

## ORIGINAL ARTICLE

# Change in Smoking Outcome Expectation Scale and Anti-Smoking Self-Efficacy Scale of the Students During University Education: Repeated Cross-Sectional Study

Mehmet Ali Kurçer<sup>1</sup>, Merve Bektaş<sup>2</sup>, Ebru Katar<sup>2</sup>

<sup>1</sup>Department of Public Health, Bursa Uludağ University Faculty of Medicine, Bursa, Türkiye

<sup>2</sup>Department of Public Health, Zonguldak Bülent Ecevit University Faculty of Medicine, Zonguldak, Türkiye

ORCID iDs of the authors: M.A.K. 0000-0003-2672-1079, M.B. 0000-0002-6300-547X, E.K. 0009-003-9867-3501

## Main Points

- Negative outcome expectations in students show a significant increase from first year to last year of the university education.
- Prevalence of smoking in students tends to increase from first year to last year of the university education.
- The rate of students fighting against smoking significantly increases from the first to second year but decreases in fourth year.
- Changes in “self-efficacy to resist social influences to smoke” and “self-efficacy to use strategies” differ according to departments and years.
- Findings show the necessity of providing implementations/services for the protection of students from starting smoking from the beginning to the end of the university education.

## Abstract

Adolescents are more likely to smoke when they exhibit negative attitudes toward anti-smoking and have low self-efficacy to avoid smoking. This study aims to evaluate changes in the prevalence of smoking, smoking outcome expectations (positive/negative), and anti-smoking self-efficacy among students during their four-year university education. About 435 students who started university in 2018 and graduated in 2021 comprised the participants of this repeated cross-sectional study. The Smoking Outcome Expectation Scale and Anti-Smoking Self-Efficacy Scale were used to assess smoking opposition. The prevalence of smoking among students tends to increase from the first year to the fourth year of education. The rate of students fighting against smoking significantly increases from the first year (45%) to the second year (49.3%) but decreases in the fourth year (42.8%) ( $p < .05$ ). Negative smoking outcome expectations show a significant increase after the first year in all departments ( $p < .001$ ). Self-efficacy to resist social influences to smoke decreases significantly in engineering and social sciences in the final year of university ( $p < .001$ ). Despite the increasing negativity in students' smoking outcome expectations, the decrease in anti-smoking self-efficacy and the decline in students' support for anti-smoking measures are reflected in the increase in smoking prevalence throughout university education. These findings indicate the necessity of implementing measures to protect students from starting smoking from the beginning to the end of university education.

**Keywords:** Anti-smoking self-efficacy, anti-smoking, smoking in university, smoking outcome expectation

## Corresponding author:

Merve Bektaş

## E-mail:

mervebkt@gmail.com

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## Introduction

Smoking is a significant public health problem. Approximately six million people die from smoking

each year, and it also causes excessive healthcare costs and productivity loss in society (WHO, 2015). Research shows that the prevalence of smoking varies among students in different countries and

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between male and female students in the same country. While lower rates of smoking are observed in regions of the USA and Australia, higher rates are documented in countries such as Türkiye and Spain (Smith et al., 2007). The smoking prevalence among male students in Türkiye ranges from 24.1% to 37.78%, among female students from 7.7% to 15%, and the overall average from 15.8% to 23.7% (Babaoğlu, 2017). There is ample evidence globally to suggest that early initiation of tobacco use drives the tobacco epidemic. A tobacco survey study showed that one out of every eight young people in the age group of 15 – 24 years was using some form of tobacco (Grover et al., 2020). Smoking rates increase, especially among females, adolescents, and young adults. Those who start smoking before the age of 21 are more likely to become addicted, and individuals who try smoking in adolescence become highly addicted and have more difficulty quitting smoking (Warren et al., 2006). Young people are exposed to pro-tobacco messages promoted by the tobacco industry, which increases the risk of starting smoking among university students (Abu Shomar et al., 2014). The desire to be different and independent, the effort to be included in a group of friends, and the desire to be accepted by their peers may drive young people to smoke (Wang et al., 2012). The fact that many smokers start smoking in their youth indicates that intervention policies and programs designed to prevent smoking should focus on youth (Jøsendal et al., 2012). Expecting positive outcomes is an important factor for young people to start smoking (Dalton et al., 1999), and self-efficacy is another important factor affecting the smoking attitudes of adolescents (Bandura, 2014).

