbirth and fear of childbirth between the experimental group who received a nurse-led childbirth self-efficacy enhancement program with mobile application (NCSEEPMA) and the control group who received only usual care. The following hypothesis was set: participants in the experimental group who received NCSEEPMA would have higher self-efficacy in childbirth and lower fear of childbirth than those in the control group.

Methods

Design: This study was a randomized controlled trial (RCT) with a 2-group, pretest-posttest design blinded in data collection. In writing this report, we followed the CONSORT 2010 checklist of information to be provided when reporting a randomized controlled trial.

Sampling and Setting: The sample was pregnant adolescents < 20 years who received antenatal care at a regional hospital in Southern Thailand. The inclusion criteria were: 1) first pregnancy; 2) gestational age 32-35 weeks; 3) vertex presentation; 4) normal labor plan; 5) Thai language proficiency (listening and reading); and 6) having a mobile phone with

an Android operating system or LINE application. The exclusion criteria were: 1) health complications during the study, such as hypertension, gestational diabetes, prenatal hemorrhage, severe anemia, or abnormal fetal health; and 2) use of psychosocial services. A power analysis was performed to determine the sample size, using a medium effect size of 0.50. The statistical confidence level was set at 0.95 and the statistical power at 0.80. According to Cohen’s power-of-test table, the sample size was 128, consisting of 64 participants in the experimental group and 64 participants in the control group.³⁰ To compensate for possible withdrawals of 5% of participants during the study, the sample was increased to a total of 67 per group.¹⁴

Convenience sampling was used to recruit the participant who met the inclusion criteria. The nurses approached pregnant adolescents receiving antenatal care at a regional hospital in Southern Thailand and asked them if they were eligible for this study. Out of 272 eligible cases, 138 pregnant adolescents did not meet the inclusion criteria, resulting in 134 potential participants in the recruitment. A minimized randomization program was used to control for confounding variables of age³¹ and education.³² Later, 6 participants withdrew (3 from the experimental group and 3 from the control group) because they did not respond to the posttest questionnaires. The diagram of the recruitment process is shown in **Figure 1**.

