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Research Article

CIGARETTE USE, ADDICTION LEVELS, AND INFLUENTIAL FACTORS AMONG HEALTHCARE STUDENTS IN TÜRKİYE

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Abstract: *This study aims to determine cigarette use, addiction levels, and factors influencing cigarette use among university students. A descriptive-cross-sectional study design was employed, and the study procedure was administered to students enrolled in the Health Sciences Faculty (HSF) and Vocational School (VS) of a foundation university in the southern region of Türkiye during the 2022-2023 Academic Fall Semester. The sample of the study consisted of 802 students (255 from VS and 547 from HSF). Data collection was conducted using a 'Demographic Information Form' and the 'Fagerström Test for Nicotine Dependence (FTND).' It was found that 20.8% of the participating students were cigarette users, and 71.9% initiated cigarette use after the age of 16. Among cigarette users, 34.1% were classified as very mildly addicted, 35.9% as mildly to moderately addicted, and 30.0% as highly and very highly addicted. Considering the results obtained from the Binary Logistic Regression Analysis conducted in this study, being male, having a fragmented family, and having moderate or low academic performance were determined to be factors influencing students' cigarette use ($W = 60.659$, $p < 0.001$; $W = 6.076$, $p = 0.014$; $W = 10.397$, $p = 0.001$, respectively).*

Keywords: *Addiction, Effective Factors, Students, Cigarette, Smoking Addiction.*

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1. Introduction

Cigarettes, along with all tobacco products, poses a significant public health issue causing preventable morbidity and mortality [1]. The World Health Organization (WHO) defined smoking addiction as the regular use for at least one month and difficulty or inability to quit despite numerous harmful effects [2]. Nicotine is the most important substance in cigarettes leading to addiction. It easily crosses the blood-brain barrier, stimulates receptors, and activates the release of dopamine, providing a pleasurable sensation. The release of dopamine relaxes the individual, leading to addiction in approximately 50% of cigarette users [2,3]. This addiction is thought to play an important role in the difficulty of quitting smoking.

A study carried out in Türkiye revealed that individuals, who start smoking at an early age, tend to smoke more and experience a higher level of difficulty quitting [4]. In 2007, the Global Youth Tobacco Survey (GYTS) was conducted in Türkiye to assess smoking among 13-15-year-olds.

According to the results, tobacco and tobacco products use among students in this age group increased from 8.4% in 2009 to 10.4% in 2012. In 2017, it was found that 17.9% of students still used a tobacco or tobacco product, and 7.7% still smoked cigarettes [5]. A study carried out by Demirbağ and Tavacı (2012) reported that the initiation of smoking occurs before the age of 20, particularly during the high school years, not later during university [6]. In a study by Potuk Bilici, Özer, and Bozdemir (2023), 36% of the 1407 university students surveyed used tobacco and tobacco products, with 23.1% using cigarettes [7]. In a study carried out by Aydın, Eryiğit, and Nurdan (2022) on university students, it was found that 33.1% of students smoked, with 69.2% of smoking students falling in the 20-25 age range [8]. Studies with university students from diverse sample populations in Türkiye show smoking rates ranging from 25.6% to 29.1% [9–11].

It was observed that smoking addiction mostly begins between the ages of 15 and 19 years, and approximately. 50% of those who start smoking during adolescence continue for approximately 15-20 years [12]. In a study carried out by Duran and Gözeten (2017), it was determined that the prevalence of smoking behavior was higher among university students aged 21 and above [13]. Considering the Turkish Statistical Institute (TÜİK) 2022 data, the daily tobacco product usage rate for individuals aged 15 years and above is 15.5% for females and 41.3% for males [14]. Tobacco kills half of its users who do not quit. Over 8 million people worldwide die from diseases caused by tobacco use annually, and this number is estimated to double in the next eight years [2].