Adolescents are more likely to smoke when they exhibit negative attitudes toward anti-smoking, have low self-efficacy to avoid smoking, and lack knowledge about the health risks of smoking (Su et al., 2015). Individuals with high self-efficacy to resist smoking may reduce their attempts to smoke (Bektas et al., 2010). Rejecting smoking offers and having high anti-smoking self-efficacy are found to be protective factors in preventing youth from starting smoking (Chang et al., 2006).

The aim of this research is to evaluate changes in the prevalence of smoking, changes in negative or positive smoking expectations, and changes in anti-smoking self-efficacy among students during their four-year university education.

## Material and Methods

The study population consisted of all students who started their university education in 2018 and graduated in 2021 from the faculties of Zonguldak Bülent Ecevit University. Due to the suspension of education during the COVID-19 pandemic, data could not be collected in 2020. This research was conducted with the approval of the Zonguldak Bülent Ecevit University Human Research Ethics Committee (protocol number 337, dated April 2, 2018).

Informed consent was obtained from all participants. All methods were carried out in accordance with the Strengthening the reporting of observational studies in epidemiology (STROBE) guidelines and the Helsinki Declaration. All experimental protocols were approved by the Zonguldak Bülent Ecevit University Human Research Ethics Committee.

In 2018, when the research began, seven faculties of the university were selected using the cluster method. The aim was to follow up 490 first-year students until they graduated. There were 60 students from the Faculty of Pharmacy, 105 from the Faculty of Economics, 85 from the Department of International Trade, 90 from the Department of Finance, 70 from the Department of Physical Therapy and Rehabilitation, 20 from the Department of Metallurgy Engineering, and 60 from the Department of Civil Engineering. Participants who did not agree to participate or decided not to attend school were excluded, and the research started with the remaining 435 students. The participation rate was 89% at the beginning of the research.

The collection of data was conducted through surveys, including the Smoking Outcome Expectation Scale (SOES), Anti-Smoking Self-Efficacy Scale (ASSES), and 11 questions about sociodemographic features. The survey was administered to all the participants based on their voluntary participation using a face-to-face method each year. Participants were asked to voluntarily participate in the research at the beginning by obtaining signed informed consent.

The SOES and ASSES were used to assess smoking opposition. The SOES and ASSES were developed by Chen-Ju Chen et al. in 2014 to measure outcome expectations for smoking and self-efficacy for smoking opposition in adolescents (Chen et al., 2015).

The SOES has six items and two sub-units: positive and negative outcome expectations. Scores for each item range from 1 (strongly agree) to 4 (strongly disagree), and total sub-unit scores range from 3 (lowest) to 12 (highest). The positive outcome sub-unit consists of items 1, 2, and 3, and the negative sub-unit consists of items 4, 5, and 6. The Cronbach's alpha coefficients of the sub-units are 0.78 and 0.76, respectively.

The ASSES has 15 items and 3 sub-units: self-efficacy to reject illegal tobacco use, self-efficacy to resist social influences to smoke, and self-efficacy to use strategies. Scores for each item range from 1 (I never do) to 4 (I definitely do), and total scale scores range from 15 (lowest) to 60 (highest). The Cronbach's alpha coefficients are 0.88 for the total scale and 0.88, 0.86, and 0.78 for the sub-units, respectively. The validity and reliability of ASSES for early adolescents was previously established by Bektas et al. in İzmir in 2017 (Bektas et al., 2017). This was the first time the scale was applied to university students in this research, with an internal consistency coefficient of 0.87.

In addition to the scales, a questionnaire with 11 questions about sociodemographic features, students' smoking status, and attitudes toward anti-smoking efforts was also administered.