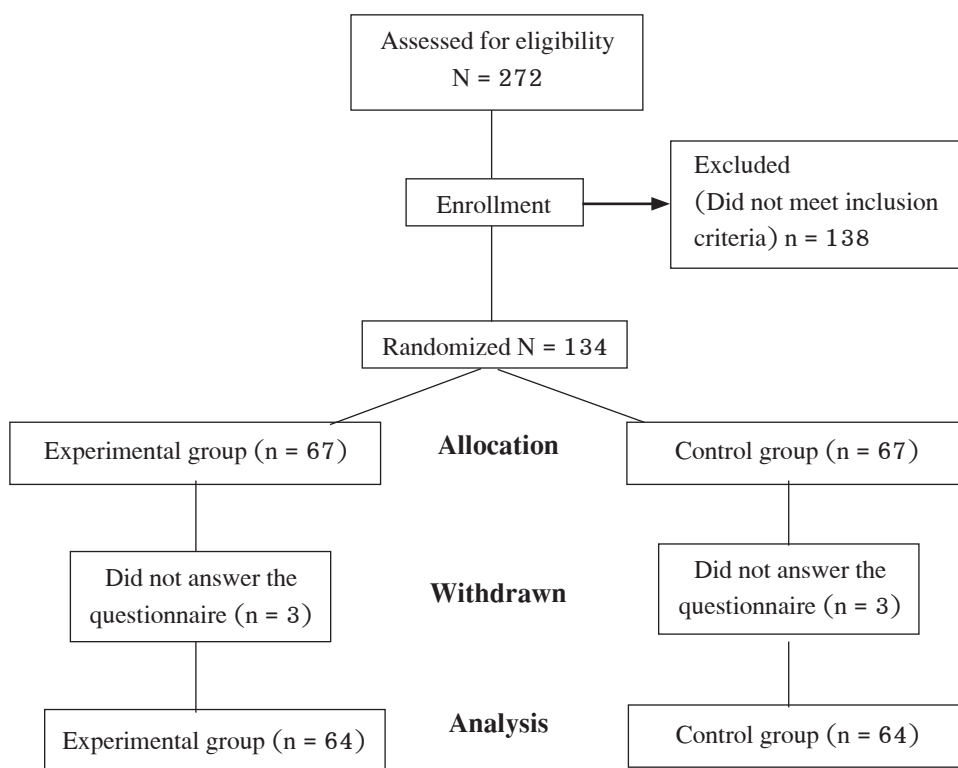


Figure 1. The recruiting process and the progress during the study

Ethical Considerations: This study was approved by the ethics committee of the Center for Social and Behavioral Sciences, Institution Review Board, Prince of Songkla University (Code: PSU IRB 2021-St-Nur-025) and a tertiary hospital in Southern Thailand (Code: HYHEC 090-64-02). Prior to commencing the research, we proceeded a registration in the Thai Clinical Trials Registry (TCTR). The registration was approved on 1st December, 2021 (TCTR20211201003). The primary investigator (PI) informed the participants in writing about the research objective, procedures, and methods and asked for their consent to voluntarily participate in the data collection. Participants younger than 18 years of age were required to provide a signed consent from their parents and witnesses. If the parents were unable to accompany the participant to sign the consent form, the researchers asked for their child's consent to participate via a phone call and had the nurse act as a witness. Participants could withdraw from the study at any time if they wished. All information obtained during the study was kept confidential. The results of the study were presented in general terms, and the names of the participants were not given. If a pregnant adolescent was found to be at risk for health complications, the PI arranged for additional examination and diagnosis by an obstetrician. If the obstetrician determined that the pregnancy posed a risk, the pregnant woman was excluded from the study, with no impact on treatment and no further consequences to them.

Instruments: There were three instruments to obtain the data described below:

The Demographic Characteristics Form was divided into three sections, and had a multiple-choice and fill-in-the-blank format: 1) general demographic information, consisting of 8 questions about age, family monthly income, sufficient of income, marital status, education level, occupation, religion, and family accommodation; 2) pregnancy history, consisting of six questions; gestational age at first antenatal care visit, gestational age at first intervention, antenatal care records, pregnancy intention, want of baby after childbirth, and number of antenatal care visits; and 3) personal demographic data of the baby's father,

consisting of 3 questions; age, education level, and occupation.

The Fear of Childbirth in the Third Trimester Questionnaire (FCTTQ) was developed by Prabdin et al.⁸ It is based on the concept of fear of childbirth by Fisher et al.³³ and was an appropriate instrument for this study because it was also used to measure fear of childbirth of pregnant adolescents in the third trimester. It has seven domains: 1) fear of an unknown and unexpected future (2 items); 2) perceived childbirth as a frightening (2 items); 3) fear for the health of the baby (2 items); 4) fear of the medical staff in the delivery room (3 items); 5) fear of labor pain (2 items); 6) fear of loss of self-control and self-determination (3 items); and 7) fear of abnormal labor or dangerous labor complications (2 items). Thus, the FCTTQ consists of 16 items and is scored on a 5-point Likert scale ranging from "not at all afraid" (score = 0) to "extremely afraid" (score = 4). The overall scores range from 0 to 64; a higher score indicates a higher fear of childbirth. The content validity index (CVI) was 1.00. The questionnaire was pilot-tested with 20 pregnant adolescents who met the same criteria as the sample in the main study, and the Cronbach's alpha coefficient was .91 for the pilot sample and .93 for the main study.

The Childbirth Self-Efficacy Questionnaire was developed by Lowe²⁵ and translated by Tanglakmankhong et al.³⁴ and permission was obtained from the Thai translator to use the Thai Childbirth Self-Efficacy Inventory (TCBSEI). The pregnant adolescents were asked to rate 16 items on a 10-point Likert scale (e.g., "Relax my body," "Tell myself that I can do it"). Thus, the score in each item ranges from 1 to 10 corresponding to "not confident at all" to "extremely confident." The scores range from 16 to 160. A higher total score signifies a higher level of childbirth self-efficacy. The result of the CVI was 0.99; Cronbach's alpha coefficient was analyzed yielding the value of 0.93 for the pilot sample and 0.94 for the main study.

