Effectiveness of Enhancing Childbirth Self–Efficacy Support Program via LINE Official Account among Pregnant Adolescents: A Randomized Controlled Trial

Tiratta Duangiad, Sopen Chunuan, Warangkana Chatchawet*

Abstract: Pregnancy and childbirth among adolescents present significant challenges during a transitional phase characterized by profound physical, emotional, and social transformations that affect adolescents and their families due to societal norms. In recent years, mobile health (mHealth) applications have gained popularity, offering continuous educational support during pregnancy and significantly enhancing preparedness for childbirth. This study evaluated the effectiveness of an Enhancing Childbirth Self-Efficacy Support Program delivered via the LINE Official Account application on smartphones incorporating childbirth self-efficacy, fear of childbirth, labor pain, and pain-coping behaviors in pregnant adolescents. A randomized controlled trial was conducted with pregnant adolescents receiving antenatal care and delivering at a tertiary hospital in Bangkok between April and September 2024. Participants were randomly assigned to an experimental group (n = 24), which received the program, or a control group (n = 23), which received only usual care. The research instruments included: 1) a Personal Information Questionnaire, 2) the Thai Childbirth Self-Efficacy Inventory, 3) the Fear of Childbirth of Pregnant Adolescents in the Third Trimester Questionnaire, 4) the Fear of Birth Scale, 5) a Numerical Rating Scale for Pain, and 6) a Labor Pain Coping Behavior Assessment. Data were analyzed using descriptive statistics, paired t-test, independent t-test, and the Mann-Whitney U test.

The findings revealed that the program successfully improved self-efficacy in the experimental group. Participants in the experimental group reported significantly less fear of childbirth during pregnancy and labor, experienced lower labor pain, and demonstrated better pain-coping behaviors compared to the control group. Nurses can apply this program to support pregnant adolescents through the developmental process and labor. However, further testing in multi-site studies is necessary.

Keywords: Antenatal care, Childbirth self-efficacy, Fear of childbirth, Labor pain, mHealth, Pain-coping behaviors, Pregnant adolescents, Smartphone application

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Introduction

Pregnancy and childbirth in adolescents pose significant risks due to incomplete physical and emotional development.[1] In 2021, the birth rate among Thai females aged 15-19 was 28.7 per 1,000, highlighting adolescent pregnancy as a public health concern requiring comprehensive support.[2] Health complications such as anemia and low birth weight[1] can impact both the adolescent's well-being and future opportunities. Additionally, families often struggle to provide adequate care and emotional support during this critical period.[3]

Adolescents frequently perceive childbirth as intensely painful and overwhelming, leading to increased fear and self-doubt.[4] Fear of childbirth is more severe among adolescents than adults,[5] and physiologically triggers increased catecholamine levels, which inhibit oxytocin secretion, resulting in poor uterine contractions and delayed labor progression.[6] This cycle of fear-tension-pain intensifies labor pain, stress, and negative birth experiences.[7] Inadequate pain management further contributes to ineffective coping behaviors during labor.[8]

Building childbirth self-efficacy is crucial for reducing fear, managing pain, and improving coping behaviors.[9] Pregnant adolescents with higher self-efficacy exhibit greater confidence and control during labor, leading to better outcomes.[10] Studies suggest that early preparation and continuous support enhance self-efficacy, reducing fear and pain perception.[11] However, existing interventions often lack accessibility, particularly for adolescents who rely on digital technology.

A lack of knowledge and preparation for pregnancy and childbirth can significantly impact adolescents' ability to cope with challenges during this critical period. This knowledge gap often leads to emotional distress, heightened stress levels, and an increased risk of depression and fear of childbirth.[12] Insufficient understanding of the childbirth process can make labor feel overwhelming and difficult to manage.[13] Additionally, misinformation and distrust in healthcare providers can further exacerbate fear and reduce confidence in medical care.[14] Furthermore, inadequate knowledge of pain management techniques during labor can heighten feelings of helplessness and loss of control, potentially leading to long-term family challenges.[15] Therefore, comprehensive education and preparation for pregnancy and childbirth, along with efforts to enhance self-confidence in pregnant adolescents, are essential in mitigating risks and preventing adverse consequences.[16]

This study addresses the gap by developing a childbirth self-efficacy support program delivered via the LINE Official Account (OA) application, a popular platform in Thailand.[17] Integrating Mayer's multimedia learning theory,[18] Lowe's self-efficacy concept,[10] and Dick-Read's fear-tension-pain framework,[7] the program offers tailored educational content through videos and e-books, accessible anytime. Its interactive features provide continuous, convenient support to reduce fear and pain during labor, enhance self-efficacy, and improve pain-coping behaviors and childbirth outcomes.

Conceptual Framework and Review of Literature

Lowe's concept of childbirth self-efficacy emphasizes an individual's ability to evaluate their competence in managing childbirth-related challenges, including fear, pain, and stress.[10] The development of self-efficacy is based on four key sources: mastery experiences, observing successful role models, verbal persuasion, and emotional arousal.[10] Incorporating these elements into the intervention, the program empowers pregnant adolescents to reduce fear, manage labor pain effectively, and improve pain-coping behaviors.

Similarly, Dick-Read's fear-tension-pain syndrome[7] explains a continuous cycle where fear induces tension and stress, exacerbating labor pain.