The initiation and habituation of cigarette use among university students involve various risk factors [15]. These risk factors include family, peer group, school life, and individual characteristics, as well as environmental and societal risk factors [11,15]. In a study carried out by Özcebe et al. (2014) among first-year university students, it was found that the prevalence of smoking was higher among those whose mothers were illiterate (23.0%), those living alone (37.7%), and those who perceived their spending money as insufficient (24.9%) (16). The same study identified that 28.6% of fourth-year students and 19.7% of first-year students were found to be smoking during the research [16]. Another study revealed that university students stated pleasure (12.2%), social environment (10.7%), curiosity (4.6%), and stress (4.3%) as reasons for smoking [8]. Some studies indicated that male university students used cigarettes at a higher rate than female students [13,17].

University students, due to their age, may fail to fully comprehend the potential harms of smoking addiction and can forget that serious effects may develop after a prolonged period [18]. Adolescents, representing an important stage in terms of initiating tobacco consumption, are potential consumers from the perspective of the tobacco industry. Therefore, investigating the tobacco consumption behavior of this group holds significant importance [19]. This study aims to determine the cigarette use, addiction levels, and factors influencing cigarette use among university students. Studies conducted with university students in Türkiye have examined the rates, reasons, and levels of cigarette use. Since the 1990s, the importance given to tobacco control policies globally has increased, thanks to efforts led by the World Bank (WB) and the World Health Organization (WHO), in order to mitigate the adverse health and economic impacts of tobacco consumption. The "Framework Convention on Tobacco Control (FCTC)" and the "MPOWER" policy package have played significant roles in this increase. In Türkiye, the implementation of Law No. 4207 in 1996 and the FCTC in 2004 brought a significant boost in tobacco control policies [19]. In Türkiye, the increase in tobacco use led to the establishment of the “National Tobacco Control Program” through the Prime Ministry’s directive numbered 2006/29. This program involved decisions to ban and restrict smoking in enclosed spaces, certain modes of transportation, and open areas of educational institutions [20]. As a part of our research’s significance, participating students were asked about their opinions on smoke-free zone practices implemented in Türkiye. Moreover, through various statistical analyses, factors influencing the addiction to cigarettes among student smokers were identified, and an analysis predicting the level of addiction was presented.

It is anticipated that planning new practices based on these factors will contribute to preventing the initiation and addiction of smoking in Türkiye, thereby reducing a significant public health issue.

2. Materials and Methods

2.1. Study Population

The universe of this descriptive-cross-sectional study consists of a total of 1460 students enrolled in the Health Sciences Faculty (Nursing: 442, Nutrition and Dietetics: 299, Physiotherapy and Rehabilitation: 259) and the Vocational School (Dialysis: 150, Anesthesia: 150, First Aid and Emergency Assistance: 160) during the 2022-2023 Fall Semester at a foundation university in the southern region of Türkiye. According to the power analysis, if the universe size is 1000 and the significance level (α) is set at 0.05, the sample size for calculating sample sizes with a margin of ±0.05 error ($p = 0.5$, $q = 0.5$) is 278. Similarly, for a universe size of 500, the calculated sample size, with the same parameters, is 217. In this study, it was aimed at reaching reach a minimum of 278 undergraduate and 217 associate degree students, totaling 495 participants. However, the study was completed with the participation of 802 students.

2.2. Data Collection Tools

In the study, the 'Introductory Information Form' and the 'Fagerström Test for Nicotine Dependency (FTND)' were used in data collection. The data collection process was conducted through face-to-face interviews carried out by the researchers. The application duration for the data collection forms ranged from 30 to 45 minutes.

Introductory Information Form: A total of 31 questions, including sociodemographic characteristics of university students, aspects related to cigarette usage (such as the age of initiation, duration of smoking, quantity of cigarettes smoked, desire or experience of quitting, etc.), the effectiveness of smoke-free zones in front of the buildings where they receive education, the adequacy of warnings, and opinions on expanding these areas, were included.

Fagerström Test for Nicotine Dependence (FTND): Fagerström initially developed the Fagerström Tolerance Test in 1978 to measure nicotine addiction. This test was revised in 1992 by Fagerström, Heatherton, and Kozlowski, leading to the development of the Fagerström Test for Nicotine Dependence [21]. The Fagerström Test for Nicotine Dependence consists of six questions, each receiving a different score. The assessment of this test categorizes nicotine addiction into five groups based on the total scores obtained: very low (0-2 points), low (3-4 points), moderate (5 points), high (6-7 points), and very high (8-10 points). In Türkiye, the validity and reliability of the Fagerström Test for Nicotine Dependence were tested by Uysal et al. in 2004, resulting in a Cronbach's alpha coefficient of 0.56 [22]. In the present study, the FTND Scale demonstrated a Cronbach's alpha reliability coefficient of $\alpha = 0.681$.

