Effects of a Self-Management Support Program on Knowledge, Anxiety, and Self-Care Behaviors in Women with a Low-Grade Squamous Intraepithelial Cervical Lesion: A Quasi-experimental Study

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Abstract: Low-grade squamous intraepithelial lesions, which represent mild abnormalities in cervical cytology, are being identified with increasing frequency among women. Encouraging effective self-care practices is a key strategy for preventing or slowing the progression of precancerous cervical conditions. This quasi-experimental study was part of a larger study aimed at developing and evaluating the impact of a self-management support program. We employed an integrated framework of self-management theory and feminist theory on women's knowledge, anxiety levels, and self-care behaviors following a diagnosis of low-grade cervical cytological abnormalities.

A total of 50 eligible women were purposively selected from a university hospital in Bangkok, Thailand. Participants were allocated sequentially, with the comparison group (n = 25) enrolled prior to the experimental group (n = 25). Women in the experimental group received the self-management support program in addition to standard care, whereas those in the comparison group received standard care alone. Data were collected between May 2020 and June 2021 using the Personal Information Questionnaire, the Knowledge of Abnormal Cervical Cytology Questionnaire, the State-Trait Anxiety Inventory, and the Health-Promoting Lifestyle Profile II. Statistical analyses included descriptive statistics, the chi-square test, independent t-test, Wilcoxon signed-rank test, Mann–Whitney U test, and ANCOVA.

The findings demonstrated a significant improvement in self-care behaviors among participants in the experimental group only. Post-intervention comparisons showed that women who received the self-management support program achieved significantly higher levels of knowledge and self-care behaviors than those receiving usual care alone. However, no significant difference in state anxiety was observed between the two groups. Overall, the results suggest that the self-management support program was effective in increasing knowledge and promoting positive health behaviors, although it did not significantly reduce anxiety. This program requires further testing in other groups before application to practice by nurses as an educational and empowerment tool to support women with low-grade squamous intraepithelial lesions in managing their health and reducing the risk of cervical cancer progression through practical guidance and accessible resources.

Keywords: Cervical cancer, Feminist theory, Low-grade squamous intraepithelial lesions, Self-management support program, Women

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Introduction

Cervical cancer is a significant health problem affecting women worldwide, and among all the cancers that occur among women globally, cervical cancer ranks fourth.[1-3] It adversely affects women's physical and psychological health, disrupts familial and social roles, and imposes substantial economic burdens due to high treatment costs.[4] Importantly, cervical cancer is largely

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preventable through early detection and timely treatment of precancerous lesions.[5] In response to this situation, the World Health Organization (WHO) has initiated a global program to eliminate cervical cancer from the public health system by 2030.[1] However, the cervical cancer burden is likely to increase in the future, unless preventive measures are expanded.[6]

Prevention and management strategies include human papillomavirus (HPV) vaccination, regular screening, and timely treatment.[7] As screening programs expand, the detection of abnormal cervical cytology has increased, particularly for mild lesions. Low-grade squamous intraepithelial lesion (LSIL) is a common mild abnormality that often regresses spontaneously but may progress to higher-grade lesions.[8] Nearly 40% of women with mild cervical lesions are lost to follow-up within 24 months.[8] Despite this high attrition rate, management and supportive interventions for women with abnormal cytology remain insufficient, and evidence on effective follow-up strategies is limited.[7,9]

Although LSIL is generally considered a low-risk abnormality, the unexpected diagnosis often causes uncertainty, anxiety, and misconceptions about cervical cancer risk.[8] Knowledge and self-management are essential for women with LSIL, as they enable active participation in a management approach that primarily involves surveillance and lifestyle modification, thereby supporting spontaneous regression and preventing disease progression.[10] Appropriate education helps women understand that LSIL is typically noncancerous and self-limiting, which substantially reduces psychological distress.[11]

Women who are well informed are more likely to adhere to recommended follow-up procedures, such as repeat cytology or colposcopy, which are critical for early detection of progression to high-grade lesions or cervical cancer.[12] In contrast, inadequate information and support may hinder acceptance of the diagnosis, compliance with follow-up, and engagement in preventive self-care behaviors.[13] Therefore, enhancing educational and self-management support for women with LSIL cytology is imperative. Accordingly, the aim of this study was to evaluate a tailored self-management support program for women with LSIL and to assess its effectiveness in improving knowledge, promoting self-care behaviors, and reducing anxiety.

Conceptual Framework and Review of Literature

This study was guided by an integrated framework combining Creer's self-management theory[14] and Andrist's feminist model for women's health,[15] which had not been used previously in LSIL or other studies. As shown in **Appendix Table A1**, Creer's theory emphasizes individuals' active regulation of health behaviors,[14] whereas Andrist's model centers women's experiences and promotes equitable, responsive care.[15] These perspectives formed the basis for developing the self-management support program for women with low-grade squamous intraepithelial lesions.

Although LSIL is not a chronic condition, its management requires ongoing monitoring and behavioral adjustment, consistent with self-management principles. In this study, self-management refers to women's ability to increase health awareness, monitor bodily changes, and modify behaviors to reduce disease progression, consistent with Creer's dynamic process of goal setting, information processing, decision-making, action, and self-reflection.[14]

Andrist's feminist model adds a gender-sensitive lens by emphasizing shared decision-making, access to accurate information, and recognition of sociocultural influences on women's health.[15] By integrating behavioral self-regulation with women's empowerment, this framework supports an intervention designed to promote positive health behaviors while ensuring respectful, individualized care for women with LSIL.