Breaking the fear-tension-pain cycle involves equipping pregnant women with childbirth knowledge and pain-relief techniques tailored to their needs. This approach not only reduces fear and anxiety but also builds confidence and fosters effective pain management during labor.[19] These strategies equip pregnant adolescents with effective labor pain-coping behaviors, while Mayer's multimedia learning theory enhances the program by optimizing learning through visual and auditory channels.[18] Multimedia tools, including videos, e-books, and quizzes, were used to deliver engaging and accessible content through LINE OA under the name "Easy for Teen Mom," aiming to enhance knowledge retention and facilitate the practical application of skills.

Various studies have emphasized the effectiveness of interventions in alleviating the fear of childbirth and enhancing strategies for coping with labor pain. Childbirth education programs incorporating relaxation techniques, breathing exercises, and visualization have empowered women during labor.[16] Lamaze classes, in particular, have demonstrated success in increasing confidence and alleviating childbirth-related fear through interactive learning and peer support.[20] Additionally, mobile health (mHealth) applications have gained popularity, offering continuous educational support during pregnancy and significantly enhancing preparedness for childbirth.[21]

In Thailand, antenatal education programs that integrate yoga and relaxation techniques have been effective in reducing the fear of childbirth among adolescents.[11] Similarly, community-based initiatives involving experienced mothers and healthcare providers have boosted self-efficacy and reduced anxiety.[22] Telemedicine and digital platforms have also emerged as valuable tools to overcome accessibility challenges and provide consistent support throughout pregnancy and labor.[23] Despite these advancements, existing interventions often fall short of addressing the unique developmental and psychological needs of pregnant adolescents. Many lack a tailored focus and fail to provide ongoing support during labor, a critical time when fear and pain are at their peak.[24]

This study integrated theoretical frameworks with evidence-based practices into the Enhancing Childbirth Self-Efficacy Support Program (ECSESP) via LINE OA, a technology-driven intervention providing continuous support from the antenatal period through labor. Using multimedia-based learning, childbirth education, and skill-building activities, the program reduces the fear of childbirth, manages labor pain, and improves coping behaviors to enhance childbirth outcomes. Antenatal activities included childbirth education, pain relief training, and exposure to positive role models to build confidence. Mastery was developed through demonstrations and simulations, while verbal persuasion via LINE OA reinforced labor readiness. During labor, the program provided verbal encouragement, guided pain relief techniques, and emotional reinforcement to ensure adolescents felt prepared, confident, and supported. By integrating psychological, physiological, and digital strategies, the ECSESP via LINE OA is a comprehensive, adolescent-centered intervention that enhances self-efficacy, reduces the fear of childbirth, alleviates pain, and strengthens coping behaviors. This study advances technology-driven prenatal care by addressing the educational and emotional needs of pregnant adolescents, fostering a more positive, empowering, and less painful childbirth experience.

Study Aim and Hypothesis

This study aimed to test the ECSESP via LINE OA on childbirth self-efficacy, fear of childbirth during labor, labor pain levels, and pain-coping behaviors among pregnant adolescents. The hypothesis was that pregnant adolescents who participated in the program, along with usual care, would exhibit greater childbirth self-efficacy, lower levels of fear of childbirth and labor pain, and more effective pain management behaviors compared to those who received only usual care.

Methods

Design: This randomized controlled trial (RCT) employed a single-blind design, randomly assigning pregnant adolescents to experimental and control groups. The report writing followed the CONSORT 2010 checklist to ensure comprehensive and transparent reporting of the study.

Sampling and Setting: The sample in this study consisted of pregnant adolescents under the age of 20 (as of their expected due date) who attended antenatal clinics and delivered at a tertiary hospital in Bangkok. Inclusion criteria were: 1) gestational age of 34-35 weeks at the study's start, 2) cephalic presentation with no fetal abnormalities, 3) absence of high-risk pregnancy or chronic conditions (e.g., hypertension, gestational diabetes, heart disease, thyroid disease, multiple pregnancies, or cervical insufficiency), 4) no contraindications for vaginal delivery, 5) ability to read, write, and understand Thai, and 6) ownership of a smartphone with internet access and familiarity with the LINE application.

The sample size was determined using G*Power 3.1 software, based on effect sizes from similar studies (3.61, 2.82, and 1.30),[11,23] indicating significant effects. A conservative effect size of 0.80 was used, with an alpha level of 0.05 and power of 0.80, yielding a required sample size of 21 participants per group. This was increased by 30% to account for potential dropouts, resulting in 28 participants per group. Recruitment was conducted purposively through posters and antenatal clinic nurses, who screened participants against the inclusion criteria.

Pregnant adolescents who met the inclusion criteria were consecutively enrolled in the study after being approached by nurses at the target hospital and agreeing to participate. Of the 147 women examined, 56 met the inclusion criteria. These participants were randomly assigned into experimental and control groups using Minimized Randomization software to balance variables such as maternal age,[18] educational level,[1] and childbirth experience.[22] However, nine participants withdrew (four from the experimental group and five from the control group) due to incomplete participation, leaving final group sizes of 24 in the experimental group and 23 in the control group (**Figure 1**).

