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# Electronic Cigarette Usage and Psychological Distress: Insights from University Students amid the Armed Conflict in Southern Thailand

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Article

# Electronic Cigarette Usage and Psychological Distress: Insights from University Students amid the Armed Conflict in Southern Thailand

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## Abstract

**Background/Objectives:** Electronic cigarettes (e-cigarettes) are a significant public health concern, particularly among young individuals. This study aimed to assess the attitudes and factors, including mental distress, that influence e-cigarette uses among university students in Southern Thailand, including in armed conflict areas. **Methods:** A cross-sectional survey was conducted at the Prince of Songkla University across two campuses: Hatyai and Patani. Data on demographics, attitudes towards e-cigarettes, usage patterns, and mental health (using the 21-item Depression, Anxiety, and Stress Scale) were collected and analysed using R software. **Results:** Among 901 participants (236 men and 665 women), the prevalence of e-cigarette use was 6.9%. Furthermore, male students (odds ratio [OR] = 2.65; 95% confidence interval [CI] = [1.28, 5.46]), tobacco users (OR = 97.56; 95% CI = [26.77, 355.66]), and those living alone (OR = 13.48; 95% CI = [1.21, 150.47]) were more likely to engage in e-cigarette use. Additionally, Islamic students reported lower usage rates than their Buddhist counterparts (OR = 0.32; 95% CI = [0.11, 0.9]). **Conclusions:** E-cigarette users exhibited higher scores on the depression, anxiety, and stress subscales than non-users. Smokers perceived e-cigarettes as a means of reducing tobacco consumption, alleviating stress, and enhancing their image. Moreover, non-smokers considered e-cigarettes should be "illegal" in Thailand.

**Keywords:** attitudes; armed conflict; e-cigarette; mental health; student

## 1. Introduction

Electronic cigarettes (e-cigarettes or vapes) are designed to deliver nicotine in a vapour form [1]. They are predominantly marketed as smoking cessation aids and are potentially less harmful alternatives to traditional cigarettes [2]. E-cigarettes comprise a power source, a cartridge containing an atomiser and liquid solution, and a mouthpiece. The liquid, known as e-liquid or e-juice, is typically composed of glycerol, propylene glycol, water, flavours, and varying levels of nicotine [3]. E-cigarettes aim to mimic the smoking experience without using tobacco [4]. Notably, the World Health Organization expressed concerns about the health risks associated with e-cigarettes, advocating for stricter regulations and warnings to prevent their use among non-smokers, youth, and vulnerable groups [5,6]. Although few studies examined the long-term health effects of e-cigarettes, evidence suggests that e-cigarettes can cause acute endothelial dysfunction, oxidative stress, DNA damage, and other harmful effects [7]. Short-term risks include burns, injuries from device

malfunctions, e-liquid toxicity, lung injuries associated with the usage of e-cigarettes or vaping products, and pneumomediastinum [8]. Increasing evidence of these health risks has led to restrictions on e-cigarette sales in several U.S. states and in more than 98 countries [9].

Despite widespread awareness of the harms, e-cigarette use among children and young adults surged after the Food and Drug Administration approved a 'heat-not-burn' device in 2018 [10]. Even dental students across 11 countries displayed positive beliefs toward e-cigarettes, which affected their professional practices [11]. In Thailand, a study found that 28.7% of vocational students used e-cigarettes, of which 7.4% used them exclusively, and 21.3% used both e-cigarettes and traditional cigarettes [12].

The appealing design and vibrant packaging of e-cigarettes significantly influence young consumers' purchasing decisions. Additionally, the various available flavours, such as fruity and candy, shape adolescents' perceptions, leading them to underestimate the associated risks [13]. Young adults who use e-cigarettes often have a limited understanding of their potential dangers and a low perception of addiction. They consider e-cigarettes to be modern and more socially acceptable than traditional cigarettes [14]. Consequently, e-cigarette use among adolescents and young adults is rising globally, with market growth projected to reach 3.4% annually from 2023 to 2027 [15].

In addition to attractive designs, stress plays a significant role in e-cigarette consumption among youth. A notable percentage of dental students reported using e-cigarettes to relieve stress and enhance pleasure [11]. Healthcare students, who often experience high levels of depression and anxiety, may misinterpret their anxiety as stress, leading them to self-medicate with e-cigarettes and other substances [13]. A study among vocational students in Thailand found a link between higher grade point averages (GPAs) and increased e-cigarette use [11].