In accordance with the conceptual framework guiding the self-management support program for women diagnosed with LSIL cytology results, the present study employed three primary outcome measures: knowledge, anxiety, and self-care behaviors. Knowledge was identified as a fundamental element because it empowers women to actively participate in healthcare decisions and to establish individualized health objectives.[15] Anxiety was included as another key outcome, given that receiving an abnormal Pap smear result often elicits heightened emotional distress and uncertainty.[16] Self-care behavior was equally emphasized within the outcome framework. Women with LSIL are usually asymptomatic, and the abnormal cellular changes occur internally, making them imperceptible without screening. Consequently, many women with LSIL may not recognize behaviors that contribute to increased risk.[17] Adopting appropriate self-care practices—such as maintaining balanced nutrition, obtaining adequate sleep, engaging in regular physical activity, safe sex, and refraining from smoking—can bolster immune function.[3] Enhanced immunity may, in turn, help prevent genital human papillomavirus (HPV) infection or slow the progression of cervical epithelial abnormalities, ultimately decreasing the likelihood of developing high-grade lesions or cervical carcinoma.[18] A systematic review to examine the effectiveness of health education in preventing cervical cancer found that educational interventions significantly improved participants' knowledge, which in turn enhanced cervical cancer awareness and screening participation.[19]

The self-management support approach aims to empower women with LSIL to take a proactive role in managing their own daily health care. By enhancing understanding of their condition and promoting self-efficacy, this intervention encourages sustained engagement in preventive behaviors.[20] Accordingly, this study was conducted in Thailand to evaluate the program's effectiveness, contributing to the growing global body of evidence supporting targeted interventions for women with LSIL cytology findings.

Study Aim and Hypotheses

The study aimed to investigate the effects of a self-management support program on knowledge, anxiety, and self-care behaviors in Thai women with LSIL cytology results. It was hypothesized that participants who received the program would show: 1) higher mean scores of knowledge and self-care behaviors compared to their baseline scores and compared to those receiving only usual care; and 2) lower mean scores of state anxiety at 12 weeks compared with baseline, and compared to those receiving only usual care.

Methods

Design: This research employed a quasi-experimental design with a pretest-posttest structure and a nonrandomized comparison group. The reporting of the study adhered to the guidelines recommended by the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement.[21]

Samples and Setting: Participants were recruited via purposive sampling using predetermined inclusion criteria. The sample comprised women aged 18-59 years who had been identified as having LSIL on cervical cytology and were attending a colposcopy clinic for their initial evaluation. Exclusion criteria included the presence of other gynecological disorders, a previous diagnosis of cancer, pregnancy, or postmenopausal status. All participants were required to communicate in Thai and provide written informed consent. The study was conducted at the colposcopy clinic of a university-affiliated hospital in Bangkok, Thailand.

The sample size for this quasi-experimental employing a pretest-posttest design with a comparison group, was determined using G*Power 3.[22] Since no studies using a self-management support program were found in women with abnormal Pap smears, and the outcomes measured in existing studies using

a self-management support program in other conditions differed from those in this study, the researcher applied standardized effect sizes to calculate the sample size. The calculation was based on a significance level of 0.05 and a statistical power of 0.80. Due to the restrictive inclusion criteria, particularly a specific population and the short recruitment period, the researchers employed a large effect size to make the study mathematically feasible with the limited number of participants available. This feasibility study aimed to investigate the effect of a newly developed program for women with cervical LSIL on selected health outcomes. The computation indicated that 42 participants would be sufficient, with 21 per group. However, based on evidence from previous research reporting an attrition rate of approximately 20% over a three-month follow-up period,[23] an adjustment was made to account for potential dropout. Consequently, the final sample size was increased to 50 participants, with 25 assigned to the experimental group and 25 to the comparison group.

Ethical Considerations: Ethical approval for this research was given by the Ethical Review Committee of the Faculty of Medicine Ramathibodi Hospital, Mahidol University (COA.MURA2020/139). The present study represented the second phase of an earlier publication entitled "Perceptions and needs of women with low-grade squamous intraepithelial lesions on cervical cytology: a qualitative descriptive study."[10] Prior to enrollment, all eligible participants received the study information, including objectives, methods of data collection, research benefits and risks, and signed the written informed consent document. Participation was entirely voluntary, and individuals were free to discontinue their involvement at any point without any consequences.

Participant privacy and data confidentiality were rigorously protected. All research documents were de-identified, with numerical codes replacing personal identifiers. Data were securely stored in a locked cabinet with access restricted to the research team. Study results were presented only in aggregated form for scholarly dissemination. To ensure fairness, participants assigned to the comparison group were offered the self-management support program after data collection.

Research Instruments: This study employed two categories of instruments: data-collection tools and the intervention instrument. Data were gathered using five self-administered questionnaires.

The Personal Information Questionnaire was designed by the primary investigator (PI) in collaboration with the research team, drawing on relevant empirical literature.[24] This questionnaire collected participants' demographic and background information, including age, marital status, religious affiliation, educational attainment, occupation, perceived financial status, health insurance coverage, age at first sexual intercourse, number of sexual partners, reproductive history, number of children, contraceptive practices, history of alcohol consumption and tobacco use, and the presence of cervical cancer among first-degree relatives.