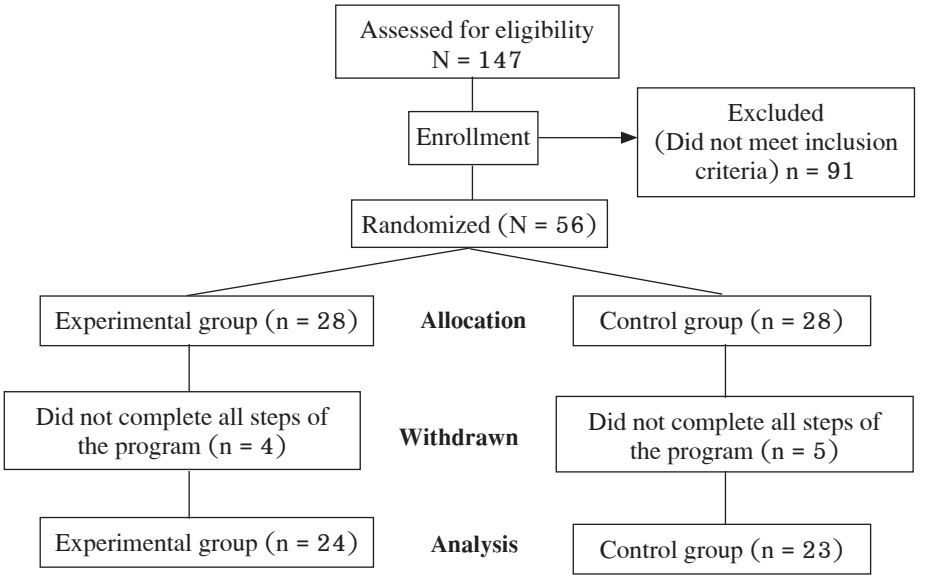

Figure 1. The recruiting process and the progress during the study

Potential biases in this study were mitigated through several measures. To control test bias, fear of childbirth was assessed both before and after the experiment, using the same standardized instrument with a two-week interval between measurements. Research assistants were trained to ensure consistency in interpretation. They were responsible for collecting data during labor, including assessing fear of childbirth, pain levels, and pain-coping behaviors. Participants were randomly allocated to either experimental or control group to maintain an equal distribution of sample sizes. Additionally, the data collectors were blinded to provide objective and unbiased data collection.

Ethical Considerations: This study received ethical approval from the Ethics Review Committee of the Human Research Ethics Center, Social and Behavioral Sciences at Prince of Songkla University (Code: PSU IRB 2023-St-Nur-036), and the Bangkok Metropolitan Administration Human Research Ethics Committee (Code: U004hh/67). The study was registered with the Thai Clinical Trials Registry (TCTR) before participant enrollment and officially accepted on April 25, 2024 (TCTR20240425004). All participants received detailed information about the study, including its objectives, procedures, benefits, risks, and their rights to participate voluntarily or withdraw. Written consent was obtained from all participants, with additional parental consent required for those under 18 years of age. In cases where parents were unavailable in person, consent was obtained by telephone, with hospital staff acting as witnesses. Participants were assured that withdrawing from the study would result in the immediate destruction of their data, with no impact on their current or future care, and that they would continue to receive usual care.

Instruments: Six instruments were used to obtain the data, described below:

The Demographic Characteristics Form included three subcategories: 1) General information about age, marital status, religion, education level, occupation, average monthly family income, residence, and support during pregnancy; 2) Pregnancy information involving gestational age at the first antenatal visit, gestational age during the current visit, body mass index during pregnancy, previous childbirth experience, pregnancy planning, and intention or desire to have a child; and 3) Delivery information collected during labor, including gestational age at delivery, the number of antenatal visits, estimated fetal weight, initial cervical dilation upon admission, and time taken for cervical dilation progression. Three content experts reviewed the instrument to ensure validity. Adjustments were made to align with the study's objectives, enhancing its relevance and accuracy for collecting data on pregnant adolescents.

The Thai Childbirth Self-Efficacy Inventory (TCBSEI) was developed by Lowe[10] and adapted into Thai by Tanglakmankhong and colleagues.[25] This tool assesses Thai women's childbirth self-efficacy and is applicable to primiparous and multiparous individuals. It includes 16 items, with responses rated on a 10-point scale ranging from 1 ("not confident at all") to 10 ("completely confident") (e.g., "can control pain during each instance" and "prepared to face labor pain each time"). In this study, the total score range for the TCBSEI was 16 to 160, with higher scores reflecting greater self-efficacy. The TCBSEI achieved a content validity index of 1.00, confirmed by three experts. Pilot testing with 20 pregnant adolescents in Bangkok yielded a Cronbach's alpha of 0.95 in the pilot. Cronbach's alpha in the main study was 0.93.

The Fear of Childbirth of Pregnant Adolescents in the Third-Trimester Questionnaire (FCPA-TTQ), developed by Prabdin et al.,[26] was used to assess the thoughts and fears of pregnant adolescents regarding their impending birth. The questionnaire consists of 16 items spanning seven dimensions: 1) fear of the unknown or inability to predict events (2 items), 2) perception of childbirth as frightening (2 items), 3) fear for the baby's health (2 items), 4) fear of the medical staff in the delivery room (3 items), 5) fear

of labor pain (2 items), 6) fear of losing self-control and personal self-determination (3 items), and 7) fear of abnormalities or danger during childbirth (2 items). The answers are rated on a 5-point Likert scale ranging from "not at all" (score = 0) to "very much" (score = 4), with the total scores ranging from 0 to 64. Higher scores indicate a higher level of fear. Examples include: "I think childbirth is scary" and "I am afraid that the staff in the delivery room will let me down and leave me alone." The questionnaire achieved a CVI of 1.00, confirmed by three experts. Pilot testing with 20 pregnant adolescents in the antenatal care unit of a hospital in Bangkok yielded a Cronbach's alpha of 0.85. The main study's reliability coefficient was 0.93, indicating high internal consistency.