2.3. Statistical Analysis

Research data were analyzed using the Statistical Package for Social Sciences (SPSS) 25.0 program. Data on continuous variables were reported using mean (M), median, minimum-maximum values, interquartile range (IQR), and standard deviation (SD). For categorical variables, the data were presented as numbers (n) and percentages (%). The normality of the distribution of continuous dependent variables requires the Kolmogorov-Smirnov normality test to be nonsignificant ($p > 0.05$), skewness and kurtosis values calculated by dividing them by their standard errors to be within acceptable limits (within ±1 boundaries) and within ±1.96 boundaries, a bell curve to be in the histogram graph, points on the Normal Q-Q Plot graph to be near or on the 45-degree line, and arithmetic mean, mode,

and median to be equal or close to each other. Since the majority of continuous variables did not meet the above criteria for normal distribution, non-parametric tests were used as evidence of their deviation from normal distribution.

For variables with two groups, the Mann-Whitney U test was utilized, while the Kruskal-Wallis H test was used for three or more groups. Evaluations regarding the predictive relationships between variables were reported using Logistic Regression Analysis. A significance level of $p<0.05$ was considered for all conducted tests.

2.4. Ethical Statement

The necessary ethical approval was obtained by applying to the Institutional Review Board for Non-Interventional Research in Health Sciences of Hasan Kalyoncu University in southern Türkiye (Decision No: 2022/3; Decision Date: 01.01.2023). Moreover, written permission was obtained from the university administration. The research adhered to the principles of the Helsinki Declaration. Verbal consent was obtained from university students who voluntarily participated in the research.

3. Results

Distribution of students and their families by sociodemographic characteristics are shown in Table 1.

Table 1. Distribution of Students and Their Families by Sociodemographic Characteristics (n=802)

Variables	Mean ± SD	Min – Max
Age	24.58±2.18	21-48
Variables and Subgroups	**Number (n)**	**Percentage (%)**
Age groups		
≤ 23	247	30.8
24 years	201	25.0
25 years	177	22.1
26 ≤	177	22.1
Sex		
Female	589	73.4
Male	213	26.6
Department of graduation in high school		
Private or state high school	99	12.3
Technical\vocational high school	194	24.2
Anadolu or science high school	509	63.5
Department in university		
HSF	547	68.2
VS	255	31.8
Year		
1st	249	31.0
2nd	249	31.0
3rd	138	17.3
4th	166	20.7
Success in courses		
Good	426	53.1
Moderate	349	43.5
Low	27	3.4
Place of residence		
Rural	158	19.7
Urban	644	80.3

Table 1. Continued.

Variables and Subgroups	Number (n)	Percentage (%)
Cohabitating with		
Family	633	78.9
Relative/Friend/Dormitory/Alone at home	169	21.1
Chronic disease		
No	742	92.5
Yes	60	7.5
Family type		
Extended family	66	8.2
Nuclear family	699	87.2
Broken family	37	4.6
Father's educational level		
Undergraduate and higher	183	22.8
High school	233	29.1
Elementary school	352	43.9
Uneducated	34	4.2
Mother's educational level		
Undergraduate and higher	71	8.9
High school	203	25.3
Elementary school	437	54.5
Uneducated	91	11.3
Father's employment status		
Employed	753	93.9
Unemployed	49	6.1
Mother's employment status		
Employed	131	16.3
Unemployed	671	83.7
Family income level		
Income>Expenses	221	27.6
Income=Expenses	467	58.2
Income<Expenses	114	14.2
Scholarship		
No	628	78.3
Yes	174	21.7
Political view of family		
Democratic-egalitarian	745	92.9
Not democratic-egalitarian	57	7.1
Chronic disease in first-degree relatives		
No	595	74.2
Yes	207	25.8
Total	**802**	**100.0**