The Knowledge of Abnormal Cervical Cytology Questionnaire was used to assess participants' understanding and awareness of abnormal cervical cytology, cervical cancer, human papillomavirus (HPV), and colposcopy. This questionnaire was modified from the tools developed by Kaewsomboon et al.[25] and Taepisitpong and Kantathavorn,[26] with permission from the original developers of both instruments to adapt the content to this study and ensure coverage of all aspects. The revised questionnaire consisted of 28 items, each offering three response options: true, false, or "do not know." Answering a question correctly earns 1 point, while incorrect or uncertain answers receive 0 points. The maximum total score ranged from 0 to 28 points, with higher scores indicating greater knowledge. To confirm content validity, the instrument was reviewed by five experts: one physician specializing in gynecology, two nurse

instructors with expertise in obstetrics and gynecology, and two registered nurses specializing in gynecology. The content validity index (CVI) of the questionnaire equaled 0.97, indicating excellent content congruence. Reliability testing using the Kuder-Richardson-20 (KR-20) formula was performed on 30 Thai women with abnormal cervical cytology before its use, yielding a reliability coefficient of 0.89. For this study, the reliability coefficient was 0.90.

The State-Trait Anxiety Inventory (STAI) was used to evaluate participants' anxiety levels. Initially developed by Spielberger,[27] this instrument—formally titled the *State-Trait Anxiety Inventory for Adults™ (STAI-AD)* and published by Mind Garden, Inc.—has been translated into more than 40 languages. It is widely accepted for assessing anxiety in adult populations. Authorization to use the Thai version of the STAI was obtained from Mind Garden, Inc. for this study. In the present research, state anxiety reflected women's immediate emotional reactions after receiving their LSIL cytology results, whereas trait anxiety represented a relatively stable tendency associated with individual personality characteristics. The STAI consists of 40 items, divided evenly into two subscales: 20 items assessing state anxiety (Form Y-1) and 20 items measuring trait anxiety (Form Y-2). Responses are rated on a four-point rating scale. For Form Y-1, response options range from not at all to very much so, while Form Y-2 responses range from "almost never" to "almost always." Each item is scored from 1 to 4, yielding total scores of 20 to 80 per subscale, with higher scores indicating greater anxiety. Prior reliability testing among 30 women with abnormal cervical cytology demonstrated Cronbach's alpha values of 0.93 for Form Y-1 and 0.90 for Form Y-2, indicating high internal consistency. In the current study, the Cronbach's alpha coefficients were 0.95 for state anxiety and 0.88 for trait anxiety.

The Health-Promoting Lifestyle Profile II (HPLP-II), developed by Walker et al.,[28] was employed in this study to assess self-care behaviors among women with LSIL cytology results. Permission to use the instrument was obtained prior to data collection. The HPLP-II contains 52 items across six dimensions: health responsibility, physical activity, nutrition management, interpersonal relationships, stress management, and spiritual growth. Each item measures the frequency of engagement in health-promoting behaviors using a four-point rating scale ranging from never (1) to regularly (4). Total scores range from 52 to 208, with higher scores indicating more consistent and favorable self-care behaviors. With permission from the original developers, the HPLP-II was translated into Thai by Sriyuktasuth,[29] who reported a Cronbach's alpha coefficient of 0.87 when the instrument was applied to Thai women with systemic lupus erythematosus, supporting its reliability. The translator granted approval to use this validated Thai version in the present study. Internal consistency reliability of the HPLP-II was further confirmed, with Cronbach's alpha values of 0.95 in a pilot sample of 30 Thai women with abnormal cervical cytology and 0.93 in the current study.

The Patient Satisfaction Questionnaire was developed by the PI and the research team to evaluate the self-management support program. Five experts assessed the content validity of this questionnaire: one physician specializing in gynecology, two nurse instructors specializing in obstetrics and gynecology care, and two registered nurses specializing in gynecology care. The questionnaire's CVI was 1.00. The patient satisfaction questionnaire measured the extent to which women perceived that the self-management support program satisfied their needs and evaluated the quality of the program's delivery. This questionnaire was divided into two parts: satisfaction with the process and satisfaction with the outcome. Totally, it consisted of 9 items. The questionnaire was evaluated using a five-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). The total score was sorted from 9 to 45. Higher scores indicated greater satisfaction among participants. The revised self-management

support program was then pilot-tested with six women who met the study inclusion criteria. The pilot study evaluated content comprehension, implementation feasibility, and participant satisfaction, allowing further refinement before full implementation.

The Self-Management Support Program for Women with LSIL Cytology Results

Before this study, a qualitative descriptive study had been conducted to explore women's emotional responses and informational needs following an LSIL diagnosis.[10] Three main themes emerged: 1) emotional responses, including shock, fear, and uncertainty; 2) perceived causes of cervical cellular changes, commonly attributed to unhealthy lifestyle behaviors, poor personal hygiene, and unsafe sexual practices; and 3) the need for healthcare support, emphasizing health education, timely medical consultation, and access to reliable information.[10] Based on these findings and supported by existing literature, a self-management support program was developed to address the identified needs and concerns of women with LSIL. The self-management support program for women with LSIL cytology results, together with its educational materials, was validated by a panel of five experts, including a gynecologist, two obstetrics and gynecology nurse instructors, and two registered nurses with gynecology expertise. Construct validity was assessed by evaluating the clarity, accuracy, and completeness of the program content. The program and materials were subsequently revised in accordance with the experts' recommendations.

Pilot results from testing a patient satisfaction questionnaire to evaluate the self-management support program with 6 women indicated high participant satisfaction, with mean scores for both process and outcome measures exceeding 4.5 out of 5 and an overall satisfaction score of 4.83. Feedback from two participants suggested extending the consultation duration, focusing more on self-care and self-management strategies, and updating the content to be more relevant to the current situation. The program was revised accordingly.

Based on the integration of the self-management theory and feminist theory (**Appendix, Table A1**), feminist principles were embedded throughout the self-management support program by prioritizing women's voices, promoting autonomy, and emphasizing nurse support rather than authority. Information sharing between nurses and women was encouraged to reduce hierarchical relationships. In addition, the program was informed by qualitative findings from women with LSIL, grounded in an understanding of their lived experiences.