Nurse-led childbirth self-efficacy enhancement program with mobile application (NCSEEPMA): This program was developed based on Lowe's childbirth self-efficacy concept²⁵ together with existing knowledge

relating to childbirth self-efficacy and fear of childbirth and adopting multimedia learning according to Mayer’s theory.²⁶ The instrument consists of two parts: 1) nurse-led childbirth self-efficacy enhancement education plan, and 2) mobile application “Mama Can Do It.” The instrument was validated by five experts, an obstetrician, two nurse educators (with expertise in midwifery or psychiatric and mental health), a technical educator in digital innovation and transformation, and a midwife, to ensure content accuracy and correct readability. A pilot study was conducted on three pregnant adolescents who had similar characteristics to the women in the main study. The interventions were as follows:

1. Nurse-led childbirth self-efficacy enhancement education plan consisting of: (1) pregnancy and childbirth education, covering the pros and cons of

various types of labor, stages of labor, progression of labor, false and true labor pain, preparation for labor, practice for giving birth, and abnormality that the health care provider should be informed about; and (2) physical preparation for labor demonstration and practice consisting of muscle stretching exercise and labor pain management techniques.

2. “Mama Can Do It” is an application developed by the PI. It can be used through a cell phone with an Android operating system or through the application LINE Official Account, which can be downloaded through the QR code created by the PI. It contains content on childbirth education, i.e., basic childbirth knowledge, a training game for coping with the birth situation, and video clips of teenage mothers who have had positive childbirth experiences. The NCSEEPMA was conducted in two sessions, which are listed in **Table 1**.

Table 1. Nurse-led childbirth self-efficacy enhancement program with mobile application intervention step

Time (week)	Objective of content	Activity
1st session	Childbirth self-efficacy enhancement at hospital	
GA 32-35 wks (60 minutes)	<ul style="list-style-type: none"> - Assessing pre-education childbirth self-efficacy and fear of childbirth - Giving education to motivate pregnant adolescents to enhance childbirth self-confidence 	<ul style="list-style-type: none"> - Participants take pre-intervention childbirth self-efficacy and fear of childbirth questionnaires - Giving education to participants on childbirth knowledge and exercise training for childbirth preparation including labor pain management skill training to enhance childbirth self-efficacy - Improving self-confidence of pregnant adolescents by praising and motivating them during education and skill training - Arranging question and answer session to allow participants to clarify their doubts
	Childbirth self-efficacy enhancement on application	
	<ul style="list-style-type: none"> - Learning from teenage mother who had positive childbirth experience 	<ul style="list-style-type: none"> - Learning from experience sharing video clips of teenage mothers who had positive childbirth experience with reflection on the lesson learned
2nd session		
GA 33-36 wks	<ul style="list-style-type: none"> - Promoting consistent childbirth education and training by application 	<ul style="list-style-type: none"> - The researchers sent participants a message to remind them and encourage them to use it consistently one week after the initial intervention
GA 34-37 wks	<ul style="list-style-type: none"> - Assessing post-education childbirth self-efficacy and fear of childbirth 	<ul style="list-style-type: none"> - Pregnant teenagers answer childbirth self-efficacy questionnaires, fear of childbirth questionnaires, and application user satisfaction questionnaire in Google form

Routine care: The pregnant adolescents received routine prenatal care consisting of vital sign examinations (body temperature, blood pressure, and pulse rate), weighing, assessment of current illnesses and medical history, physical examination, abdominal examination, assessment of fetal movements, prenatal laboratory tests, maternity counseling, and health education during pregnancy, including counseling and answering questions about behavior during pregnancy, e.g., diet, exercise, etc.

Data collection: This study was conducted from September 2021 to March 2022. After IRB approval, nurses in the antenatal clinic approached pregnant women, and then the PI recruited pregnant adolescents who met the inclusion criteria and agreed to participate in the study. This study used a single-blinded method in which the data collector was unaware of group assignment. The PI informed participants in both groups about the study before asking them to sign the informed consent form. The experimental group was asked to complete the three questionnaires before receiving the NCSEEPMA and routine care, which was given to participants at 32 to 35 weeks of gestation. The PI provided the NCSEEPMA to the experimental group. The control group was asked to complete the pretest questionnaires before receiving the routine care from the antenatal care clinics. After the intervention (2 weeks), participants in both groups completed a Google Form questionnaire on the FCTTQ and TCBSEI at 34 to 37 weeks gestation.