Mean: Mean, **SD:** Standard deviation, **Min:** Minimum value, **Max:** Maximum value **HSF:** Health Sciences Faculty, **VS:** Vocational School

The mean age of the students participating in the present study was 24.58±2.18 (min.-max.= 21-48), with 30.8% aged 23 years or younger. Moreover, 73.4% were female, 63.5% were graduates of Anadolu or science high schools, and 68.2% were currently enrolled in a health sciences faculty, with 62.0% attending their first and second years. It was found that 53.1% of students had a good academic performance, 80.3% lived in a city, and 78.9% resided with their families. Chronic illness was present in 7.5% of the students (Table 1).

Furthermore, 87.2% of students lived in nuclear families, 43.9% had fathers, and 54.5% had mothers with education at the primary school level. Additionally, 93.9% of students' fathers were employed, and 83.7% of mothers were housewives. In terms of family income, 58.2% of students reported equal monthly income and expenses, while 78.3% did not receive any scholarships from institutions. The family's ideological perspective revealed that 92.9% held democratic and egalitarian views. It was determined that 25.8% of students' immediate family members had chronic illnesses (Table 1).

Ninety-two percent (92.0%) of students found the school-based SFA necessary, with 25.2% stating that the designated SFAs in school were not used for their intended purpose. Moreover, 55.5% of students believed that the warnings in the school's designated SFAs were insufficient, whereas 48.4% considered it appropriate to expand these areas. It was observed that 40.4% of students were undecided about the effectiveness of the school's SFA program in the stages of abstaining from or quitting smoking (Table 2).

Table 2. Distribution of Smokers' Characteristics and Students' Opinions on Smoke-Free Areas

Variables and Subgroups	Number (n)	Percentage (%)
Smoke-Free Areas (SFAs) are necessary		
Yes	738	92.0
No	64	8.0
Are SFAs in your university used for the intended purposes		
No	202	25.2
No opinion	283	35.3
Yes	317	39.5
Are SFAs in your university enough		
Yes	357	44.5
No	445	55.5
Should SFAs in your university be expanded		
No	98	12.2
No opinion	316	39.4
Yes	388	48.4
Are SFAs in your university effective in quitting smoking		
No	224	27.9
No opinion	324	40.4
Yes	254	31.7
Smoking status		
No	635	79.2
Yes	167	20.8
Age of starting smoking		
≤ 15 years	47	28.1
16 years ≤	120	71.9
Duration and amount of smoking		
0-5 years 10 pcs	58	34.7
0-5 years 20 pcs	62	37.1
6-10 years 10 pcs	10	6.0
6-10 years 20 pcs	37	22.2
Monthly expenditure on cigarettes		
< 150 TL	64	38.3
150 TL ≤	103	61.7
Desire to quit smoking		
Yes	75	44.9
No	92	55.1

Regarding smoking habits, 20.8% of students were identified as smokers, with 71.9% initiating smoking after the age of 16. Among smokers, 37.1% reported a smoking duration of 0-5 years, consuming an average of 20 cigarettes per day. Notably, 61.7% of smoking students spent 150 TL or more monthly on cigarettes, and 44.9% expressed a desire to quit smoking (Table 2).

When examining the levels of addiction among students based on their FTND scores, it was determined that 29.3% were mildly addicted, 6.6% were moderately addicted, and 17.4% were severely addicted. The mean FTND score was calculated to be 3.90±2.72 (min-max=0-10) (see Table 3).

Table 3. Fagestrom Nicotine Dependence Scores and Distribution of Smoker Students

Fagestrom Nicotine Dependence	Number (n)	Percentage (%)	Cumulative (%)
Fagestrom Score			
0	19	11.4	11.4
1	18	10.8	22.2
2	20	12.0	34.2
3	27	16.1	50.3
4	22	13.1	63.4
5	11	6.6	70.0
6	15	9.0	79.0
7	14	8.4	87.4
8	11	6.6	94.0
9	7	4.2	98.2
10	3	1.8	100.0
Level of Addiction			
0-2: Very mild addiction	57	34.1	34.1
3-4: Mild addiction	49	29.3	63.4
5: Moderate addiction	11	6.6	70.0
6-7: High level of addiction	29	17.4	87.4
8-10: Very high level of addiction	21	12.6	100.0