Accordingly, the finalized self-management support program consisted of three core components: 1) introduction and goal setting, 2) implementation, and 3) motivation and evaluation. The specific activities for each component were detailed in **Appendix Table A2.**

Usual care referred to the standard care that women with LSIL cytology results received during their clinic visits. This included providing health education through videos, group consultations, and a leaflet on performing a colposcopy.

Data Collection: After ethical approval was granted, participants who met the inclusion criteria were enrolled from the hospital's colposcopy clinic. Data collection was conducted from May 2020 to June 2021. The PI verified participant eligibility, and written informed consent was obtained before participation. Data for both study arms were collected by a research assistant (RA) trained by the PI. To reduce the risk of cross-group contamination, participants assigned to the comparison group were recruited before those in the intervention group.

Baseline information was obtained through self-completed questionnaires covering demographic characteristics, knowledge, anxiety levels measured by the State-Trait Anxiety Inventory (Forms Y-1 and Y-2), and self-care behaviors assessed using the Health-Promoting Lifestyle Profile II. Standard clinical care was provided to all participants before baseline data collection. The comparison group

continued to receive only standard care. In contrast, participants in the intervention group received a structured self-management support program administered by the PI within one week after routine care. This program included small-group educational sessions, personalized goal setting, written materials, and action planning. In addition, motivational text messages were delivered weekly from weeks 2 through 11, and follow-up telephone calls were conducted at weeks 4, 8, and 12, with an additional reminder call placed two days prior to the final follow-up. Outcome assessments were conducted at week 1 for knowledge and at week 12 for state anxiety and self-care behaviors.

Data Analysis: The data were examined using a combination of descriptive statistics and both parametric and nonparametric inferential techniques to compare baseline demographic characteristics and outcome variables between the experimental and comparison groups. Before performing inferential analyses, the assumptions required for parametric testing were evaluated to confirm the suitability of the selected statistical methods. Knowledge outcomes were analyzed using the Wilcoxon matched-pairs signed-rank test to assess within-group changes from pretest to posttest measurements. In contrast, between-group differences in knowledge were examined using the Mann-Whitney U test. Anxiety outcomes, with particular emphasis on state anxiety, were evaluated using an independent-samples t-test to compare scores between the two groups and a paired-samples t-test to assess changes over time within each group. To determine the effectiveness of the intervention on self-care behaviors, paired-samples t-tests and analysis of covariance (ANCOVA) were conducted. ANCOVA was applied to adjust for baseline variations and to estimate the specific impact of the self-management support program on the study outcomes.

Results

The study included 50 participants in total, evenly divided between the two groups. As shown in **Table 1**, there were **no statistically significant differences** ($p > 0.05$) between the two groups' demographic variables, indicating baseline equivalence. At the **baseline assessment**, comparisons of the dependent variables—**state anxiety, trait anxiety, knowledge,** and **self-care behaviors**—were conducted using **independent samples t-tests** after confirming that the assumptions for parametric analysis were met. The results showed **no significant differences** between groups in any of these variables ($p > 0.05$), as displayed in **Table 2.**

Table 1. Comparison of demographic characteristics between groups at baseline (N = 50)

Characteristics	Comparison group (n = 25)		Experimental group (n = 25)		Statistics value*	p-value
	n	%	n	%		
Demographic characteristics						
Age (years)					0.125[c]	0.901
Comparison group: mean = 35.08, median = 35.00, SD = 8.61, min-max = 20-52 years						
Experimental group: mean = 34.76, median = 35.00, SD = 9.53, min-max = 19-54 years						
Marital status					< 0.001[a]	1.000
Single/separated/ divorced	11	44.00	11	44.00		
Married	14	56.00	14	56.00		
Religion affiliation					-	1.000[b]
Buddhist	25	100.00	24	96.00		
Muslim	0	0.00	1	4.00		

Table 1. Comparison of demographic characteristics between groups at baseline (N = 50) (Cont.)

Characteristics	Comparison group (n = 25)		Experimental group (n = 25)		Statistics value*	p-value
	n	%	n	%		
Education attainment					< 0.001[a]	1.000
Less than bachelor's degree	7	28.00	7	28.00		
Bachelor's degree and higher	18	72.00	18	72.00		
Occupation					3.399[a]	0.183
Unemployed	6	24.00	5	20.00		
Employee	10	40.00	16	64.00		
Government officer	9	36.00	4	16.00		
Perceived financial status					-	0.667[b]
Sufficient	23	92.00	21	84.00		
Insufficient	2	8.00	4	16.00		
Health insurance coverage					2.282[a]	0.320
Government officer and state enterprise officer	12	48.00	7	28.00		
Universal coverage scheme and social security scheme	6	24.00	7	28.00		
Private health insurance and self-payment	7	28.00	11	44.00		
Age at first sexual intercourse (years)					-1.708[d]	0.088
Comparison group: mean = 19.52, median = 18.00, SD = 2.86, min-max = 15-25 years						
Experimental group: mean = 21.64, median = 20.00, SD = 4.91, min-max = 16-38 years						
Number of sexual partners					-0.280[d]	0.780
Comparison group: mean = 2.88, median = 3.00, SD = 2.22, min-max = 1-10 persons						
Experimental group: mean = 2.56, median = 2.00, SD = 1.53, min-max = 1-6 persons						
Reproductive history					0.080[a]	0.777
Never be pregnant	12	48.00	13	52.00		
Ever be pregnant	13	52.00	12	48.00		
Number of children					0.082[a]	0.774
No children	15	60.00	14	56.00		
Having children	10	40.00	11	44.00		
Contraceptive practices					-	0.667[b]
Never taken birth control	2	8.00	4	16.00		
Used to take birth control	23	92.00	21	84.00		
Current methods of contraception					1.675[a]	0.433
No contraception	9	36.00	5	20.00		
Hormonal contraception	8	32.00	9	36.00		
Non-hormonal contraception	8	32.00	11	44.00		
History of alcohol consumption					2.885[a]	0.089
No drinking	10	40.00	16	64.00		
Drinking	15	60.00	9	36.00		

Table 1. Comparison of demographic characteristics between groups at baseline (N = 50) (Cont.)