Prevalence of smoking was given as prevalence of current smoking. Current smoking prevalence was evaluated based on the standard NHIS current smoking definition (Senol et al., 2006). According to the NHIS current smoking definition, the term Current smoking term includes everyday smoking and sometimes smoking in this study.

A total of 435 students were reached in the first year, 375 in 2019, and 350 in 2021. Data could not be collected in 2020 due to the suspension of education because of COVID-19.

Sixty participants were lost from 2018 to 2019 and 25 more from 2019 to 2021 due to their own decision to give up the research or change their university. The reasons for the participants to leave the research were due to their lack of time to complete the survey, feeling hesitant to reveal their smoking status, and struggles with attitudes toward smoking. Forty-two of the students changed their university. Twenty-seven students reported that they lacked the time to complete the survey and sixteen indicated that they felt hesitant to reveal their smoking status and attitudes toward smoking struggle. Thirty-six of the lost ones were female, and 44 were male.

For the statistical analysis, IBM SPSS 21 software program was utilized. The Kolmogorov – Smirnov test confirmed the normal distribution of the data. Continuous variables are presented with mean values and standard deviations. Categorical variables are presented with numbers and percentages. The chi-square test was used to evaluate categorical variables, and *t*-test, ANOVA, and repeated-measures tests were used to evaluate dependent continuous variables. Statistical significance was accepted as  $<.05$ .

## Results

Students were followed up during their university education years, and changes in their smoking status year by year according to their departments are shown in Table 1.

The prevalence of current smoking in university students tends to increase from the first year (2018) to the fourth year (2021) of education (39.5%, 41.1%, 48.8%) ( $p < .001$ )\*.

Current smoking prevalence in health sciences students (22.2%, 30.1%, 36.4%) is significantly lower than that in social sciences (42.9%, 41%, 53.5%) and engineering (56.3%, 59.3%, 53.6%) in each of the 3 years ( $p < .001$ )\*.

While there is no significant increase in the current smoking prevalence of students in engineering (56.3%, 59.3%, 53.6%), the smoking prevalence of students in social sciences (42.9%, 41%, 53.5%) and in health sciences (22.2%, 30.1%, 36.4%) significantly increases ( $p < .001$ )\*.

The changes in students' attitudes toward the anti-smoking struggle based on their smoking status are shown in Table 2.

About 67.4% of non-smokers, 26.2% of current smokers in 2018; 69.5% of non-smokers, 28.6% of current smokers in 2019; 77.2% of non-smokers, 9.7% of current smokers are engaged in 2021. The rate of students participating in the anti-smoking struggle is higher among non-smokers than current smokers in each of the 3 years ( $p < .05$ )\*. About 45% of the students in 2018, 49.3% in 2019, and 42.8% in 2021 fought against smoking. This rate of fighting against smoking significantly increases from the first year to the second year but decreases in the fourth year ( $p < .05$ )\*.

The changes in students' attitudes toward anti-smoking measures based on their smoking status are shown in Table 3.

About 94% of non-smoking students in 2018, 91.4% in 2019, and 91.6% in 2021 rate prohibition of smoking indoors as a necessary measure in the struggle against smoking. The most necessary measure is rated as the prohibition of smoking indoors by non-smoking students ( $p < .001$ )\*.

About 19.8% of the current smoking students in 2018, 21.5% in 2019, and 10.5% in 2021 rate increasing cigarette prices as a necessary measure in the struggle against smoking. The measure supported by current smoking students is increasing cigarette prices ( $p < .001$ )\*.

Non-smoking students find measures like indoor smoking bans, banning smoking scenes in media, and increasing cigarette prices significantly more necessary each year than smoking students ( $p < .001$ )\*.

The changes in outcome expectation and refusal self-efficacy during university education by gender are given in Table 4.

Negative outcome expectation scores of females significantly increase in the final year ( $p < .001$ )\*\*.

Females' negative outcome expectation and refusal self-efficacy scores are significantly higher than males ( $p < .05$ ) in total.

