

The Effectiveness of a Self-Efficacy Development Program on Self-Efficacy and Preventive Behaviors Against Electronic Cigarette Use Among Male Vocational Students: A Quasi-Experimental Study

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ABSTRACT:

Electronic cigarette (e-cigarette) use has become an increasing public health concern among adolescents, particularly male vocational students who are at high risk of tobacco use. This study examined the effectiveness of a self-efficacy development program on self-efficacy and preventive behaviors against e-cigarette use among male vocational students in private vocational colleges in Ubon Ratchathani Province, Thailand. A quasi-experimental non-equivalent comparison group pretest–posttest design was conducted with 68 second-year male vocational students assigned to an experimental group ($n = 34$) and a comparison group ($n = 34$). The experimental group participated in an 8-week self-efficacy development program based on Bandura's self-efficacy theory, while the comparison group received the standard health education curriculum. Baseline self-efficacy and preventive behavior did not differ significantly between groups. Following the intervention, the experimental group demonstrated significantly higher self-efficacy and preventive behavior than the comparison group (both $p < .001$), with significant within-group improvements observed only in the experimental group. These findings indicate that the program effectively enhanced self-efficacy and preventive behaviors against e-cigarette use and may provide an effective school-based strategy for preventing e-cigarette use among vocational students.

Keywords: self-efficacy, electronic cigarette, preventive behavior, vocational students, school-based intervention

1. Introduction

Electronic cigarette (e-cigarette) use has emerged as a significant public health concern among adolescents worldwide, with increasing prevalence particularly among vocational students who are at elevated risk of tobacco and

nicotine use. Evidence indicates that adolescent e-cigarette use is associated with an increased likelihood of subsequent combustible cigarette smoking and other adverse health outcomes (Aladeokin & Haighton, 2019; Salari et al., 2024). In Thailand, despite the nationwide prohibition

on the import and sale of e-cigarettes, their use has continued to rise, especially among young people. National surveillance has identified vocational students, particularly males, as one of the highest-risk groups for e-cigarette use (Department of Disease Control, 2024; Ruenphet, 2021).

Bandura's Self-Efficacy Theory (1997) provides a widely accepted framework for promoting health behavior change by strengthening individuals' confidence in their ability to perform desired behaviors. School-based interventions based on self-efficacy or social cognitive theory have been shown to reduce tobacco and e-cigarette use while improving adolescents' confidence in resisting peer pressure (Gardner et al., 2024; Kelder et al., 2020). Similar findings have been reported in Thailand, where theory-based educational programs enhanced students' self-efficacy and tobacco-related preventive behaviors (Putthai, 2023; Takaree et al., 2024).

Despite these encouraging findings, few theory-based interventions have been specifically developed for male vocational students in Thailand, a population that continues to experience disproportionately high rates of e-cigarette use. Preliminary needs assessment conducted at the participating colleges revealed persistent covert e-cigarette use and limited awareness of the associated health and legal risks despite existing school tobacco-control policies. Addressing this gap, the present study developed a self-efficacy development program based on Bandura's Self-Efficacy Theory and examined its effectiveness in improving self-efficacy and preventive behaviors against e-cigarette use among male vocational students enrolled in private vocational colleges in Ubon Ratchathani Province, Thailand.

2. Methodology

Design

This quantitative study employed a quasi-experimental, non-equivalent comparison group pretest-posttest design.

The study was conducted in two private vocational colleges in Ubon Ratchathani Province, Thailand. One college served as the experimental site and the other as the comparison site. Baseline data were collected before the intervention, and posttest data were collected immediately after the 8-week intervention.

Participants/Sample

The study was conducted between April and May 2026 among second-year male vocational certificate students enrolled in the automotive technology program at two private vocational colleges in Ubon Ratchathani Province, Thailand. A total of 68 participants were recruited using multistage sampling. Students from one college comprised the experimental group ($n = 34$), whereas students from the other college comprised the comparison group ($n = 34$). Sample size was determined using G*Power (version 3.1.9.7) with an effect size of 0.70, a statistical power of .80, and a significance level (α) of .05. Eligible participants were male students aged 17–18 years who had never used electronic or combustible cigarettes, were able to communicate in Thai, and provided written informed consent. Students with health conditions that precluded participation or who withdrew during the study were excluded.