Data analysis: Analysis of personal and pregnancy demographics of pregnant adolescents and their husbands was performed using frequencies, percentages,

means, and standard deviations. Chi-square and likelihood ratio tests for nominal and ordinal scale variables were used to compare demographic variables between experimental and control groups. The assumptions of the independent t-tests and paired t-tests showed no violation of normality or homogeneity of variance; therefore, the independent t-tests were used to analyze the mean difference of demographic data, self-efficacy in childbirth, and fear of childbirth between two groups, and the paired t-tests were used to compare the mean difference before and after the intervention.

Results

Participant Characteristics

The mean age of the experimental group was 17.05 years (SD = 1.53) and the control group was 17.08 years (SD = 1.58). The majority education level in both groups was secondary school 54 (84.38%) and 50 (78.13%) respectively, including the majority of babies' fathers with education level at secondary school 49 (76.56%) and 52 (81.25%) respectively. More than three quarters in both groups were Buddhists. Regarding income, more than half in both groups had sufficient income. The comparison of the demographic data and histories of pregnancy of the pregnant adolescents and demographic data of the father of the child between experimental and the control groups are shown in **Tables 2, 3, and 4**. Chi-square test and independent t-test revealed no statistically significant difference between the two groups.

Table 2. Demographic characteristics of participants

Personal demographic	Experimental group (n = 64)		Control group (n = 64)		t/χ ²	p-value
	n	%	n	%		
Age (years)					4.08	.67
M(SD)	17.05(1.53)		17.08(1.58)			
Range	13-19		13-19			
Family monthly income					0.01	.36
Baht M(SD) (US\$)	272.92(113.21)		272.92(123.34)			
Range	54.63-491.64		68.28-491.64			

Table 2. Demographic characteristics of participants (Cont.)

Personal demographic	Experimental group (n = 64)		Control group (n = 64)		t/ χ^2	p-value
	n	%	n	%		
Sufficiency of income					0.13 ^a	.72
Sufficient	36	56.25	38	59.38		
Not sufficient	28	43.75	26	40.63		
Marital status					6.81 ^b	.08
Living together, not married	33	51.56	22	34.38		
Married, not registered	15	23.44	25	39.06		
Separated, not married	15	23.44	13	20.31		
Married, registered	1	1.56	4	6.25		
Education level					1.40 ^b	.51
Primary	9	14.06	11	17.18		
Secondary	54	84.38	50	78.13		
Vocational	1	1.56	3	4.69		
Occupation					0.50 ^b	.92
Vacant	29	45.31	32	50.00		
Student	19	29.69	19	29.68		
Business	8	12.50	7	10.94		
Employee	8	12.50	6	9.38		
Religion					2.05 ^b	.44
Buddhist	51	79.69	48	75.00		
Muslim	12	18.75	16	25.00		
Christian	1	1.56	0	0		
Family accommodation					1.82 ^b	.70
Pregnant woman's family	27	42.18	30	46.88		
Baby's father's family	26	40.63	24	37.50		
Own family	11	17.19	9	14.06		
With friend	0	0	1	1.56		

^aChi-square test, ^bLikelihood ratio

Table 3. Pregnancy histories of participants

Pregnancy demographics	Experimental group (n = 64)		Control group (n = 64)		t/ χ^2	p-value
	n	%	n	%		
GA at 1st ANC visit (weeks)					1.04	.31
M(SD)	13.83(0.61)		14.72(0.62)			
Range	6.14-24.86		5.57-25.28			
GA at the 1st intervention (weeks)					0.96	.54
M(SD)	33.26(0.12)		34.43(0.12)			
Range	32.00-35.00		32.00-35.00			

Table 3. Pregnancy histories of participants (Cont.)