**Table 1.**  
*Smoking Status of the Students According to Years and Departments*

Department		Smoking Status									
		I Smoke Everyday		I Smoke Sometimes		I Have Never Smoked		I Gave Up Smoking		Total	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
2018 <i>n</i> = 435	Health sciences	18	14.8	9	7.4	89	72.9	6	V	122	100
	Social sciences	59	25.3	41	17.6	122	52.4	11	V	233	100
	Engineering	31	38.8	14	17.5	33	41.2	2	2.5	80	100
2019 <i>n</i> = 375	Health sciences	18	17.5	13	12.6	65	63.1	7	6.8	103	100
	Social sciences	68	31.9	20	9.4	102	47.8	23	10.9	213	100
	Engineering	22	37.3	13	22.0	19	32.2	5	8.5	59	100
2021 <i>n</i> = 350	Health sciences	20	20.8	15	15.6	55	57.3	6	6.2	96	100
	Social sciences	64	34.6	35	18.9	62	33.5	24	10.8	185	100
	Engineering	25	36.2	12	17.4	27	39.1	5	7.2	69	100

**Table 2.***The Changes in Attitudes of the Students Toward Anti-Smoking Struggle in Terms of Smoking Status of the Students*

Anti-Smoking Struggle	Smoking Status					
	2018 n = 435		2019 n = 375		2021 n = 350	
	Smoking N (%)	Not Smoking N (%)	Smoking N (%)	Not Smoking N (%)	Smoking N (%)	Not Smoking N (%)
I have no effort	116 (67.4)	111 (42.2)	107 (69.5)	76 (34.4)	132 (77.2)	61 (34.1)
I support	45 (26.2)	151 (57.4)	44 (28.6)	141 (63.8)	34 (19.9)	116 (64.8)
On the contrary I am in favor of smoking	11 (6.4)	1 (0.4)	3 (1.9)	4 (1.8)	5 (2.9)	2 (1.1)
Total	172 (100)	263 (100)	154 (100)	221 (100)	171 (100)	179 (100)

Chi-square:  $p < .05$ .\*

Scores for “outcome expectation,” as well as total refusal self-efficacy scores, significantly decrease in both genders through the final year ( $p < .001$ \*\*).

The comparisons of outcome expectation and refusal self-efficacy by year and department are provided in Table 5.

Positive outcome expectation is significantly higher in engineering than in other faculties in 2019 ( $p < .05$ )\*. Negative outcome expectation shows a significant increase after the first year in all faculties ( $p < .001$ \*\*).

Refusal self-efficacy scores are significantly higher in the final year only for health sciences students ( $p < .05$ )\*.

“To resist social influences to smoke” scores decrease significantly in engineering and social sciences in the final year ( $p < .001$ ). While “self-efficacy to use strategies” increases in health sciences and social sciences, it decreases in engineering ( $p < .001$ ).

“To reject illegal tobacco use scores increased both among faculties and over the years only in the senior Health Sciences faculties ( $p < .05$ \*,  $p < .001$ \*\*).”

**Table 3.***The Changes in Attitude of the Students Toward Anti-Smoking Measures in Terms of Smoking Status of the Students During Their University Education*