This study explored the prevalence and factors related to e-cigarette use and examined the anxiety, depression, and stress levels among university students in Southern Thailand, along with their attitudes toward e-cigarettes. Furthermore, this study examined the relationship between psychological distress (anxiety, depression, and stress) and e-cigarette usage. This study is part of a larger project on e-cigarette use among university students in Southern Thailand, especially those who lived and studied in the armed conflict areas and was approved by the ethics committee of the Faculty of Medicine at Prince of Songkla University (REC 67-094-91).

## 2. Materials and Methods

### 2.1. Study Design and Participants

This observational cross-sectional study was conducted over two weeks, between March and April 2024. A Google Forms digital survey was distributed to undergraduate students enrolled at the Prince of Songkla University, at the Pattani campus, which is located in a conflict-affected area of Southern Thailand, and the Hat Yai campus, which is the university's largest campus, situated in another part of Southern Thailand.

During the academic year, there were 19,173 undergraduate students on the Hat Yai campus and 7,471 on the Pattani campus. The minimum target sample size estimated using the R program was 670 students. This estimation was based on a 95% confidence interval (CI) with a 5% margin of error, and an additional 10% was added to account for potential errors [11]. The inclusion criteria required participants to be students aged >18 years from the Hat Yai and Pattani campuses who were proficient in the Thai language. Students who were experiencing severe mental or physical illnesses during the survey period were excluded.

Convenience sampling was employed to select participants by selecting lecture classrooms from the faculties of three main schools (health-related sciences, non-health-related sciences, and social sciences) that were officially scheduled during the survey period at both campuses.

## 2.2. Data Collection and Study Variables

The questionnaire comprised four sections: demographic information; smoking habits; attitudes toward e-cigarettes; and the 21-item Depression, Anxiety, and Stress Scale (DASS-21 [15]).

First, data were gathered on the participants' sociodemographic characteristics, including age, sex, marital status, religion, academic year, faculty, place of residence, monthly income, perceptions of family relationships, and physical or mental health issues. Additionally, the history of drug use and smoking habits among close contacts was explored [16].

Second, the four-item smoking habits section assessed the respondents' use of e-cigarettes and conventional cigarettes over the past 12 months.

Third, the 10-item section examined participants' perspectives on e-cigarettes. The Item Objective Congruence Index (IOC) was calculated and re-adjusted until the IOC value > 0.5. The first five questions assessed positive attitudes, whereas the last five questions assessed negative attitudes. Responses to questions about positive and negative attitudes toward e-cigarettes were indicated using a 5-point Likert scale: 1 (least agree), 2 (less agree), 3 (moderately agree), 4 (more agree), and 5 (most agree).

Fourth, the Thai version of the DASS-21 was employed, which included three subscales (depression, anxiety, and stress), each containing seven items. A 4-point Likert scale was used to measure severity levels: 0 (not applicable at all), 1 (somewhat applicable), 2 (considerably applicable), and 3 (very applicable). The DASS-21 cutoff points for the severity levels are presented in Table 1.

**Table 1.** The cutoff scores for the 21-item Depression, Anxiety, and Stress Scale (DASS-21) by severity [15].

	Depression	Anxiety	Stress
Normal	0–9	0–7	0–14
Mild	10	8	15
Moderate	14	10	19
Severe	21	15	26
Extremely severe	28	20	34

The first three sections of the study measurements involved creating a unified questionnaire in Thai. The content validity of the questionnaire was evaluated by three scholars before the questionnaire was finalised. The item objective congruence index was determined for each question, and each question was adjusted until the item objective congruence value exceeded 0.5.

## 2.3. Data Analysis

Data were compiled using Microsoft Excel. All data were processed and analysed using R (version 4.1.3). Descriptive statistics are reported as means, frequencies, and percentages. The chi-square test and Fisher's exact test were used to assess the significance of comparisons between the two groups. Spearman correlations were used for association analysis.