The Fear of Birth Scale (FOBS), adapted from Prasan et al.,[24] was used to measure the intensity of women's fears and anxieties about childbirth. This visual analog scale (VAS) comprises two items rating: 1) the level of fear of childbirth and 2) the level of anxiety about childbirth. The scale ranges from 0 to 10 cm, with zero at the extreme left end and 10 at the extreme right end. For item 1, the left end (0) represents "no fear of childbirth at all," while the right end (10) represents "extremely afraid of childbirth." For item 2, the left end (0) signifies "I feel calm," while the right end (10) indicates "I feel extremely anxious." The total score for fear of childbirth is the sum of the scores for the two items, and the average is calculated. Higher scores indicate a greater fear of childbirth. For this study, the instrument achieved a CVI of 1.00 and Cronbach's alpha of 0.90 in the pilot and 0.93 in the main study, confirming reliability.

The Numerical Rating Scale for Pain (NRSP). This scale was used to assess pain intensity during labor. The scale consists of a straight line marked with continuous numbers ranging from 0 to 10, where 0 indicates "no pain," and 10 represents "the worst possible pain." Adolescent pregnant women self-evaluate their pain levels by selecting a number that corresponds to their perceived pain intensity. Pain intensity was assessed twice during labor: in the latent phase (cervical dilation less than 4 cm) and the active phase (cervical dilation between 4-10 cm). The NRSP is a standard tool widely used both nationally and internationally. Due to its established credibility as a pain assessment instrument, it was not tested for validity or reliability in this study.

The Labor Pain Coping Behavior Assessment (LPCBA), developed by Chuchuay,[27] assesses pregnant women's coping behaviors during labor across five dimensions: facial expressions, verbal expressions, vocal expressions, physical movements, and breathing patterns. The total score ranges from 0 to 10, with higher scores indicating effective pain-coping behaviors (e.g., "Complaining about the pain, the discomfort, or asking for help," and "Unable to control breathing, such as breathing faster or slower than normal almost all the time"). Observations are conducted during two labor phases: the latent phase (cervical dilation less than 4 cm) and the active phase (cervical dilation between 4-10 cm). In the current study, the LPCBA achieved a CVI of 1.00. Interrater reliability, evaluated by five experienced nurses who assessed 10 similar participants in the antenatal care clinic of a hospital in Bangkok, yielded a Cohen's Kappa of 0.90.

The Enhancing Childbirth Self-Efficacy Support Program via LINE OA

The ECSESP via LINE OA was developed to support pregnant adolescents from the antenatal period through labor. Combining in-clinic activities with follow-up via LINE OA, the program was validated by experts for content accuracy, clarity, and language. It was piloted with three adolescents to ensure feasibility. The program includes an e-book covering childbirth preparation, labor stages, pain management techniques, and exercises to promote labor progression. There is a two-way interaction through a skill stimulation plan delivered via the LINE OA. This platform provides motivational messages and reminders to practice pain management techniques and physical preparation at

home. Additionally, it allows pregnant adolescents to send questions and receive responses, offering continuous support and the option to inquire at any time throughout the program.

The LINE OA platform, accessible via QR code, features three parts: e-book content, educational videos on childbirth preparation and intrapartum care (including guidance on pain relief and labor progression), and interactive demonstrations with simulated delivery scenarios. Together, these components integrate knowledge, skills, and motivation to empower pregnant adolescents for a positive childbirth experience. The details and implementation of the program are shown in **Appendix Table A1.**

Usual care refers to the routine nursing care provided to pregnant women by antenatal clinic and delivery room nurses in accordance with the hospital's standard guidelines and practices. During the antenatal period, this care included education based on the Quality ANC Service Guidelines, screening, prenatal checkups, ultrasound examinations, referrals to adolescent clinics, and group education as part of the parent school curriculum. Information was also recorded in the maternal and child health record book, and follow-up appointments were scheduled in alignment with the Thai Ministry of Public Health's standards. During labor, routine care involves initial assessments, such as taking a medical history, screening for risk conditions, conducting physical examinations, assessing vital signs, monitoring labor progression, evaluating fetal health, and assessing uterine contractions. Women were informed about their treatment plan, potential complications, and the current progress of labor.

Data Collection: This study was conducted from April to September 2024 after obtaining IRB approval. Recruitment posters were placed at the history-taking desk in the antenatal clinic to invite pregnant adolescents to participate, and clinic nurses screened potential participants based on the inclusion criteria. The primary investigator (PI) introduced eligible participants to the study, obtained written informed consent, and delivered the program to those in the experimental group. The study followed a single-blind design, where only the PI was aware of group assignments. Before receiving the intervention or usual care, all participants completed three pre-test questionnaires: the Demographic Characteristics Questionnaire, TCBSEI, and FCPA-TTQ. The research assistant (RA) collected the TCBSEI and FCPA-TTQ again at 36 to 37 weeks of gestation. During labor, the experimental group participated in two activities in the delivery room: one in the latent phase and another in the active phase, where they received the program and completed questionnaires. The research assistants collected additional delivery information, including data on the variables FOBS, NRSP, and LPCBA, before the intervention in the latent phase and during the active phase for both groups.