	Mean ± SD	Min-Max	Median (IQR: Q3-Q1)
Scale total	3.90±2.72	0-10	3 (6-2)

Mean: Mean, **SD:** Standard deviation, **Min.:** Minimum value, **Max.:** Maximum value
IQR: Interquartile range (Q3:quantile of 75%, Q1: quantile of 25%), **Median:** Quantile of 50%

A statistically significant difference was found between groups' mean rank in the FTND scale by gender ($Z = 3.943$, $p < 0.001$). A statistically significant difference was also observed between the groups' mean ranks on the FTND scale by academic performance ($\chi2(2) = 14.349$, $p < 0.001$). Students with low and medium academic performance had higher mean ranks and were more addicted to cigarettes in comparison to students with good academic performance ($p = 0.003$, $p = 0.018$, respectively). Similarly, a statistically significant difference was found between groups' mean ranks on the FTND scale by family income ($\chi2(2) = 6.765$, $p = 0.034$). Students whose family income exceeded their expenses had higher average ranks and were more addicted to cigarettes than students whose family income was equal to their expenses (p=0.040). Moreover, a statistically significant difference was found between groups' mean ranks on the FTND scale by family type ($\chi2(2) = 9.745$, $p = 0.008$). Students from broken families had higher mean ranks and were more addicted to cigarettes compared to those from nuclear families (p=0.019) (Table 4).

Table 4. Comparing the Sociodemographic Characteristics of Smoker Students with Fagerström Test for Nicotine Dependence Mean Ranks (n=167)

Characteristics	n	Mean Rank	Median (IQR)	Min-Max	Test	p	Post Hoc
Age groups							
≤ 23	42	85.32	3 (6-2)	0-9	3.818	0.282	-
24 years	41	83.55	3 (6-1)	0-10			
25 years	36	95.32	4 (5.5-3)	0-9			
26 ≤	48	74.74	3 (5.5-1)	0-10			
Sex							
Female[1]	76	67.96	2.50 (5-1)	0-9	**3.943**	**<0.001***	**2>1**
Male[2]	91	97.40	4 (7-3)	0-10			
Department in University							
HSF	100	83.61	3.5 (6-2)	0-10	0.128	0.898	-
VS	67	84.58	3 (7-1)	0-10			
Year							
1	41	88.33	4 (6-2)	0-10	0.755	0.860	-
2	58	83.64	3 (6-2)	0-10			
3	35	78.80	3 (6-1)	0-9			
4	33	84.77	4 (6-2)	0-10			
Success in courses							
Good[1]	63	68.47	3 (5-1)	0-9	**14.349**	**0.001****	**3-2>1**
Moderate[2]	92	90.10	4 (7-2)	0-10			
Low[3]	12	118.75	6 (7-4)	2-10			
Family income level							
Income>Expenses[1]	56	95.39	4 (7-2)	0-10	**6.765**	**0.034****	**1>2**
Income=Expenses [2]	91	75.21	3 (5-1)	0-9			
Income<Expenses [3]	20	92.10	4 (6-2.5)	0-9			
Family type							
Extended family[1]	12	104.38	4 (6.5-3.5)	2-8	**9.745**	**0.008****	**3>2**
Nuclear family[2]	140	78.98	3 (6-1)	0-10			
Broken family[3]	15	114.53	5 (9-3)	1-10			
Cohabitating with							
Family	128	84.96	4 (6-2)	0-10	-0.470	0.638	-
Relatives/Friends/Dormitory/Alone at home	39	80.83	3 (6-2)	0-9			
Chronic Disease							
No	156	83.43	3 (6-2)	0-10	0.581	0.561	-
Yes	11	92.14	5 (5-2)	0-9			
Chronic disease in first degree relatives							
No	136	86.21	4 (6-2)	0-10	-1.247	0.212	-
Yes	31	74.29	3 (6-1)	0-9			