Instruments

Data were collected using three instruments: a demographic questionnaire, the 13-item Self-Efficacy for Preventing E-cigarette Use Questionnaire, and the 25-item Preventive Behavior Against E-cigarette Use Questionnaire. Content validity was established by a panel of three experts, yielding an item-level content validity index (I-CVI) of 1.00 for the self-efficacy questionnaire and 0.66–1.00 for the preventive behavior questionnaire. The instruments demonstrated acceptable internal consistency, with Cronbach's alpha coefficients of .84 and .75, respectively.

Procedure

Prior to data collection, ethical approval was obtained from the Nakhon Phanom University Human Research Ethics Committee (approval no. HE 1486-1492/2569). Permission to conduct the study was obtained from the participating vocational colleges. Eligible students and their parents or legal guardians received information about the study, and written informed consent was obtained before participation. Baseline (pretest) data were collected from both the experimental and comparison groups using the study questionnaires. The experimental group participated in an 8-week self-efficacy development program developed by the first author based on Bandura's (1997) self-efficacy theory. The intervention comprised eight weekly 60-minute sessions incorporating mastery experience, vicarious experience, verbal persuasion, and emotional arousal. During Weeks 1–2, participants received interactive health education on the health risks and legal consequences of electronic cigarette use and practiced refusal skills through role-play to strengthen mastery experience. During Weeks 3–4, live peer role modeling, video testimonials, and case discussions were used to enhance learning through vicarious experience. During Weeks 5–6, participants received individual and group motivational counseling, positive reinforcement, peer support, and school–family–community support to enhance self-efficacy through verbal persuasion. During Weeks 7–8, participants engaged in reflective activities using authentic cases, educational games, and anti-electronic cigarette campaign activities to promote emotional awareness and reinforce long-term preventive behaviors. The intervention was reviewed for content validity by three experts and achieved an Index of Item–Objective Congruence (IOC) of 0.91. The comparison group continued to receive the

school's routine health education program without the self-efficacy intervention. Immediately after completion of the intervention, participants in both groups completed the posttest using the same questionnaires. All collected data were coded, de-identified, and prepared for statistical analysis.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequency, percentage, mean, standard deviation, median, and interquartile range, were used to summarize participants' characteristics and study variables. The normality of the data was assessed using the Shapiro–Wilk test. Between-group differences in self-efficacy were analyzed using the Mann–Whitney U test, and within-group changes were examined using the Wilcoxon signed-rank test. Preventive behaviors against electronic cigarette use were analyzed using the independent-samples t-test for between-group comparisons and the paired-samples t-test for within-group comparisons. Statistical significance was set at $p < .05$.

3. Results

Sample Characteristics

All 68 participants (34 per group) completed both baseline and posttest assessments, resulting in a retention rate of 100%. Participants were male Year 2 vocational students enrolled in the automotive technology program. The experimental and comparison groups were comparable with respect to baseline demographic characteristics, with mean ages of 17.29 and 17.38 years, respectively. Detailed participant characteristics are presented in Table 1.

Table 1. Baseline Characteristics of Participants by Study Group

Characteristic	Experimental group (n = 34)	Comparison group (n = 34)
Age (years)		
17	24 (70.6)	21 (61.8)
18	10 (29.4)	13 (38.2)
Mean age, years (SD)	17.29 (0.46)	17.38 (0.49)

Living with family	31 (91.2)	34 (100.0)
Monthly personal income, 1,001–3,000 THB	15 (44.1)	13 (38.2)
Parents living together	19 (55.9)	19 (55.9)
Neither parent uses e-cigarettes	28 (82.4)	22 (64.7)
Close friend(s) use e-cigarettes	16 (47.1)	21 (61.8)
Social media as the primary source of e-cigarette information	27 (79.4)	28 (82.4)

Note. Data are presented as n (%) unless otherwise indicated. SD = standard deviation; THB = Thai baht.

Self-Efficacy for Preventing E-cigarette Use

At baseline, self-efficacy scores did not differ significantly between the experimental and comparison groups. Following the intervention, the experimental group demonstrated significantly higher self-efficacy scores than the

comparison group ($p < .001$). Within-group analysis showed significant improvements in self-efficacy from baseline to post-intervention in both groups, with a substantially greater improvement observed in the experimental group. Detailed results are presented in Table 2.