## 3. Results

### 3.1. Demographic Information and E-Cigarette Consumption Among University Students in Southern Thailand

Based on the inclusion criteria, 942 students (Table 2; 236 men and 665 women) were included, and 41 students were excluded. Most participants identified as single (84.0%), Buddhist (50.8%), and reported being both physically and mentally healthy (90.5% and 97.9%, respectively) without any history of substance abuse (96.2%). Most participants were first-year students (60.4%), studied social sciences (49.5%), had GPAs >3.0 (63.1%), and resided in a university dormitory (56.8%). Approximately 20.9% were from areas affected by the Southern Thailand insurgency, whereas most participants were from other regions of Southern Thailand (73.0%). Their average income ranged between 5,000 and 10,000 baht (94.0%), and they generally perceived their family relationships as

positive (90.4%). However, 53.4% reported being surrounded by smokers (both tobacco and e-cigarette users), predominantly family members (29.2%), despite denying a history of tobacco use (96.6%).

The results presented in Table 2 reveal a statistically significant variation in the prevalence of e-cigarette use among students based on several criteria: sex, marital status, religion, faculty affiliation, domicile, place of residence, income, GPA, tobacco use, close contact with smokers, and other substance use.

**Table 2.** University students' demographic information related to e-cigarette usage.

Variable	Total N = 901 (100%)	Non-e-cigarette user N = 839, (93.1%)	E-cigarette user N = 62, (6.9%)	p-value
Sex				<0.001*
Male	236 (25.0)	199 (23.7)	37 (59.7)	
Female	665 (75.0)	640 (76.3)	25 (40.3)	
Marital status				<0.001*
Single	757 (84.0)	714 (85.1)	43 (69.4)	
Married	0 (0)	0 (0.0)	0 (0.0)	
In relationship	104 (11.5)	93 (11.1)	11 (7.7)	
Situationship	40 (4.5)	32 (3.8)	8 (12.9)	
Religion				<0.001*
Buddhism	458 (50.8)	410 (48.9)	48 (77.4)	
Islam	435 (48.2)	423 (50.4)	12 (19.4)	
Other	8 (1.0)	6 (0.7)	2 (3.2)	
Academic year				0.178
1st	545 (60.4)	515 (61.4)	30 (48.4)	
2nd	166 (18.4)	153 (18.2)	13 (21.0)	
3rd	147 (16.3)	131 (15.6)	16 (25.8)	
4th	35 (4.0)	32 (3.8)	3 (4.8)	
5th	8 (0.9)	8 (1.0)	0 (0.0)	
6th	0 (0)	0 (0.0)	0 (0.0)	
School of study				0.030*
Health-related science	195 (21.6)	184 (21.9)	11 (17.7)	
Non-health-related science	260 (28.9)	233 (27.8)	27 (43.5)	
Social science	446 (49.5)	422 (50.3)	24 (38.7)	
Domicile				0.048*
Other	658 (73.0)	608 (72.5)	50 (80.6)	
Southern regions	189 (20.9)	183 (21.8)	6 (9.7)	
Armed-conflict areas	54 (6.1)	48 (5.7)	6 (9.7)	
Other regions of Thailand				
Monthly income (baht)				<0.001*
<5,000	487 (54.0)	470 (56.0)	17 (27.4)	

5,000–10,000	361 (40.0)	327 (39.0)	34 (54.8)	
10,001–50,000	50 (5.6)	39 (4.6)	11 (17.7)	
>50,000				
	3 (0.4)	3 (0.4)	0 (0.0)	
Perceived family relationship				0.124
Good	815 (90.4)	763 (90.9)	52 (83.9)	
Bad	23 (25.5)	21 (2.5)	2 (3.2)	
Neutral	63 (7.1)	55 (6.6)	8 (12.9)	
Grade point average				0.005*
<2.0	209 (23.2)	187 (22.3)	22 (35.5)	
2.0–2.5	99 (11.0)	90 (10.7)	9 (14.5)	
2.5–3.0	24 (2.6)	20 (2.4)	4 (6.5)	
>3.0	569 (63.1)	542 (64.6)	27 (43.5)	
History of physical disorders				0.405
Yes	85 (9.5)	81 (90.3)	4 (6.5)	
No	816 (90.5)	758 (9.7)	58 (93.5)	
History of psychiatric disorders				1.000
Yes	882 (97.9)	821 (97.9)	61 (98.4)	
No	19 (2.1)	18 (2.1)	1 (1.6)	
Tobacco use				<0.001*
No	871 (96.6)	835 (99.5)	36 (58.1)	
Yes	30 (3.4)	4 (0.5)	26 (41.9)	
Being around smokers				<0.001*
No	420 (46.6)	407 (48.5)	13 (21.0)	
Yes	481 (53.4)	432 (51.5)	49 (79.0)	
Surrounded by people who smoke				<0.001*
Couple	24 (26.7)	20 (4.6)	4 (8.2)	
Family member(s)	266 (29.2)	258 (59.3)	8 (16.3)	
Friend(s)	157 (17.4)	120 (27.6)	37 (75.5)	
Senior(s) or junior(s)	37 (40.6)	37 (8.5)	0 (0.0)	
History of substance use				0.005*
No	876 (96.2)	820 (97.7)	56 (90.3)	
Yes	25 (3.8)	19 (2.3)	6 (9.7)	
Place of residence				<0.001*
Friend(s) or couple(s)	23 (2.5)	21 (2.5)	2 (3.2)	
Dormitory	517 (56.8)	498 (59.4)	19 (30.6)	