Pregnancy demographics	Experimental group (n = 64)		Control group (n = 64)		t/ χ^2	p-value
	n	%	n	%		
Antenatal care records					2.49 ^a	.11
Regular/on due	56	87.50	61	95.31		
Absence/delay	8	12.50	3	4.69		
Pregnancy intention					0.05 ^a	.82
Unexpected	52	81.25	53	82.81		
Intended	12	18.75	11	17.19		
Want of baby after childbirth					1.01 ^a	.31
Want	63	98.44	64	100		
Not want	1	1.56	0	0		
Number of ANC visits					2.32 ^b	.31
More than 4	59	92.19	61	95.31		
Third time	5	7.81	2	3.13		
First time	0	0.00	1	1.56		

^aChi-square test, ^bLikelihood ratio, ANC = Antenatal care, GA = Gestational age

Table 4. Personal demographic of baby's father

Personal demographic	Experimental group (n = 64)		Control group (n = 64)		t/ χ^2	p-value
	n	%	n	%		
Age (years)					2.46	.16
M(SD)	20.30(3.37)		19.00(2.78)			
Range	15-29		14-26			
Education level					0.61 ^a	.89
Primary	12	18.75	10	15.63		
Secondary	49	76.56	52	81.25		
Vocational	2	3.13	1	1.56		
Bachelor degree	1	1.56	1	1.56		
Occupation					2.09 ^a	.56
Employee	34	53.13	36	56.25		
Vacant	14	21.88	10	15.63		
Student	11	17.19	9	14.06		
Business owner	5	7.81	9	14.06		

^aLikelihood ratio

Effect of the NCSEEPMA

At the baseline, there were no significant differences between the two groups in childbirth self-efficacy and fear of childbirth ($p > .05$). Hypothesis testing showed that childbirth self-efficacy in the

experimental group after the intervention was significantly higher than before the intervention ($t = -6.26, p < .001$), and after the intervention the experimental group had significantly higher childbirth self-efficacy than those in the control group ($t = 9.07,$

p <.001). For the fear of childbirth in the experimental group after the intervention was significantly lower than before the intervention (t = 5.01, p <.001),

and significantly lower than the corresponding value in the control group (t = -9.58, p <.001) (Table 5).

Table 5. Comparisons of within and between groups of the pretest and posttest mean scores of a childbirth self-efficacy and the fear of childbirth in the experimental and control groups

Variables	Experimental group (n = 64)	Control group (n = 64)	t	p-value
	M(SD)	M(SD)		
Childbirth self-efficacy				
Pre-test	101.50(26.75)	93.00(29.44)	1.71 ^b	.09
Post-test	126.22(21.61)	85.51(28.66)	9.07 ^b	<.001
t	-6.26 ^a	1.92 ^a		
p-value	<.001	.06		
Fear of childbirth				
Pre-test	31.20(12.51)	35.36(12.20)	-1.90 ^b	.06
Post-test	19.33(11.95)	38.58(10.74)	-9.58 ^b	<.001
t	5.01 ^a	-1.71 ^a		
p-value	<.001	.09		

^a = paired t-test, ^b = independent t-test

Discussion

The results of this study demonstrated the effectiveness of NCSEEPMA in increasing self-efficacy in childbirth and decreasing fear of childbirth. The reasons can be explained as researchers applied Lowe’s concept of childbirth self-efficacy²⁵ and Mayer’s cognitive theory of multimedia learning²⁶ to guide the NCSEEPMA. Pregnant women’s childbirth self-efficacy is based on learning from four different sources: 1) verbal persuasion; 2) enactive attainment; 3) vicarious experience; and 4) visceral arousal.²⁵ Childbirth self-efficacy from all four data sources gives a pregnant woman self-efficacy, confidence, motivation, and effort to achieve her behavior.²⁵ In this study, the PI provided participants with basic knowledge about childbirth, practical exercises, and coping skills for birth pain. In addition, the PI was able to motivate and encourage participants during classes and training to promote their childbirth self-efficacy.

In addition, a component of the NCSEEPMA was improving self-efficacy in childbirth using a mobile

application: learning from experience, sharing video clips of teen mothers who had positive birth experiences, training game for coping with birth pain, and other pregnancy- and birth-related skills. The development of the application was based on Mayer’s cognitive theory of multimedia learning.²⁶ This theory states that multimedia learning is perceived through two types of perception: 1) auditory perception, e.g., narratives; and 2) visual perception, e.g., images and text. An educational application is appropriate for pregnant adolescents, since they are excited about new technologies on mobile platforms.³⁵ Therefore, providing an educational application can improve the learning ability of pregnant adolescents and achieving self-efficacy in childbirth. Besides, the pregnant adolescents experienced other adolescent mothers having a positive and successful childbirth from the intervention that was provided, whereby they were able to project their own birth situation and cope with a positive expectation of the outcome of the birth.²⁹