Table 2. Comparison of Self-Efficacy Scores at Baseline and Post-Intervention Within and Between Study Groups

Group	Baseline Median (IQR)	Post-intervention Median (IQR)	Within- group Z	Between- group U (Z)	P
Experimental group (n = 34)	25.0 (3.50)	42.0 (3.00)	-5.10	-	<.001
Comparison group (n = 34)	24.0 (4.00)	26.0 (2.00)	-4.42	-	<.001
Between-group comparison (baseline)	-	-	-	496.00 (-1.02)	.310
Between-group comparison (post- intervention)	-	-	-	0.00 (-7.13)	<.001

Note. Data are presented as median (interquartile range). Between-group comparisons were performed using the Mann–Whitney U test, whereas within-group comparisons were performed using the Wilcoxon signed-rank test. Mdn = median; IQR = interquartile range.

Preventive Behavior Against E-cigarette Use

At baseline, preventive behavior scores did not differ significantly between the experimental and comparison groups. Following the intervention, the experimental group demonstrated significantly higher preventive behavior scores than the comparison group ($p < .001$), with

85.3% of participants achieving a high level of preventive behavior, whereas 73.5% of participants in the comparison group remained at the low level. Within-group analysis demonstrated a significant improvement in preventive behavior in the experimental group, while no significant change was observed in the comparison group. Detailed results are presented in Table 3.

Table 3. Comparison of Preventive Behavior Scores at Baseline and Post-Intervention Within and Between Study Groups

Group	Baseline Mean (SD)	Post-intervention Mean (SD)	Within-group t	Between-group t	P	95% CI of the Mean Difference
Experimental group (n = 34)	55.91 (6.53)	95.74 (5.63)	41.31	-	< .001	37.86 to 41.79
Comparison group (n = 34)	55.00 (6.35)	55.26 (6.40)	1.36	-	.184	-0.13 to 0.66
Between-group comparison (baseline)	55.91 (6.53)	55.00 (6.35)	-	0.58	.562	-2.21 to 4.03
Between-group comparison (post-intervention)	95.74 (5.63)	55.26 (6.40)	-	27.70	< .001	37.55 to 43.39

Note. Data are presented as mean (standard deviation). Between-group comparisons were performed using the independent-samples t test, whereas within-group comparisons were performed using the paired-samples t test. M = mean; SD = standard deviation; CI = confidence interval.

4. Discussion

The present study demonstrated that the self-efficacy development program significantly improved self-efficacy and preventive behaviors against electronic cigarette use among male vocational students, supporting both study objectives. Consistent with Bandura's self-efficacy theory (1977, 1997), the program combined mastery experiences, peer role modeling, verbal persuasion, and emotional regulation through interactive activities, refusal-skills practice, counseling, and reflection. These experiences likely strengthened participants' confidence in resisting peer pressure and contributed to healthier preventive behaviors. The findings are consistent with previous Thai and international studies reporting that theory-based interventions improve self-efficacy and reduce tobacco- and e-cigarette-related risk behaviors among adolescents (Putthai, 2023; Takaree et al., 2024; Wongpanarak & Wongpiriyayothin, 2022; Kelder et al., 2020; Nadasan et al., 2017). Likewise, Gardner et al. (2024) concluded that school-based e-cigarette prevention programs are generally effective. The

lack of meaningful behavioral improvement in the comparison group further suggests that routine health education alone may be insufficient without opportunities for active participation and repeated behavioral practice. These findings support Bandura's self-efficacy theory as an effective framework for school-based e-cigarette prevention. Vocational schools may integrate structured self-efficacy activities, including refusal-skills training, peer role modeling, and motivational support, into routine health education. Collaboration among schools, healthcare professionals, families, and communities may further strengthen sustainable prevention efforts for adolescents. This study has several limitations. Participants were recruited from only two private vocational colleges and included only male second-year vocational students, limiting generalizability. The intervention was delivered by the researcher, and the comparison group did not receive an attention-control intervention. In addition, outcomes were measured using self-reported questionnaires immediately after the intervention without long-term follow-up. Future studies should include

more diverse populations, longer follow-up periods, and more rigorous study designs.

5. Conclusion

An 8-week self-efficacy development program based on Bandura's self-efficacy theory significantly improved self-efficacy and preventive behaviors against e-cigarette use among male vocational students compared with the standard curriculum alone. These findings support the integration of structured, theory-based self-efficacy interventions into routine health promotion programs in vocational schools. Collaboration among vocational institutions, school nurses, public health professionals, families, and communities may further strengthen sustainable e-cigarette prevention efforts for this high-risk adolescent population.

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