Apartment	228 (25.3)	195 (23.2)	33 (53.2)
Living alone at home	5 (0.6)	2 (0.2)	3 (4.8)
Home with family	128 (14.2)	123 (14.7)	5 (8.1)

### 3.2. Factors Related to E-Cigarette Use Among University Students in Southern Thailand

Table 3 presents the factors influencing the utilisation of e-cigarettes. The likelihood of e-cigarette usage was 2.65 times greater among men (95% CI = [1.28, 5.46]) than among women. Additionally, students who used tobacco had a considerably higher probability of using e-cigarettes (97.56 times higher) than those who did not (95% CI = [26.77, 355.66]). Furthermore, the likelihood of a student using e-cigarettes was significantly greater for those residing in apartments and living alone (by a factor of 2.44, 95%CI = [1.11, 5.35], and 13.48, 95% CI = [1.21, 150.47], respectively). Students with complicated marital statuses or 'situationships' were 2.01 times more likely to use e-cigarettes than those who were single (95% CI = [0.62, 6.47]). Additionally, students with a GPA below 2.00 exhibited 3.56 times higher rates of e-cigarette use than those with a GPA above 3.00 (95% CI = [0.54, 23.46]).

Notably, a significantly lower likelihood of e-cigarette usage was noted among participants who identified as Islamic than those who identified as Buddhist (OR = 0.32; 95% CI = [0.11, 0.9]).

**Table 3.** Associated factors of E-cigarette usage among university students in Southern Thailand.

Variable	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)
Sex		
Male	4.76 (2.8, 8.1)	2.65 (1.28, 5.46)
Female	1.00 (reference)	1.00 (reference)
Marital Status		
Single	1.00 (reference)	1.00 (reference)
In relationship	1.96 (0.98, 3.94)	1.1 (0.43, 2.79)
Situationship	4.15 (1.8, 9.55)	2.01 (0.62, 6.47)
Religion		
Buddhism	1.00 (reference)	1.00 (reference)
Islam	0.24 (0.13, 0.46)	0.32 (0.11, 0.9)
Other	2.85 (0.56, 14.5)	1.03 (0.08, 14.08)
School of Study		
Health-related science	1.05 (0.5, 2.19)	1.18 (0.44, 3.19)
Non-health-related science	2.04 (1.15, 3.61)	1.05 (0.46, 2.41)
Social science	1.00 (reference)	1.00 (reference)
Domicile		
Southern Thailand	2.51 (1.06, 5.94)	1.07 (0.32, 3.57)
The restive areas of Southern Thailand	1.00 (reference)	1.00 (reference)
Other regions of Thailand	3.81 (1.18, 12.35)	0.6 (0.1, 3.6)
Monthly income (baht)		
<5,000	1.00 (reference)	1.00 (reference)
5,000–10,000	2.87 (1.58, 5.23)	1.56 (0.68, 3.56)
10,001–50,000	7.8 (3.41, 17.81)	1.99 (0.53, 7.47)
>50,000	0 (0, inf)	0 (0, inf)
Grade point average		
<2.0	4.01 (1.28, 12.57)	3.56 (0.54, 23.46)
2.0–2.5	2.01 (0.91, 4.41)	1.55 (0.48, 5.08)