Moreover, the skill game allowed users to train and improve their skills. The positive effect of

competition in the game stimulated real-life improvements by boosting self-esteem and motivating self-development.³⁶ This result is with a study²⁰ finding an educational game about childbirth in a mobile application can improve the effectiveness of childbirth. In this study, the PI called the participants one week after the initial intervention to remind and encourage them to practice the skills trained in the educational application regularly at home. The participants were able to study what they had learned and used the practice techniques in the application to prepare for childbirth. It was found that regular reminders and encouragement enable pregnant women to recognize the importance and give priority to preparing for childbirth and then to practice consistently to adequately prepare to manage birth situations.²⁹ In addition, positive feedback and encouragement during birth preparation and skills training can boost pregnant women's self-confidence and encourage them to practice the skills they learned to manage their birth situation with a high expectation of self-efficacy,²⁵ then develop a sense of security, and finally have little fear of childbirth.

Recent studies have shown positive results of potential interventions to increase childbirth self-efficacy like our study, such as improving women's knowledge about childbirth through education.^{13,14,28,37,38} A study³⁹ found that pregnant women who attended childbirth education classes received information about childbirth and were encouraged by trained nurses. As a result, the women were more confident about giving birth and had a higher birth capacity than those who were not prepared. Basic childbirth education is the topic with the greatest impact on increasing self-efficacy during childbirth.⁴⁰ Previous studies found that pregnant women who were adequately educated by registered nurses about childbirth knowledge and exercise techniques had better self-efficacy skills during childbirth than women who did not.^{15,21} This is also consistent with another study,²⁸ finding that teaching childbirth preparation techniques in conjunction with pain management training increased

pregnant women's confidence in coping with childbirth situations, which in turn increased self-efficacy during childbirth and decreased fear of childbirth.

The reduction of fear before birth can be explained as follows. According to Dick-Read's fear-tension-pain cycle,²⁴ birth pain triggers fear, and fear in turn triggers stress. We used this model as a guide to break the cycle and establish a new cycle that relies on positive rather than negative forces. The NCSEEPMA includes several activities: teaching birth knowledge; exercise training; emotional support through praise and motivation; and practicing labor pain management skills, each aimed at breaking a specific segment of the cycle. In this study, the PI used the NCSEEPMA to enhance knowledge and self-confidence in childbirth through face-to-face conversations and mobile applications. The information imparted can finally improve self-efficacy in childbirth then reduce fear of childbirth.

Previous literature reviews suggest that childbirth preparation through midwife or nurse-led interventions may increase childbirth self-efficacy and reduce psychological problems, including fear of childbirth. Our findings are consistent with previous studies testing a similar intervention (psychoeducational intervention) that was effective in reducing fear of childbirth and improving women's self-confidence about childbirth,^{17,18} and consistent with a previous study conducted with primigravida women that found that self-efficacy-based counselling can reduce fear of childbirth and increase self-efficacy in pregnant women.¹⁹ A systematic review and meta-analysis also concluded that prenatal education focused on pregnancy and birth can reduce fear of childbirth.³⁸ A study conducted in Thailand also found that prenatal education can reduce fear of childbirth in primiparous women.¹⁴ Thus, midwives can help women develop coping strategies for birth to overcome fear of birth, have a positive birth experience, and prevent negative birth outcomes. The results of this study suggest that NCSEEPMA is likely to increase childbirth self-efficacy and reduce fear of childbirth in pregnant adolescents.

Limitations

The participants in this study were exclusively pregnant adolescents from Southern Thailand, limiting generalization to other groups or settings. In addition, this program may not be suitable for pregnant adolescents who do not own a smartphone. In addition, the duration of the program is quite long, 60 minutes, and may be impractical for antenatal caregivers in some situations.

Conclusions and Implications for Nursing Practice

The NCSEEPMA proved to be suitable for childbirth preparation of pregnant adolescents. Pregnant women who had high self-efficacy in childbirth had less fear of childbirth. The content of the application consists of multimedia learning content to strengthen self-efficacy in childbirth, i.e., text content, pictures, videos, and games that are simple and easy to understand. The application can be run on a cell phone that is easily accessible and available at any time. Antenatal nurses or responsible health personnel could use this intervention or application as an adjunct to routine care of pregnant adolescents, especially in this COVID-19 pandemic. Further research should examine this intervention in different age groups, such as pregnant women older than 35 years and pregnant women with complications. In addition, future research should include a longitudinal study to measure other variables after the implementation of NCSEEPMA, such as the degree of labor pain, the duration of labor, or the labor experience of pregnant women. We recommend that this program and application undergo testing with different sample groups before implementation into practice.