Characteristics	Comparison group (n = 25)		Experimental group (n = 25)		Statistics value*	p-value
	n	%	n	%		
Tobacco use					-	0.609[b]
No smoking	22	88.00	24	96.00		
Used to smoke	3	12.00	1	4.00		
Presence of cervical cancer among first-degree relatives					-	1.000[b]
No having	24	96.00	24	96.00		
Having	1	4.00	1	4.00		

Note. *a = Pearson chi-square test, b = Fisher's exact test, c = Independent t-test, d = Mann-Whitney U test

Table 2. Comparison of the dependent variables between groups at baseline

Dependent variables	Comparison group (n = 25)		Experimental group (n = 25)		t	p-value
	Mean	SD	Mean	SD		
State anxiety	43.80	11.91	46.64	10.27	-0.903	0.371
Trait anxiety	43.08	9.05	44.12	8.14	-0.427	0.671
Knowledge	18.44	5.30	14.92	7.44	1.927	0.060
Self-care behaviors	144.20	20.35	138.36	19.30	1.041	0.303

The effects of a self-management support program

As summarized in **Table 3**, participants in the experimental group showed a statistically significant improvement in knowledge scores following implementation of the self-management support program ($Z = -4.245$, $p < 0.001$), with participants' knowledge after program participation significantly higher than at baseline. Similarly, the results within the comparison group were similar to those from the experimental group ($Z = -4.141$, $p < 0.001$). However, a comparison of the two groups (**Table 3**) revealed that post-intervention knowledge scores in the experimental group were significantly higher than those in the comparison group ($Z = -2.257$, $p = 0.024$). The knowledge was higher in the experimental group, confirming that the program had a positive effect on participants' understanding of LSIL-related health issues.

Table 3. Comparison of knowledge between the comparison group (n = 25) and the experimental group (n = 25) before and after the program implementation

Knowledge	Comparison group (n = 25)		Experimental group (n = 25)		Z	p-value
	Median	SD	Median	SD		
Pretest	19.00	5.30	16.00	7.44	-1.818	0.069[a]
Posttest	26.00	2.30	27.00	3.52	-2.257	0.024[a]
	Z = -4.141, p < 0.001[b]		Z = -4.245, p < 0.001[b]			

Note. [a] Mann-Whitney U test, [b] Wilcoxon Signed-Rank test

For state anxiety, the experimental group's mean score before intervention was 46.64 (SD = 10.27), which decreased to 37.44 (SD = 8.95) at week 12, as shown in **Table 4**. Statistical analysis demonstrated a significant reduction in anxiety after program implementation (t = 4.871, p < 0.001). At week 12, the mean state anxiety scores were 36.36 (SD = 10.35) for the comparison group and 37.44 (SD = 8.95) for the experimental group. The between-group comparison revealed no statistically significant difference in state anxiety levels after the intervention (t = -0.395, $p = 0.695$), as demonstrated in **Table 4**.

Regarding self-care behaviors, participants in the experimental group showed significant improvement after the program. The mean pre-intervention score was 138.36 (SD = 19.30), which increased to 151.24 (SD = 19.00) at week 12, as presented in **Table 4**. Statistical testing confirmed that this increase was significant (t = -3.877, p = 0.001). In contrast, the results of the comparison group showed that there were no statistically significant differences between before and after receiving the usual care at week 12 (t = -0.489, p = 0.629) (see **Table 4**). For analysis of self-care behaviors between two groups, ANCOVA was selected because it provided a more rigorous analysis than an independent t-test, while also reducing error variance and increasing statistical power. The assumptions were verified and met; the ANCOVA was conducted. After controlling for pretest HPLP-II scores, post-intervention analysis indicated that self-care behavior scores at week 12 were significantly higher in the experimental group than in the comparison group ($F_{1,47} = 4.401$, p = 0.041), as shown in **Table 5**.

Table 4. Comparison of state anxiety and self-care behaviors between the comparison group (n = 25) and the experimental group (n = 25) before and after the program implementation in the 12th week

State anxiety	Comparison group (n = 25)		Experimental group (n = 25)		t	p-value
	Mean	SD	Mean	SD		
Pretest	43.80	11.91	46.64	10.27	-0.903	0.371[a]
Posttest	36.36	10.35	37.44	8.95	-0.395	0.695[a]
	t = 3.132, p = 0.005[b]		t = 4.871, p < 0.001[b]			
Self-care behaviors						
Pretest	144.20	20.35	138.36	19.30	1.041	0.303[a]
Posttest	145.84	19.10	151.24	19.00	-1.002	0.321[a]
	t = -0.489, p = 0.629[b]		t = -3.877, p = 0.001[b]			

Note: [a] Independent t-test, [b] Paired sample t-test

Table 5. Comparison of self-care behaviors after the program implementation in the 12th week between the comparison group (n = 25) and the experimental group (n = 25) using ANCOVA