2.5–3.0	2.36 (1.31, 4.25)	2.14 (0.97, 4.69)
>3.0	1.00 (reference)	1.00 (reference)
Tobacco use		
No	1.00 (reference)	1.00 (reference)
Yes	150.76 (49.97, 454.86)	97.56 (26.77, 355.66)
Being around smokers		
No	1.00 (reference)	1.00 (reference)
Yes	3.55 (1.9, 6.64)	1.73 (0.81, 3.69)
History of substance use		
No	1.00 (reference)	1.00 (reference)
Yes	4.62 (1.78, 12.04)	2.07 (0.37, 11.65)
Place of residence		
Lived with friend(s) or couple(s)	2.5 (0.55, 11.43)	2.92 (0.42, 20.35)
Living alone	39.32 (6.2, 249.27)	13.48 (1.21, 150.47)
University dormitory	1.00 (reference)	1.00 (reference)
Apartment	4.44 (2.46, 7.99)	2.44 (1.11, 5.35)
Home	1.07 (0.39, 2.91)	1.31 (0.42, 4.09)

### 3.3. Attitudes and Perceptions Toward E-Cigarette Use Among University Students in Southern Thailand

Table 4 presents the relationship between e-cigarette usage and perceptions among these students by comparing non-users with users. Non-users generally disagreed that e-cigarettes helped reduce smoking, were less harmful, and effectively reduced stress. Conversely, users frequently or strongly agreed with these positive statements ( $p < 0.001$  for Items 1–5).

Both non-users and users largely or strongly agreed that e-cigarettes were addictive, should remain illegal in Thailand, and were harmful to individuals' physical and mental health and to children and pregnant women. However, compared with users, non-users tended to agree more that e-cigarettes should remain illegal in Thailand ( $p < 0.001$ ). This suggested that although the participants recognised the health-related risks associated with e-cigarettes, positive attitudes and perceptions toward e-cigarettes led to their use (Table 4).

**Table 4.** Attitudes and perceptions regarding e-cigarette use among university students.

Question			<i>p</i> -value
	Non-user (N=839)	User (N=62)	
Do you think that e-cigarettes will help reduce smoking?	2 [1,3]	3 [2,4]	<0.001*
Do you think that e-cigarettes reduce the harm of cigarette smoke to people around you, compared with cigarette smoke?	1 [1,2]	2 [1,3]	<0.001*
Do you think that e-cigarettes are less harmful to smokers' health than cigarettes?	1 [1,3]	2.5 [1,4]	<0.001*
Do you think that smoking e-cigarettes gives a better public image than smoking cigarettes?	1 [1,2]	2 [1.25,3]	<0.001*
Do you think that e-cigarettes can be used to reduce stress effectively?	1 [1,3]	3 [2.25,4]	<0.001*
Do you have an understanding that e-cigarettes are addictive?	4 [3,5]	4 [3,5]	0.897
Do you have the opinion that e-cigarettes should remain illegal?	4 [2,5]	3 [2,3]	<0.001*
Do you understand that e-cigarettes are harmful to both physical and mental health?	4 [3,5]	4 [3,5]	0.025*
Do you understand that electronic cigarettes are harmful to children and pregnant women?	5 [4,5]	5 [4,5]	0.976

Do you feel that electronic cigarettes are more accessible and easier to buy than cigarettes? 3 [2,4] 3 [3,4] 0.904