Measures		Smoking Status					
		2018		2019		2021	
		Smoking N %	Not Smoking N %	Smoking N %	Not Smoking N %	Smoking N %	Not Smoking N %
Prohibition of smoking indoors	Necessary	110 (64.0)	247 (94.0)*	112 (72.7)	202 (91.4)*	119 (69.6)	164 (91.6)*
	Unnecessary	29 (16.9)	8 (3.0)	23 (14.9)	8 (3.6)	27 (15.8)	5 (2.8)
	No matter	33 (19.2)	8 (3.0)	19 (12.4)	11 (5.0)	25 (14.6)	10 (5.6)
Bans on smoking scenes in movies and Tv shows	Necessary*	43 (25.0)	107 (40.7)*	38 (24.6)	79 (35.7)*	44 (25.7)	70 (39.1)*
	Unnecessary	96 (55.8)	83 (31.6)	85 (55.2)	89 (40.0)	100 (58.5)	74 (41.3)
	No matter	33 (19.2)	73 (27.8)	31 (20.2)	53 (24.0)	27 (15.8)	35 (19.6)
Warnings of “harmful for health” on cigarette packages	Necessary	56 (32.6)	49 (18.6)*	37 (24.1)	49 (22.2)	47 (27.6)	106 (59.2)*
	Unnecessary	84 (48.8)	183 (69.6)	51 (33.1)	123 (55.7)	87 (50.8)	54 (30.2)
	No matter	32 (18.6)	31 (11.8)	66 (42.8)	49 (22.2)	37 (21.6)	19 (10.6)
Cigarette prices	It should be more expensive	34 (19.8)	202 (76.8)*	33 (21.5)	155 (70.1)*	18 (10.5)	92 (51.4)*
	It should be cheaper	18 (10.5)	31 (11.8)	24 (15.6)	32 (14.5)	131 (76.6)	42 (23.5)
	Prices are normal	120 (69.8)	30 (11.4)	97 (62.9)	34 (15.4)	22 (12.9)	45 (25.1)
Prohibition of smoking under 18 years	Necessary	147 (85.5)	236 (89.7)*	126 (82)	191 (86.4)*	149 (87.1)	172 (96.1)*
	Unnecessary	13 (7.6)	9 (3.4)	18 (11.5)	17 (7.7)	11 (6.4)	5 (2.8)
	It can be sold with consent of parents	12 (7)	18 (6.8)	10 (6.5)	13 (5.9)	11 (6.4)	2 (1.1)

\*Chi-square:  $p < .001$ .

**Table 4.**

*The Changes in Outcome Expectation and Refusal Self-Efficacy Scores of the Students During Their University Education in Terms of Gender*

Male	Female					
	2018	2019	2021	2018	2019	2021
Outcome Expectation	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Positive	4.9 ± 2.37	5.2 ± 2.56	5.3 ± 2.48	4.4 ± 2.00	4.6 ± 2.11	4.9 ± 2.36
Negative	8.0 ± 1.93	9.9 ± 2.47	9.3 ± 2.64	8.1 ± 1.74	10.1 ± 2.54	11.6 ± 4.29*
<b>Refusal Self-efficacy</b>						
To reject illegal tobacco use	5.8 ± 1.94	5.9 ± 1.91	5.6 ± 1.90	6.7 ± 1.74***	6.4 ± 3.84***	6.0 ± 1.72***
To resist social influences to smoke	21.8 ± 6.33	21.5 ± 4.59	14.9 ± 5.07	21.9 ± 2.45	23.3 ± 4.10	16.5 ± 4.30***
To use strategies	20.9 ± 7.22	21.3 ± 7.11	22.4 ± 7.14	21.5 ± 7.00	22.8 ± 7.57	23.2 ± 7.62***
<b>Total</b>	<b>48.5 ± 9.56</b>	<b>48.7 ± 9.56</b>	<b>42.9 ± 8.41</b>	<b>51.1 ± 8.79***</b>	<b>52.5 ± 8.79***</b>	<b>45.7 ± 11.96***</b>

Note: SD = Standard deviation.

\**t*-test:  $p < .05$ .

\*\*Repeated-measures test:  $p < .001$ .

## Discussion

The prevalence of current smoking among students increases from the first year to the last year of university. When examined by department, the smoking prevalence remains high and does not rise significantly in engineering. However, the prevalence increases continuously in social sciences and health sciences. There are very few studies that monitor the smoking tendencies of university students from the year they enroll until they graduate. Senol and colleagues found that the prevalence of smoking gradually increased in the first 4 years of their studies in Antalya, Türkiye, in line with this study (Senol et al., 2006). This study, unlike Senol's study, is valuable in showing the increasing prevalence in a sample that represents all students of the university, not just those in the medical faculty.

While the smoking prevalence in health sciences departments is lower than that in other departments, it still increases during the crucial university period, including for medical students. Previous research has shown that despite expanding medical knowledge, smoking rates increase in upper grade levels (Sönmez et al., 2017; Mayda et al., 2007; Kara et al., 2011). It has been shown that although the problem is greater in the non-health faculties of the university, the university in general is the place where many students start smoking. This also suggests that knowledge alone does not necessarily translate to changed smoking behavior (Livaditis et al., 2001; Richmond, 1999). Attitudes toward smoking, methods for deterrence, and problem-solving skills have been found to be deterrents to starting smoking (Lotecka et al., 1983; Supnick et al., 1984).