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ผลของโปรแกรมที่นำโดยพยาบาลในการส่งเสริมสมรรถนะแห่งตนและลดความกลัวการคลอดในหญิงตั้งครรภ์วัยรุ่น: การวิจัยทดลองแบบสุ่มและมีกลุ่มควบคุม

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บทคัดย่อ: ความกลัวการคลอดเป็นความรู้สึกทั่วไปที่เกิดขึ้นกับหญิงตั้งครรภ์ตั้งแต่ก่อน ระหว่าง หรือหลังคลอด ความกลัวการคลอดส่งผลกระทบต่อหญิงตั้งครรภ์ทั้งด้านร่างกายและจิตใจ วัตถุประสงค์ของการวิจัยทดลองแบบสุ่มและมีกลุ่มควบคุม เพื่อศึกษาผลของโปรแกรมที่นำโดยพยาบาลร่วมกับการใช้แอปพลิเคชันมือถือในการส่งเสริมสมรรถนะแห่งตนและลดความกลัวการคลอดในหญิงตั้งครรภ์วัยรุ่น กลุ่มตัวอย่างเป็นหญิงตั้งครรภ์วัยรุ่นที่รับบริการฝากครรภ์ในโรงพยาบาลศูนย์แห่งหนึ่งในภาคใต้ของประเทศไทย ใช้มินิโมเซ่ซันในการสุ่มกลุ่มตัวอย่างเข้ากลุ่มทดลองและกลุ่มควบคุม โดยกลุ่มทดลองได้รับโปรแกรม (n = 64) และกลุ่มควบคุมจะได้รับการพยาบาลตามปกติ (n = 64) เครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล ประกอบด้วย 1) แบบสอบถามข้อมูลส่วนบุคคลของหญิงตั้งครรภ์วัยรุ่น 2) แบบสอบถามความกลัวการคลอดของหญิงตั้งครรภ์วัยรุ่นในไตรมาสที่ 3 และ 3) แบบสอบถามสมรรถนะแห่งตนในการคลอดฉบับภาษาไทย วิเคราะห์ข้อมูลด้วยสถิติพรรณนา สถิติทีคู่และสถิติทีอิสระ

ผลการวิจัยพบว่าหลังได้รับโปรแกรม หญิงตั้งครรภ์วัยรุ่นกลุ่มทดลองมีคะแนนเฉลี่ยสมรรถนะแห่งตนในการคลอดสูงกว่าก่อนการทดลอง และมีคะแนนเฉลี่ยความกลัวการคลอดต่ำกว่าก่อนการทดลอง เมื่อเปรียบเทียบระหว่างกลุ่ม พบว่าหลังการทดลองกลุ่มที่ได้รับโปรแกรมมีคะแนนเฉลี่ยสมรรถนะแห่งตนในการคลอดสูงกว่า และมีคะแนนเฉลี่ยความกลัวการคลอดต่ำกว่ากลุ่มควบคุม ผลการวิจัยครั้งนี้แสดงให้เห็นว่าการประยุกต์โปรแกรมส่งเสริมสมรรถนะแห่งตนในการคลอดช่วยเพิ่มสมรรถนะแห่งตนในการคลอดและลดความกลัวการคลอดในหญิงตั้งครรภ์วัยรุ่นได้ ดังนั้นจึงเป็นโปรแกรมที่มีแนวโน้มที่ดีในการดูแลหญิงตั้งครรภ์วัยรุ่น แต่จำเป็นต้องทดสอบใช้กับกลุ่มตัวอย่างอื่นก่อนนำไปใช้จริง

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คำสำคัญ: แอปพลิเคชัน สมรรถนะแห่งตนในการคลอด ความกลัวการคลอด โปรแกรมที่นำโดยพยาบาล หญิงตั้งครรภ์วัยรุ่น

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