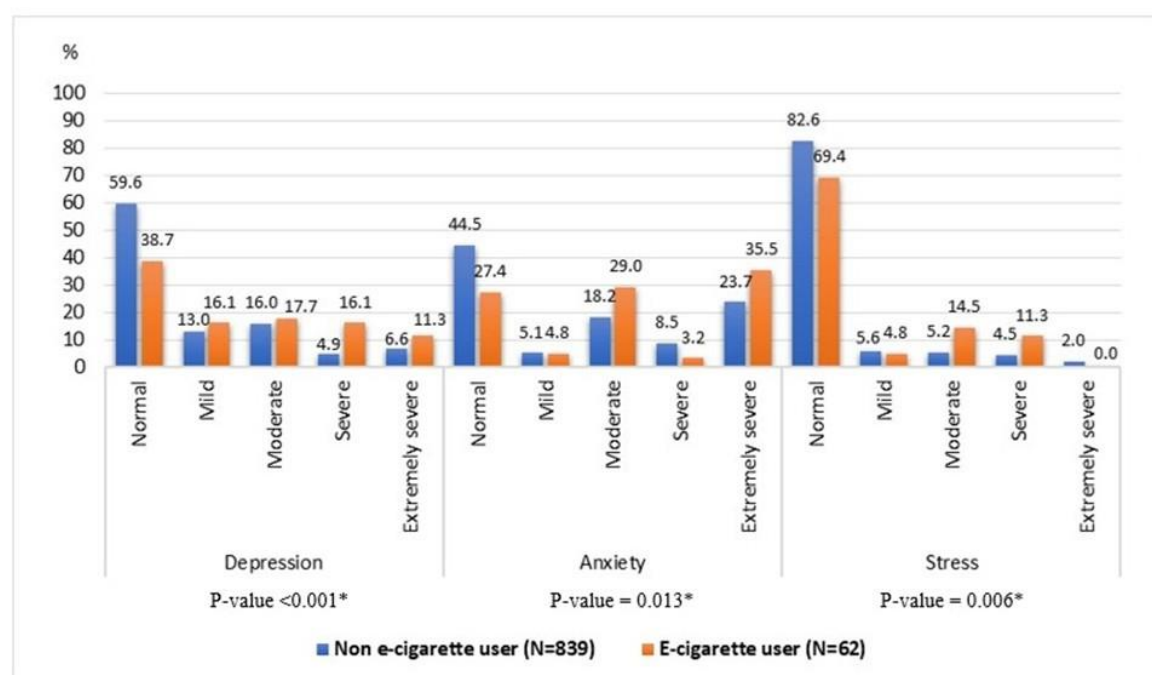
### 3.4. Relationship Between E-Cigarette Usage and Students' Depression, Anxiety, and Stress Levels (DASS-21)

Table 5 presents the relationship between the DASS-21 score and e-cigarette usage. The results indicated that individuals in the e-cigarette user group exhibited notably elevated scores across all three subscales (depression, anxiety, and stress) compared with non-users ( $p$ -values < 0.001, 0.0006, and 0.0010, respectively).

**Table 5.** E-cigarette use and its association with depression, anxiety, and stress among students (DASS-21).

Psychological distress	Mean score		$p$ -value
	Non-e-cigarette user	E-cigarette user	
Depression	3 [0,7]	6 [2.25,11]	<0.001*
Anxiety	5 [0,9]	7 [3,12]	0.006*
Stress	2 [0,6]	3.5 [1,10.5]	0.010*

Based on the DASS-21 scoring guidelines, Figure 1 presents students' frequency of experiencing depression, anxiety, and stress at different severity levels, classified as normal, mild, moderate, severe, and extremely severe. This study found the prevalence of depression, anxiety, and stress to be 41.8%, 32.6%, and 18.3%, respectively. The results suggested that e-cigarette use was significantly associated with stress ( $p = 0.006$ ), anxiety ( $p = 0.013$ ), and depression ( $p = 0.001$ ).



**Figure 1.** Association between e-cigarette usage and students' depression, anxiety, and stress (DASS-21) by severity.

## 4. Discussion

This cross-sectional study among university students in Southern Thailand, including the campus located in armed conflict areas found a low occurrence of e-cigarette usage among them. E-cigarette usage on both campuses in Southern Thailand was found to be 6.9%, indicating an increase

in use compared with previous studies conducted among Thai students before the COVID-19 pandemic [17]. This study reported a prevalence rate of 3.3% for smoking over the past 30 days, which aligned with a study conducted among high school students in Indonesia [16].

Moreover, this study revealed a strong association between several risk factors and increased e-cigarette use in Southern Thailand. These risk factors include male sex, history of tobacco use, and place of residence. This finding was consistent with that of a previous report from China [18]. One explanation for this may be that compared with female adolescents, male adolescents perceive e-cigarettes as less detrimental than traditional cigarettes [19]. Additionally, this study revealed that conventional tobacco users were significantly more likely to use e-cigarettes than non-tobacco users [19], which aligned with the findings of the seven articles mentioned in a previous systematic review conducted in Southeast Asia [20]. Furthermore, this study found that students residing in apartments and alone were more likely to use e-cigarettes than those residing in dormitories. This finding differed from previous studies. For example, a study conducted in the United States indicated that college students residing in university dormitories may be more influenced by their peers who use e-cigarettes [21].