Source	Sum of squares	df	Mean square	F-ratio	p-value
Pretest of HPLP-II	6,962.583	1	6,962.583	31.317	< 0.001
Groups	978.444	1	978.444	4.401	0.041
Error	10,449.337	47	222.326		
Total	1,120,983.000	50			

Discussion

The findings indicated that the self-management support program successfully improved cervical health knowledge and self-care behaviors among women with low-grade squamous intraepithelial lesions. Although a significant anxiety reduction was noted among participants receiving the intervention, this improvement did not differ significantly from that of the comparison group. This result demonstrates effectiveness in increasing knowledge, as the educational content was developed based on the expressed needs of women identified in a prior qualitative study,[10] thereby addressing the gap between the information received and the information desired. Consistent with the theoretical framework, the program employed both verbal and written communication, which has been shown to optimize knowledge acquisition.[30,31] In this study, participants received information on abnormal cervical cytology, cervical cancer, HPV, colposcopy, self-care behaviors, and self-management skills through a small group with the PI, who was a nurse. Each received one-on-one teaching to establish personalized goals, develop their action plans, and carry them out, as well as a printed manual and an e-book to review at home. Previous studies supported our findings in that one-on-one education combined with written materials was more effective than written materials alone in improving knowledge and promoting screening behaviors among women with a positive high-risk HPV.[32,33] A QR code linked to the e-book provided convenient access, and both digital literacy and age diversity were considered in the delivery of the material to ensure inclusivity. The availability of both printed and digital formats allowed women to choose their preferred method, thereby enhancing engagement. Overall, the program's patient education, delivered by a nurse and utilizing tailored materials, effectively improved women's knowledge of self-care.

The self-management support program significantly improved self-care behaviors among women with LSIL cytology results by combining education, goal setting, skill training, motivation, and follow-up via mobile-based SMS and telephone calls. This is consistent with evidence that health education enhances behavior change and health literacy among women with cervical intraepithelial neoplasia (CIN), as accurate knowledge promotes appropriate health practices.[34] Healthy behaviors—including HPV vaccination, regular Pap smear screening, safe sex, avoidance of smoking and alcohol, proper genital hygiene, physical activity, adequate sleep, and stress management—may reduce the risk of HPV infection and progression to precancerous lesions.[3,35]

The program highlighted the often asymptomatic nature of LSIL and the need for continued surveillance, as cytology alone may not reflect disease severity. Printed and digital educational materials, supplemented by SMS reminders and telephone follow-ups, reinforced motivation and monitoring. Consistent with prior evidence, the addition of SMS reminders enhanced Pap smear uptake.[36] Thus, the mobile-based communication effectively reinforced self-care behaviors among women with LSIL cytology results.

The self-management support program significantly reduced state anxiety within the experimental group; however, no statistically significant difference was found between the experimental and comparison groups. This may be because both usual care and the intervention contributed to anxiety reduction. Observations during program implementation suggested that women with both low and high baseline anxiety benefited from the intensive information and anxiety-reduction strategies provided. External factors—such as increased general awareness, social support, environmental changes, and access to information from multiple sources—may also have contributed to anxiety reduction in both groups.

Consistent with previous studies, providing information alone through leaflets, mail, phone, video,

or online sources did not significantly reduce anxiety among women with abnormal cervical cytology.[37-39] Although such interventions may improve understanding and reduce consultation time,[39] increased knowledge did not necessarily alleviate emotional distress.[32,37] Anxiety is typically highest immediately after receiving abnormal Pap smear results[40] and tends to decline naturally over time, often within 12 weeks, regardless of educational intervention.[32,41] Evidence suggests that anxiety reduction is more effective when information provision is combined with individualized emotional support, psychological counseling, and colposcopy consultation, particularly during the initial diagnosis.[24,40,42] Thus, to reduce the anxiety of women with LSIL cytology results, a comprehensive approach beyond education alone was required.

Limitations and Recommendations

Several limitations should be noted. Anxiety was assessed only at baseline and at week 12, rather than immediately post-intervention; therefore, short-term fluctuations may not have been captured. Future studies should include multiple follow-up assessments. The use of total HPLP-II scores may have obscured changes in specific sub-dimensions; analysis of subscales could support more targeted nursing interventions. The lack of random assignment limited causal inference; randomized controlled trials are therefore recommended. Future research should also evaluate the program in women with other abnormal cytology results and consider involving family members to enhance self-care support.

Conclusions and Implications for Nursing Practice

The self-management support program for women with a low-grade squamous intraepithelial cervical lesion effectively improved knowledge and self-care behaviors among women with LSIL cytology results. This program could motivate them to adopt better self-care practices and incorporate self-care into their daily routines under a nurse's guidance. The results indicate that the self-management support program is effective in reducing state anxiety for women who participated in the experimental group. The anxiety reduction they experienced was substantial enough to be considered a significant result among the women who received this program. However, no statistical difference in anxiety scores was found between the experimental and comparison groups. Therefore, after further testing, nurses caring for women with LSIL cytology results can offer this self-management support program, which includes comprehensive education and self-care guidance covering both physical and mental well-being, to reduce anxiety and promote continued self-care, ultimately leading to improved reproductive health outcomes.

The self-management support program provided clear benefits for nurses by enhancing knowledge and promoting self-care behaviors among women with LSIL cytology results. Developed within a women's health framework, the program integrated Creer's self-management theory with feminist theory to support women's health management and increase nurses' awareness of women's health issues. The application of feminist theory emphasizes power sharing, access to information, communal decision-making, and behavioral changes within the nurse-woman relationship.[15]

In practice, nurses should apply the program to educate and support women with LSIL, encourage active participation in health management, and monitor knowledge, physical and mental health status, and adherence to self-care behaviors. Using accessible technologies, such as telephone calls and messaging applications (e.g., LINE), can facilitate communication, follow-up, and ongoing support.