Data Analysis: The data were processed and analyzed using statistical software. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to analyze demographic data. For hypothesis testing, assumptions were evaluated before analysis. The Shapiro-Wilk test, along with visual assessments of histograms and Q-Q plots, was used to evaluate normality. At the same time, the homogeneity of variances for the independent t-test was checked using Levene's test, and no violations were found. The mean scores for childbirth self-efficacy and fear of childbirth during pregnancy (pre- and post-intervention) among adolescents who had received the ECSESP were normally distributed and met the assumptions for paired t-tests, which were subsequently applied. The mean scores for fear of childbirth during labor, pain intensity, and pain-coping behaviors during the latent phase met the normality and equal variance required for the independent t-test. However, the values for labor pain and pain-coping behavior during the active phase showed a non-normal distribution and were analyzed with the Mann-Whitney U test. No other violations of the assumptions were observed. The significance level was established at 0.05.

Results

Characteristics of the participants

The experimental and control groups comprised pregnant adolescents aged 14-19. Most participants in both groups were Buddhists. Regarding educational background, most participants in the experimental group had attained lower secondary or primary education, while the control group had a mix of lower and upper secondary education. Most participants in both groups were unemployed, with smaller proportions identified as students or laborers. Most families in both groups reported a monthly income of THB 10,001-15,000 (USD 277.80-416.67) and provided primary support during pregnancy. A comparison of demographic characteristics, pregnancy-related information, and childbirth details between the groups using chi-square and independent t-tests revealed no statistically significant differences, as presented in **Table 1.**

Table 1. Demographic characteristics, pregnancy histories, and childbirth histories of participants (N = 47)

Characteristics	Experimental group (n = 24)		Control group (n = 23)		t/χ^2	p-value
	n	%	n	%		
General information						
Age (years)					-1.65[a]	0.106
M (SD)	17.46 (1.64)		18.17 (1.30)			
Min-Max	14-19		15-19			
Marital status					0.34[b]	0.842
Single	7	29.16	5	21.74		
Married/Couple	16	66.67	17	73.91		
Separated	1	4.17	1	4.35		
Religion					1.00[c]	0.748
Buddhism	23	95.83	22	95.65		
Islam	1	4.17	1	4.35		
Education					0.55[d]	0.748
Primary school	8	33.33	7	30.44		
Junior high school	10	41.67	8	34.78		
Senior high school	6	25.00	8	34.78		
Occupation					2.05[b]	0.555
Student	7	29.17	3	13.04		
Freelance	7	29.17	7	30.44		
Unemployed	9	37.50	12	52.17		
Self-employed	1	4.16	1	4.35		
Family income/month THB (USD)					7.38[b]	0.117
< 5,000 (138.89)	4	16.67	0	0.00		
5,000-10,000 (138.89-277.78)	6	25.00	7	30.44		
10,001-15,000 (277.80-416.67)	10	41.67	8	34.78		
15,001-20,000 (416.69-555.55)	1	4.16	3	13.04		
20,000 (555.55) up	3	12.50	5	21.74		
Living arrangement					3.84[b]	0.146
My husband	2	8.33	5	21.74		
Husband's family	4	16.67	7	30.44		
Own family	18	75.00	11	47.82		

Table 1. Demographic characteristics, pregnancy histories, and childbirth histories of participants (N = 47) (Cont.)

Characteristics	Experimental group (n = 24)		Control group (n = 23)		t/χ^2	p-value
	n	%	n	%		
Supporter					2.72[b]	0.257
My husband	8	33.33	6	26.09		
Husband's family	2	8.33	6	26.09		
Own family	14	58.34	11	47.82		
Pregnancy information						
GA at 1st ANC visit (weeks)					0.48[a]	0.636
M (SD)	16.08 (3.38)		14.96 (7.78)			
Min-Max	5-35		5-34			
GA at 1st intervention (weeks)					0.53[a]	0.597
M (SD)	34.33 (0.48)		34.26 (0.50)			
Min-Max	34-35		34-35			
Body mass index (kg/m^2)					-1.63[a]	0.110
M (SD)	24.64 (5.78)		27.14 (4.67)			
Min-Max	17.50-44.26		21.18-41.16			
Childbirth experience					1.00[b]	0.625
Yes	4	16.67	4	17.39		
No	20	83.33	19	82.61		
Pregnancy planning					1.00[b]	0.679
Planned	2	8.33	2	8.70		
Unplanned	22	91.67	21	91.30		
Pregnancy intention					1.00[b]	0.625
Intended	4	16.67	4	17.39		
Unexpected	20	83.33	19	82.61		
Childbirth information						
GA at delivery (weeks)					18.54[a]	0.210
M (SD)	39.05 (0.71)		39.33 (0.75)			
Min-Max	38-40		38-40			
Number of antenatal care visits					-.044[b]	0.665
Meets the standard	12	50.00	10	43.48		
Does not meet the standard	12	50.00	13	56.52		
Estimation of fetal weight (gram)					13.10[a]	0.290
M (SD)	2,990.21 (232.90)		3,025.43 (298.43)			
Min-Max	2,480-3,255		2,170-3,720			
Early cervical dilation (centimeters)					1.80[a]	0.410
M (SD)	2.25 (0.74)		2.13 (0.87)			
Min-Max	1-3		1-3			
Cervical dilation duration (hours)					42.95[a]	0.221
M (SD)	8.15 (2.88)		9.93 (5.20)			
Min-Max	2.50-14.00		4.35-29.30			

Note. [a] = Independent test, [b] = Likelihood ratio, [c] = Fisher's exact test, [d] = Chi-square test

Effect of the ECSESP via LINE OA

At baseline, there were no statistically significant differences between the two groups on childbirth self-efficacy or fear of childbirth during pregnancy ($p > 0.05$). After the intervention, the experimental group demonstrated a significant increase in childbirth self-efficacy ($p < 0.001$) and a significant decrease in fear of childbirth during pregnancy ($p < 0.001$). In contrast, the control group showed a significant decrease in childbirth self-efficacy ($p = 0.004$) and a significant increase in fear of childbirth ($p = .091$) during pregnancy (**Table 2**).