Compared with Buddhist students in lower Southern Thailand, Muslim students exhibited a notably lower likelihood of engaging in e-cigarette use. Although no Islamic perspective was examined among these individuals, this phenomenon appears to align with previous studies conducted in Malaysia, which revealed that most smokers were aware of the 'Fatwa' prohibiting smoking in Islam [22].

Regarding the participants' attitudes toward e-cigarettes, most held a negative perspective. However, e-cigarettes were perceived as more accessible than traditional cigarettes. This aligned with the findings from a previous study conducted in 2023, which revealed that a significant portion of Thai participants commonly displayed negative attitudes toward e-cigarettes and indicated that e-cigarette users tended to have more misunderstandings than non-users [23]. To curb the proliferation of new e-cigarette consumers, undergraduate students must be encouraged to cultivate a precise understanding of e-cigarette usage, focusing on health risks and the insufficiency of evidence supporting e-cigarettes as a means of tobacco cessation [24].

The findings of this study also revealed a significant correlation between the DASS-21 scores and e-cigarette use. Notably, e-cigarette users obtained higher scores on all three subscales (depression, anxiety, and stress) than non-users. This may indicate that struggling with mental health issues is significantly associated with e-cigarette use [25]. This finding is consistent with a nationwide study that observed a bidirectional association between e-cigarette use and mental illness among young adults [25]. According to neurobiological studies, individuals with depression may resort to smoking as a form of 'self-medication' to enhance the immediate transport of nicotine to brain cells; thereby, alleviating symptoms associated with depression. However, prolonged nicotine use can impair long-term monoamine function, potentially worsening or prolonging depression, leading to addiction [24].

The most common reason for using e-cigarettes was to alleviate stress. However, a multivariate logistic regression analysis in a previous study indicated that the relationship between stress and e-cigarette use was not significant [26]. This suggests that the belief that e-cigarettes reduce stress may be a myth. However, the findings of the previous study prioritised stress reduction and promoted healthy coping strategies to prevent the initiation of vaping as a common 'stress-reliever' in Thai young adults.

Although several studies found no direct connection between anxiety and e-cigarette use, the results of this study indicated that anxiety was related to the perceived advantages of e-cigarettes. Therefore, dissimilar to stress and depression, the relationship between anxiety and vaping might not be straightforward. Consequently, more studies are required to explore the relationship between anxiety and e-cigarette use, and psychological interventions should be appropriately tailored to students dealing with psychological distress and vaping. Furthermore, this study calls for additional training for both higher education and medical personnel to improve their capacity to provide the necessary counselling to smokers at universities. [27].

This study had several limitations. First, some affiliated faculty members had smaller sample sizes than others, which may have led to results that do not fully reflect the overall population. Furthermore, the stigma or reluctance associated with openly discussing e-cigarette use owing to social and cultural influences should be acknowledged, particularly because it is illegal in Thailand.

## 5. Conclusions

The prevalence of e-cigarette use among university students in Southern Thailand was 6.9%. A significant association was observed between e-cigarette use and mental distress, particularly depression, anxiety, and stress. The participants generally held a negative perspective of e-cigarettes. However, those who smoked e-cigarettes were more likely to disagree that these products are addictive, should be banned, or have harmful effects on their physical and mental health, particularly concerning children and pregnant women. Therefore, educational administrators should be concerned about e-cigarette use among these students, and smoking cessation campaigns should specifically target this group, considering their mental health and attitudes toward e-cigarettes.

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**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki, is part of a larger project on e-cigarette use among university students in Southern Thailand, and was approved by the Ethics Committee of the Faculty of Medicine at Prince of Songkla University (REC 67-094-91) on 10.03.2024.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The datasets for this study are not publicly available. Please contact the first or corresponding authors to obtain them.

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## Abbreviations

The following abbreviations are used in this manuscript:

GPA	Grade point average
OR	Odds ratio
CI	Confidence interval
DASS-21	21-item Depression, Anxiety, and Stress Scale

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