This approach highlights a proactive, supportive, and technology-integrated nursing role in managing abnormal cervical cytology results.

Author Contributions

Conceptualization, Method, and design: S.P., M.A., B.S., A.L., W.G.
Data collection, Drafting the manuscript: S.P., M.A., B.S., A.L., W.G.
Data analysis and interpretation: S.P., M.A., B.S.
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Revising the manuscript: S.P., M.A.
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Appendix

Appendix Table A1. Integration of self-management theory and feminist theory

Self-management theory[7]	Feminist theory[8]	Integration of both theories
1. Goal selection:		
- Patients need a clear understanding of their abnormal Pap smear results and appropriate management to establish specific health goals. - Goal selection emerges through genuine collaboration between patients and health care providers.	- Women's experiences are the main topic of investigation. - The goal of inquiry is to see the life-world from the women's viewpoints. - The provider-patient relationship is mutual reciprocity or non-hierarchical.	- Women are the focal point of goal selection, which will be a unique and personal process. - Before women gain knowledge and self-management skills, the provider must assess their knowledge, self-care behaviors, and perceptions by listening to their lived experience. - Goal selection originates from collaboration between health care providers and women in which the provider-woman relationship is symmetrical.
2. Information collection:		
- The basis of information collection is self-monitoring, including three suggestions: 1) monitoring especially target behaviors; 2) using an objective measure is considered if it is possible; and 3) observing and recording information only during specified periods of time as directed by their health care providers.	- Women's experience is considered a legitimate source of knowledge. - Women are experts on their own lives.	- Women know about their own health so that they can monitor the abnormal signs and symptoms happening in their bodies. - Women can monitor and measure target behaviors during specified periods of time by themselves, as agreed with their health care providers.
3. Information processing and evaluation:		
- Information processing and evaluation consist of five steps: 1) being able to detect any significant changes; 2) comparing the changes against a set of standards including public and idiosyncratic standards; 3) making judgement about their data; 4) evaluating antecedent conditions, their behaviors, and potential consequences that affects behavioral changes in the future; and 5) considering contextual factors in processing and evaluating information regarding the management of their condition.	- Women's experience is considered a legitimate source of knowledge. - Women are experts on their own lives. - Subjective data are valid.	- Women can process and evaluate their cervical health information and their health behaviors. - Subjective data obtained from women's experiences are considered a valuable and reliable source of knowledge.

Appendix Table A1. Integration of self-management theory and feminist theory (Cont.)

Self-management theory[7]	Feminist theory[8]	Integration of both theories
4. Decision making:		
- There are two viewpoints regarding patients' decision-making: 1) patients will be asked not only to make more precise judgments about their chronic conditions, but also to make more complex decisions; and 2) decision-making of the patient is at the essence of successful self-management.	- When women become empowered and gain access to information, they will be able to engage in decision-making regarding their health care. - Women can control their own bodies and health; thus, they can make their own decisions. - The notion of participation is that providers should be placed in the same critical plane as co-participants.	- Women can make their own decisions based on accurate information and critical judgments by sharing what they want with their health care providers.
5. Action:		
- Action is relevant to the patient's performance of self-management skills; so, the patient needs to have self-instruction, including prompting, directing, and maintaining performance. - Action also relies on contextual factors that may support or hinder the performance of self-management skills.	- Women can be responsible for their bodies and health. - Women act in the world within the context of relationships.	- Women can perform self-care behaviors and self-management skills by using self-instruction in collaboration with health care providers. - Women's actions are based on the influence of social, cultural, economic, ethnic, gender, and political values.
6. Self-reaction:		
- Individual patients can assess their abilities to perform self-management skills. - Patients must believe that they are able to perform the skills to attain their realistic goals.	- Women are experts on their own lives. - Women are best known for their bodies and health.	- Women can evaluate their capabilities in terms of the performance of self-management skills and self-care behaviors in order to improve and maintain their health behaviors.

Appendix Table A2. The summary of the self-management support program for women with LSIL cytology results

Parts/ Time	Activities	Materials
Part I: Introduction and goal selection (1st week: 30 minutes)	**Introduction:** - The researcher (PI) introduced herself and her team and explained the purposes and procedures of the self-management support program. - Participants introduced themselves and asked questions. **Patient education:** - Knowledge of abnormal cervical cytology, cervical cancer, HPV, and colposcopy - Self-care behaviors: diet, alcohol drinking and smoking, weight control and exercise, relaxation and sleep, hygiene, psychological well-being, spiritual well-being, and sexual behaviors - Self-management skills: self-monitoring skills, self-evaluation skills, problem-solving skills, decision-making skills, communication skills, and stress management skills **Goal setting and action plan:** Each participant set their own goal, and then initiated their action plan in collaboration with the researcher.	- The manual of the self-management support program - The lesson plans for knowledge about abnormal cervical cytology, cervical cancer, HPV, colposcopy, self-care behaviors, and self-management skills. - The patient manual (a printed book and an e-book) - The worksheet for goal setting and action plan
Part II: Implementation (1st week: 30 minutes)	**Skill trainings in self-management skills:** - Self-monitoring skills - Self-evaluation skills - Problem-solving skills - Decision-making skills - Communication skills - Stress management skills	- The activity plan for skill training - The self-care behavior record form - The self-care behavior evaluation form - The symptom record and evaluation form
Part III: Motivation and evaluation (2nd wk, 3rd wk, 5th wk, 6th wk, 7th wk, 9th wk, 10th wk, and 11th wk) (4th wk, 8th wk, and 12th wk: 10-15 minutes)	**Short message service (SMS) via mobile phone:** Participants were motivated to record their self-care behaviors through SMS. **Telephone call visits:** - Telephone counselling - Telephone reminding (12th wk)	- The guidelines for SMS via mobile phone - The guidelines for telephone call visits