Table 2. Comparison of fear of childbirth and self-efficacy before and after intervention between experimental and control groups (N = 47)

Variables	Experimental group (n = 24)	Control group (n = 23)	t	p-value
	M (SD)	M (SD)		
Childbirth self-efficacy				
Pre-test	93.33 (25.41)	95.48 (32.54)	-0.25[a]	0.802
Post-test	143.54 (8.12)	84.26 (25.77)	10.54[a]	< 0.001
t	8.95[b]	-3.26[b]		
p-value	< 0.001	0.004		
Fear of childbirth during pregnancy				
Pre-test	26.92 (12.39)	29.91 (13.30)	-7.99[a]	0.428
Post-test	12.39 (6.59)	34.00 (12.10)	-8.05[a]	< 0.001
t	-6.17[b]	1.77[b]		
p-value	< 0.001	0.091		

Note. [a] = Independent t-test, [b] = Paired t-test

During labor, the experimental group reported significantly less fear of childbirth in both the latent ($p < 0.001$) and active phases ($p < 0.001$) and less pain in both the latent ($p < 0.001$) and active phases ($p < 0 .001$) compared to the control group. In addition, the experimental group showed significantly better pain-coping behaviors in both phases of labor ($p < 0.001$ and $p < 0.001$) (**Table 3**).

Table 3. Comparison of fear of childbirth, pain, and pain-coping behaviors between the experimental and control groups (N = 47)

Variables	Experimental group (n = 24)			Control group (n = 23)			t/Z	p-value
	M (SD)	Mean rank	Sum of rank	M (SD)	Mean rank	Sum of rank		
Fear of childbirth during labor								
Latent phase	3.17 (2.04)			6.30 (2.40)			-4.84[a]	< 0.001
Active phase	4.08 (2.04)			8.26 (2.30)			-6.59[a]	< 0.001
Pain								
Latent phase	2.96 (1.40)			5.22 (2.76)			-3.50[a]	< 0.001
Active phase	6.21 (1.69)	15.50	372.00	8.83 (1.97)	32.87	756.00	-4.44[b]	< 0.001
Pain-coping Behaviors								
Latent phase	8.71 (1.30)			6.35 (1.75)			5.27[a]	< 0.001
Active phase	7.42 (2.36)	33.23	797.50	3.39 (2.41)	14.37	330.50	-4.74[b]	< 0.001

Note. [a] = Independent t-test, [b] = Mann-Whitney U test

Discussion

This study demonstrated the effectiveness of the Enhancing Childbirth Self-Efficacy Support Program (ECSESP) among pregnant adolescents. Participants who participated in the ECSESP through LINE OA improved childbirth self-efficacy, experienced less fear of childbirth, reduced labor pain, and enhanced pain-coping behaviors compared with the control group, supporting the study's hypotheses. The decrease in fear can be linked to the application of Lowe's childbirth self-efficacy framework,[9,10] which focuses on enhancing confidence by incorporating mastery experiences, observing others, receiving verbal encouragement, and managing emotional responses. Mastery experiences, including simulations and demonstrations, allowed participants to practice pain management techniques and breathing exercises tailored to labor stages, reducing fear and anxiety.[9,23] Viewing videos of the delivery room environment and hearing successful childbirth stories from peers further alleviated fear associated with unfamiliar settings, fostering a sense of preparedness and safety.[28,29] Emotional arousal, supported by weekly motivational messages and personalized feedback, ensured participants remained emotionally ready and consistently practiced their skills.[30,31]

These findings are consistent with previous studies demonstrating that fear of childbirth is prevalent among adolescents, driven by a lack of knowledge, inexperience, and the unpredictability of labor.[12,15] Pregnant adolescents face multiple factors that impact their physical, emotional, and social development, making it difficult for them to navigate these challenges independently. These factors differ significantly from those experienced by adult women with greater life experience.[32] Similar findings were reported in a qualitative study in Iran, where structured programs addressing fear through practical strategies and emotional support proved effective in alleviating adolescent childbirth fear.[12] Additionally, structured antenatal education programs have significantly improved childbirth self-efficacy and reduced fear, highlighting the importance of providing pregnant adolescents with appropriate knowledge and tools to manage childbirth effectively.[33,34] However, our findings contrast with studies indicating that interventions focusing solely on verbal persuasion without skill-building or mastery experiences have limited impact on reducing fear, suggesting that a multidimensional approach is essential.[13]

Fear of childbirth has also been associated with adverse childbirth experiences, poor outcomes, and a higher likelihood of requesting unnecessary medical interventions.[13,33,35] Addressing this fear early through comprehensive, interactive programs such as the ECSESP aligns with research emphasizing the critical role of early intervention in promoting positive childbirth experiences.[11,33]

The program also demonstrated significant efficacy in addressing labor pain and improving pain-coping behaviors. The findings align with Dick-Read's fear-tension-pain cycle, which posits that fear exacerbates muscular tension, intensifying labor pain.[7] Participants in the experimental group reported significantly lower pain levels and demonstrated better pain-coping behaviors than those receiving standard care. A prior study supports our findings, suggesting that reducing fear can break this cycle, allowing women to manage labor pain more effectively.[36]