The rate of supporting the anti-smoking struggle is significantly lower among smoking students compared to non-smoking students. Similarly, previous studies have found that non-smokers are more likely to recommend quitting smoking than smokers (Yaman et al., 2021; Atay et al., 2012). This indicates the need to develop strategies to increase smokers' support for anti-smoking measures.

The students' anti-smoking attitudes did not increase significantly from the year they started school until they finished school. This finding also reveals that university students have not developed sufficient awareness about the fight against smoking over the years.

In this study, almost all non-smoking university students evaluated the ban on smoking in closed areas as a necessary measure in the fight against smoking from the year they registered until their graduation. Support for this measure is significantly higher among non-smoking students than among smokers. The measure that students support the least during their educational years is increasing cigarette prices. Support for this measure is significantly higher among non-smoking students than among smokers. The measure of banning smoking scenes in the media is also significantly necessary among non-smoking students compared to smokers during their educational period. No anti-smoking tendency study has been found in the literature that monitors university students throughout their educational life. In the study conducted by Martinez and his colleagues in Barcelona (Spain), when only one year of data was examined, it was found that anti-smoking support was as high among smokers as among non-smokers, and the difference between them was not significant. This study reveals that smokers are more insensitive to the fight against smoking compared to their Spanish peers in the Turkish sample (Martinez et al., 2017).

An interesting finding is the significant decrease in ASSES scores, especially in the final year of university, for both male and female students. This decreasing trend was observed across all departments, with engineering students having the lowest ASSES scores throughout their education. The higher initial smoking prevalence in engineering may contribute to the lower anti-smoking self-efficacy in non-smoking students in this department (Baykan et al., 2014; Borland et al., 2006; Inandi et al., 2013; Karatay et al., 2019).

On the other hand, "self-efficacy to reject illegal tobacco use" and "self-efficacy to use strategies" scores increase significantly

**Table 5.**  
The Comparisons of Outcome Expectation and Refusal Self-Efficacy Scores in Terms of Years and Departments During University Education

	Health Sciences						Engineering						Social Sciences					
	2018		2019		2021		2018		2019		2021		2018		2019		2021	
Outcome Expectation	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Positive	4.3 ± 1.97	4.6 ± 2.43	4.4 ± 1.96	4.6 ± 2.24	4.8 ± 2.61*	4.2 ± 2.18	4.6 ± 2.24	4.8 ± 2.61*	4.8 ± 2.61*	4.4 ± 1.96	4.2 ± 2.18	4.9 ± 2.27	4.7 ± 2.14	4.7 ± 2.14	4.9 ± 2.27	4.2 ± 2.18	4.23 ± 1.87	4.23 ± 1.87
Negative	8.1 ± 1.68	11.1 ± 3.32**	10.4 ± 2.65**	7.6 ± 1.89	11.8 ± 4.07**	10.4 ± 2.2**	7.6 ± 1.89	11.8 ± 4.07**	11.8 ± 4.07**	10.4 ± 2.65**	10.4 ± 2.2**	8.1 ± 1.87	10.1 ± 3.75**	10.1 ± 3.75**	8.1 ± 1.87	10.4 ± 2.2**	11.2 ± 3.96**	11.2 ± 3.96**
Refusal Self-efficacy																		
To reject illegal tobacco use	5.6 ± 1.75	5.6 ± 1.82	6.2 ± 1.75***	5.5 ± 1.78	5.5 ± 1.88	5.8 ± 1.96	5.5 ± 1.78	5.5 ± 1.88	5.5 ± 1.88	6.2 ± 1.75***	5.8 ± 1.96	5.9 ± 1.78	5.9 ± 1.84	5.9 ± 1.84	5.9 ± 1.78	5.8 ± 1.96	5.6 ± 1.78	5.6 ± 1.78
To resist social influences to smoke	18.9 ± 2.96	18.8 ± 2.67	17.7 ± 5.84	17.9 ± 3.36	17.9 ± 3.34	14.4 ± 5.38*	17.9 ± 3.36	17.9 ± 3.34	17.9 ± 3.34	17.7 ± 5.84	14.4 ± 5.38*	18.9 ± 3.02	18.9 ± 2.76	18.9 ± 2.76	18.9 ± 3.02	14.4 ± 5.38*	15.7 ± 4.66*	15.7 ± 4.66*
To use strategies	19.6 ± 6.83	19.6 ± 7.20	22.8 ± 6.20**	21.4 ± 6.12	21.4 ± 7.35	20.3 ± 8.07*	21.4 ± 6.12	21.4 ± 7.35	21.4 ± 7.35	22.8 ± 6.20**	20.3 ± 8.07*	21.7 ± 5.65	21.7 ± 6.84	21.7 ± 6.84	21.7 ± 5.65	20.3 ± 8.07*	23.7 ± 7.55*	23.7 ± 7.55*
Total	44.1 ± 11.56	44.0 ± 10.40	46.7 ± 8.41**	44.8 ± 10.79	44.1 ± 8.79	40.5 ± 11.96	44.8 ± 10.79	44.1 ± 8.79	44.1 ± 8.79	46.7 ± 8.41**	40.5 ± 11.96	46.5 ± 8.79	46.5 ± 10.14	46.5 ± 10.14	46.5 ± 8.79	40.5 ± 11.96	45.0 ± 11.96	45.0 ± 11.96