ผลของโปรแกรมสนับสนุนการจัดการตนเองต่อความรู้ ความวิตกกังวล และพฤติกรรมการดูแลสุขภาพตนเองในผู้หญิงที่มีเซลล์ปากมดลูกผิดปกติเล็กน้อย : การวิจัยแบบกึ่งทดลอง

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บทคัดย่อ : เซลล์ปากมดลูกผิดปกติเล็กน้อย มีแนวโน้มตรวจพบเพิ่มมากขึ้นในผู้หญิง การส่งเสริมการดูแลสุขภาพตนเองอย่างมีประสิทธิภาพเป็นกลวิธีสำคัญในการป้องกันหรือชะลอการลุกลามของภาวะก่อนเป็นมะเร็งปากมดลูก การศึกษากึ่งทดลองนี้เป็นส่วนหนึ่งของการศึกษาใหญ่ที่มีวัตถุประสงค์เพื่อพัฒนาและประเมินผลของโปรแกรมสนับสนุนการจัดการตนเอง โดยการศึกษานี้ใช้กรอบแนวคิดแบบบูรณาการทฤษฎีการจัดการตนเองและทฤษฎีสตรีนิยม เพื่อศึกษาผลของโปรแกรมต่อความรู้ ระดับความวิตกกังวล และพฤติกรรมการดูแลสุขภาพตนเองของผู้หญิงภายหลังได้รับการตรวจพบเซลล์ปากมดลูกผิดปกติเล็กน้อย กลุ่มตัวอย่างประกอบด้วยผู้หญิงที่มีคุณสมบัติตามเกณฑ์จำนวน 50 คน ซึ่งคัดเลือกแบบเจาะจงจากโรงพยาบาลมหาวิทยาลัยแห่งหนึ่งในกรุงเทพมหานคร ประเทศไทย ผู้เข้าร่วมการวิจัยได้รับการจัดกลุ่มตามลำดับ โดยเก็บข้อมูลในกลุ่มเปรียบเทียบ (25 คน) ก่อนกลุ่มทดลอง (25 คน) ผู้หญิงในกลุ่มทดลองได้รับโปรแกรมสนับสนุนการจัดการตนเองร่วมกับการดูแลตามมาตรฐาน ในขณะที่กลุ่มเปรียบเทียบได้รับการดูแลตามมาตรฐานเพียงอย่างเดียว การเก็บรวบรวมข้อมูลดำเนินการระหว่างเดือนพฤษภาคม พ.ศ. 2563 ถึงเดือนมิถุนายน พ.ศ. 2564 โดยใช้แบบสอบถามข้อมูลส่วนบุคคล แบบสอบถามความรู้เกี่ยวกับความผิดปกติของเซลล์ปากมดลูก แบบประเมินความวิตกกังวลขณะเผชิญและความวิตกกังวลแฝง (State-Trait Anxiety Inventory) และแบบประเมินพฤติกรรมส่งเสริมสุขภาพ (Health-Promoting Lifestyle Profile II) การวิเคราะห์ข้อมูลใช้สถิติพรรณนา การทดสอบไคสแควร์ การทดสอบทีแบบอิสระ การทดสอบวิลคอกซันแบบจับคู่ การทดสอบแมน–วิทนีย์ยู และการวิเคราะห์ความแปรปรวนร่วม (ANCOVA)

ผลการศึกษาแสดงให้เห็นถึงการพัฒนาของพฤติกรรมการดูแลตนเองที่ดีขึ้นอย่างมีนัยสำคัญทางสถิติของกลุ่มผู้เข้าร่วมการวิจัยในกลุ่มทดลองเท่านั้น เมื่อเปรียบเทียบหลังการทดลองระหว่างกลุ่มพบว่า ผู้หญิงที่ได้รับโปรแกรมสนับสนุนการจัดการตนเองมีระดับความรู้และพฤติกรรมการดูแลตนเองสูงกว่าผู้หญิงที่ได้รับการดูแลตามปกติเพียงอย่างเดียวอย่างมีนัยสำคัญทางสถิติ อย่างไรก็ตาม ไม่พบความแตกต่างอย่างมีนัยสำคัญของระดับความวิตกกังวลระหว่างสองกลุ่ม โดยภาพรวม ผลการวิจัยชี้ให้เห็นว่าโปรแกรมสนับสนุนการจัดการตนเองมีประสิทธิภาพในการเพิ่มพูนความรู้และส่งเสริมพฤติกรรมสุขภาพที่ดี แม้ว่าจะไม่สามารถลดระดับความวิตกกังวลลงอย่างมีนัยสำคัญก็ตาม โปรแกรมนี้ควรได้รับการทดสอบเพิ่มเติมในกลุ่มอื่น ๆ ก่อนนำไปใช้ในทางปฏิบัติโดยพยาบาลในการเป็นเครื่องมือที่ให้ความรู้และเสริมสร้างศักยภาพเพื่อสนับสนุนผู้หญิงที่มีเซลล์ปากมดลูกผิดปกติเล็กน้อยให้สามารถจัดการสุขภาพของตนเองได้และลดความเสี่ยงของการดำเนินโรคไปสู่มะเร็งปากมดลูก ผ่านแนวทางปฏิบัติที่เป็นรูปธรรมและแหล่งข้อมูลที่เข้าถึงได้ง่าย

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