The ECSESP also includes the preparation of pregnant adolescents from pregnancy to childbirth, which boosts their confidence.[23] However, fear increases during labor. Reviewing knowledge and applying skills learned during pregnancy help them better understand labor.[16] Offering support and encouragement reduces stress and fear, breaking the fear-tension-pain cycle.[7] The incorporation of non-pharmacological pain management techniques, such as proper breathing exercises, massage, and hot compresses, provided participants with practical tools to alleviate pain.[37] These strategies align with findings that relaxation methods stimulate endorphin release, reducing pain perception and associated stress.[38] The program's

emphasis on tailored care and supportive environments, including companionship and coaching during labor, empowered participants to approach labor confidently and manage pain effectively. This aligns with previous research demonstrating that continuous birth support significantly reduces pain and improves coping behaviors compared to standard nursing care.[11,39]

Our findings are consistent with prior research showing that digital interventions, such as application-based programs designed to enhance childbirth self-efficacy, improve coping strategies among first-time pregnant adolescents.[23] However, while studies highlight the benefits of digital platforms for delivering educational content,[21] some argue that digital interventions may not fully address emotional support needs in all populations. In this study, the integration of two-way communication through Line OA provided immediate feedback and emotional support, bridging gaps commonly observed in other digital-only interventions.[18,40]

This study highlights the effectiveness of ECSESP, a holistic intervention for pregnant adolescents that integrates Dick-Read's fear-tension-pain cycle and Lowe's self-efficacy theory to address childbirth's psychological and physical aspects. Delivered via the LINE Official Account, the program offers accessible educational content and interactive support and consistently aims to reduce fear, enhance self-efficacy, and improve childbirth outcomes.

Limitations

This study identified several limitations of the ECSESP via LINE OA. The interactive Q&A feature increased nurses' workload, which AI chatbots could mitigate. The program's reliance on digital literacy and smartphone access may exclude some users, highlighting the need for orientation sessions or printed materials. While tailored, the lack of adaptive learning technologies limits personalization. Additionally, the study focused on pregnancy and labor outcomes without assessing long-term maternal and neonatal health.

Conclusions and Implications for Nursing Practice

The ECSESP via LINE Official Account (OA) is a technology-enabled intervention that improves pregnant adolescents' knowledge, confidence, and pain management while reducing midwives' workload. It offers a scalable alternative to traditional antenatal education through continuous digital and real-time labor support, particularly in resource-limited areas. For nursing practice, digital tools such as the ECSESP should be integrated for constant care, better education, and improved pain management, especially for adolescent mothers in underserved areas.

Future research should investigate scalable alternatives, such as trained midwives or AI-powered chatbots, and evaluate their impact on birth outcomes, long-term maternal and newborn health, and program sustainability. Expanding similar digital-human interventions to other urban areas could further support the national integration of digital maternal health care.

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Appendix

Table A1. Steps for implementing the Enhancing Childbirth Self-Efficacy Support Program via LINE OA

Time (week)	Objective of content	Activity
Activities during pregnancy include		
1st session GA 34-35 wks	**Preparation for childbirth at antenatal clinic** (25 minutes)	
	- Assess childbirth fear and self-efficacy before labor - Equip pregnant adolescents with knowledge and skills for labor preparation and pain management, and promote labor progress confidently	- Administer self-efficacy and childbirth fear questionnaires - Instruct to download LINE app, add "Easy for Teen Mom" LINE OA, and demonstrate usage - Provide labor preparation and exercise information through an E-book online OA - Demonstrate and practice exercises, pain management, and labor progression techniques via video online OA
2nd session GA 35-36 wks	**Activity of watching various childbirth-related videos via LINE OA**	
	- To build confidence and understanding of the childbirth process in pregnant adolescents by providing essential knowledge	- The researcher sends a greeting sticker. - Participants select "Activity 2" to watch two 5-minute videos: "What to Expect During Labor" and "What is Natural Childbirth and How to Prepare." - After watching, they play the game "I Know About Childbirth" to assess their knowledge.
3rd session GA 36-37 wks	**Activity: A simulation of facing childbirth situations at antenatal clinic** (25 minutes)	
	- To build trust with pregnant adolescents - To help them gain proficiency in childbirth through simulations - To foster a positive attitude towards childbirth and boost self-confidence - To assess fear of childbirth and self-efficacy after the trial	- Greet and inquire about general well-being - Ask about labor scenarios and have participants demonstrate pain relief methods based on cervical dilation stages using LINE OA videos. - If incorrect, review and guide with praise and encouragement. - Show a video of a young mother sharing her positive childbirth experience to encourage participants - Have participants complete self-efficacy and childbirth fear questionnaires.

Table A1. Steps for implementing the Enhancing Childbirth Self-Efficacy Support Program via LINE OA (Cont.)