Note: SD = Standard deviation.  
\*ANOVA;  $p < .05$ .  
\*\*Repeated-measures test:  $p < .001$ .

in health sciences students. Additionally, while there is no change in positive outcome expectation, negative outcome expectation increases significantly, especially in female students, by the final year.

Nyman and colleagues found that the smoking refusal self-efficacy level was significantly higher in girls than in boys in early adolescents from Finland and Portugal (Nyman et al., 2024). This finding is consistent with the current study's findings. The current study went a step further than Nyman's study and showed that this difference increased in favor of girls during the academic years. Another situation that is not found in the literature, and that was only examined in the current study, is that the expectation of smoking-related results in all faculties of the university increased significantly in the later years of the university compared to the first year. Another finding that is not found in the literature is that the refusal self-efficacy scores in engineering faculties decreased significantly in the graduation year compared to other faculties of the university. This finding may indicate that engineering faculty students and males should be more sensitive in interventions against smoking in universities.

These findings highlight the necessity of developing tailored health promotion strategies for each faculty to address the specific needs and trends observed in smoking-related attitudes and behaviors during university education.

**Limitations and Suggestions for Future Research**

Although this study aimed to reveal the changes in students' smoking status, participation in the fight against smoking, outcome expectation, and refusal self-efficacy scores over the four-year period from the beginning of university until graduation, data for 2020 could not be collected due to the pandemic.

The findings of this study indicate concerning trends in smoking-related attitudes and behaviors among university students.

The prevalence of smoking has increased, particularly among students in health-related faculties. This is concerning, as these students are expected to be role models for healthy behaviors.

Moreover, the pandemic appears to have exacerbated negative smoking outcome expectations, especially among female students. At the same time, anti-smoking self-efficacy has decreased across all students.

Notably, both smoking and non-smoking students have shown a decrease in support for anti-smoking measures after the pandemic period. This suggests the need for targeted interventions to reinforce the importance of tobacco control efforts among the university population.

These findings underscore the necessity of implementing comprehensive strategies to protect students from initiating or continuing smoking behaviors throughout their university education. Tailored programs that address the specific needs and trends observed in different faculties will be crucial in combating the rising smoking prevalence and promoting healthy behaviors among future professionals

**Data Availability Statement:** The data that support the findings of this study are available on request from the corresponding author.

**Ethics Committee Approval:** This study was approved by the Ethics Committee of Zonguldak Bülent Ecevit University University (Approval No.: 337; Date: 02.04.2018).

**Informed Consent:** Informed consent was obtained from the participants who agreed to take part in the study in the study.

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