Time (week)	Objective of content	Activity
4th session GA 37-38 wks	**Activity to encourage weekly practice and physical preparation for childbirth at home via LINE OA until delivery**	
	- To motivate and encourage pregnant adolescents in body preparation and pain management for childbirth	- Ask about general well-being, encourage body preparation, practice pain relief techniques, and offer support - Inquire about fear of childbirth - Address questions and provide advice on any issues - Emphasize the importance of check-ups and when to go to the hospital - Remind about contact methods during labor
GA 38 until delivery	Weekly reminders are sent through the LINE OA chat platform until labor to ensure continuous practice of pain relief techniques and labor progress, helping pregnant adolescents feel supported and guided at all times.	
5th session: Activities during labor include		
Latent phase (Cervix < 4 cm dilated)	- To build confidence and self-trust in pregnant adolescents - To review and apply pregnancy knowledge during labor	- Assess fear of childbirth, pain, and pain-coping behaviors - Review care procedures from admission through the first 2 hours postpartum (5 minutes)
Active phase (Cervix 4-10 cm dilated)	- To prevent isolation during labor - To apply skills practiced during pregnancy in labor - To build confidence and self-trust	- Provide comfort and assistance - Update on labor progress - Encourage pain relief and coach on breathing techniques (according to the needs of the laboring woman) - Offer praise for correct skill use - Assess fear, pain, and pain-coping behaviors

ผลของโปรแกรมส่งเสริมการรับรู้สมรรถนะแห่งตนในการคลอดผ่านการใช้ไลน์ออฟฟิเชียลแอคเคาท์ของหญิงตั้งครรภ์วัยรุ่น : การวิจัยทดลองแบบสุ่มและมีกลุ่มควบคุม

ติรัตตา ด้วงเอียด โสเพ็ญ ชูนวล วรางคณา ชัชเวช*

บทคัดย่อ: การตั้งครรภ์และการคลอดในวัยรุ่นเป็นความท้าทายที่สำคัญในช่วงการเปลี่ยนแปลงที่มีลักษณะเฉพาะซึ่งเต็มไปด้วยการเปลี่ยนแปลงทางร่างกาย อารมณ์ และสังคม ส่งผลกระทบทั้งต่อวัยรุ่นและครอบครัว เนื่องจากบรรทัดฐานทางสังคม การศึกษานี้เป็นการวิจัยเชิงทดลองแบบสุ่มและมีกลุ่มควบคุม มีวัตถุประสงค์เพื่อศึกษาผลของโปรแกรมส่งเสริมการรับรู้สมรรถนะแห่งตนในการคลอดผ่านการใช้ไลน์โอเอต่อการรับรู้สมรรถนะแห่งตนในการคลอด ความกลัวการคลอด ความปวด และพฤติกรรมการเผชิญความปวดในระยะคลอดของหญิงตั้งครรภ์วัยรุ่นที่มาฝากครรภ์และคลอด ณ โรงพยาบาลระดับตติยภูมิแห่งหนึ่งในกรุงเทพมหานคร ตั้งแต่เดือนเมษายน ถึง กันยายน พ.ศ. 2567 สุ่มกลุ่มตัวอย่างเข้ากลุ่มใช้โปรแกรมมินิไมเซชันเข้ากลุ่มทดลองและกลุ่มควบคุม กลุ่มทดลองได้รับโปรแกรม (n = 24) ส่วนกลุ่มควบคุมได้รับการพยาบาลตามปกติ (n = 23) เครื่องมือที่ใช้ในการวิจัยประกอบด้วย 1) แบบสอบถามเกี่ยวกับข้อมูลส่วนบุคคล 2) แบบวัดสมรรถนะแห่งตนในการคลอดฉบับภาษาไทย 3) แบบสอบถามความกลัวการคลอดของหญิงตั้งครรภ์วัยรุ่นในไตรมาสที่สาม 4) แบบวัดความกลัวการคลอดด้วยสายตา มาตรวัดความรู้สึกเจ็บปวดชนิดที่เป็นตัวเลข 5) มาตรวัดความรู้สึกเจ็บปวดชนิดที่เป็นตัวเลข และ 6) แบบประเมินพฤติกรรมการเผชิญความเจ็บปวดในระยะคลอด วิเคราะห์ข้อมูลด้วยสถิติพรรณนา สถิติทีคู่ สถิติทีอิสระ และสถิติแมน-วิทนีย์ยู

ผลการวิจัยพบว่าหลังได้รับโปรแกรมกลุ่มทดลอง มีสมรรถนะแห่งตนในการคลอดสูงขึ้น มีความกลัวการคลอดในระยะตั้งครรภ์น้อยกว่าก่อนการทดลอง เมื่อเปรียบเทียบระหว่างกลุ่ม พบว่ากลุ่มทดลองมีความกลัวการคลอดในระยะตั้งครรภ์และระยะคลอด และมีความปวดน้อยกว่ากลุ่มควบคุม รวมทั้งมีพฤติกรรมการเผชิญความปวดดีกว่ากลุ่มควบคุม ดังนั้น จึงควรนำโปรแกรมนี้ไปประยุกต์ใช้ในการดูแลหญิงตั้งครรภ์วัยรุ่นโดยให้การดูแลอย่างต่อเนื่องตั้งแต่ระยะตั้งครรภ์จนถึงระยะคลอด เพื่อส่งเสริมผลลัพธ์การคลอดที่ดี ทั้งนี้ ควรมีการทดสอบโปรแกรมในวงกว้างเพื่อยืนยันประสิทธิผลในกลุ่มประชากรอื่นเพิ่มเติม

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คำสำคัญ: การดูแลระยะตั้งครรภ์ สมรรถนะแห่งตนในการคลอด ความกลัวการคลอด เจ็บครรภ์คลอด การสื่อสารสุขภาพผ่านอุปกรณ์เคลื่อนที่ พฤติกรรมการเผชิญความปวด หญิงตั้งครรภ์วัยรุ่น แอปพลิเคชันบนสมาร์ตโฟน

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