Min: Minimum values, **Max.:** Maximum values, **n:** Number of individuals, **[1-2-3]:** Intergroup differences **IQR:** Interquartile range (Q3:quantile of 75%, Q1: quantile of 25%), **Median:** Quantile of 50% **Post Hoc:** Bonferroni method, **HSF:** Health Sciences Faculty, **VS:** Vocational School *****Mann Whitney U test (**Z**), ******Kruskal Wallis H test (χ^2)

Paired logistic regression analysis and the backward stepwise method were used in order to determine the factors influencing smoking among students participating in the present study. The variables included in the model in the first step were gender, family type, age, academic performance, family income status, cohabiting individuals, and the presence of chronic illness in first-degree relatives. These variables were included in the model based on a literature review, considering that they could influence students' smoking status. The backward stepwise method identified the variables contributing most to the model in the fifth step. Accordingly, it was observed that the model established in the fifth step was statistically significant (Model: $\chi2=110.290$, df=4, $p<0.001$). The result of the Hosmer-Lemeshow test indicated a good fit for the model ($\chi2=9.342$, df=5, $p=0.096$). The established model explained 12.8% of the variance in smoking status (Cox & Snell R^2) and 20.1% (Nagelkerke R^2), predicting smoking status with an accuracy of 81.7%. The variables of being male, having a broken family, and having moderate or low academic performance were found to be factors influencing students' smoking status (W=60.659, $p<0.001$; W=6.076, $p=0.014$; W=10.397, $p=0.001$, respectively). Thus, for each unit increase in smoking status, being male increased the odds by 4.4 times (95% CI: 3.055-6.476), belonging to a broken family increased the odds by 2.5 times (95% CI: 1.213-5.441), and having moderate or low academic performance increased the odds by 1.8 times (95% CI: 1.273-2.692) (Table 5).

Table 5. Factors Influencing Students' Smoking Status: Paired Logistic Regression Analysis

Variables Involved in the Model							**95% Confidence Intervals for OR**	
	B	**S.E.**	**Wald**	**df**	**p**	**OR**	**LL**	**UL**
Sex (1)	1.492	0.192	60.659	1	<0.001	4.448	3.055	6.476
Family type (1)	0.944	0.383	6.076	1	0.014	2.569	1.213	5.441
Success in courses at university (1)	0.616	0.191	10.397	1	0.001	1.851	1.273	2.692
Constant	-2.573	0.187	188.667	1	<0.001	0.076		

Model: $\chi^2=110.290$, df=4, $p<0.001$; **Hosmer-Lemeshow:** $\chi^2=9.342$, sd=5, $p=0.096$

Cox & Snell R^2: 0.128; **Negelkerke R^2:** 0.201

df: Degree of freedom, **OR:** Odds Ratio, **SE:** Standard error, **LL:** Lower limit, **UL:** Upper limit
Reference groups: Sex (Female); Family type (Extended-Nuclear); Success in courses at university (good)
Proxy variables: Family type: (0) extended-nuclear family, (1) broken family; Success in courses at university: (0) good, (1) moderate, low

Table 6. Factors Influencing Students' Smoking Status: Sequential Logistic Regression Analysis

Variables Involved in the Model				95% Confidence Intervals for Wald		Hypothesis test				95% Confidence Intervals for OR	
		B	S.E.	Lower	Upper	Wald Chi-square	df	p	OR	LL	UL
Threshold	[mild =.00]	-0.767	1.9006	-4.492	2.958	0.163	1	0.687	0.464	0.011	19.261
	[moderate =1.00]	-0.382	1.8999	-4.106	3.342	0.040	1	0.841	0.683	0.016	28.271
Age of starting smoking	[≤15 years =.00]	1.264	0.3797	0.520	2.009	**11.087**	**1**	**0.001**	**3.541**	1.682	7.454
	[16 years ≤ =1.00]	0[a]	.	.	.	.		.	1	.	.
Monthly expenditure on cigarette	[<150 TL =.00]	-1.650	0.4612	-2.553	-0.746	**12.795**	**1**	**<0.001**	**0.192**	0.078	0.474
	[150 TL ≤ =1.00]	0[a]	.	.	.	.		.	1	.	.
Family type	[Extended-nuclear =.00]	-0.443	0.6030	-1.624	0.739	0.538	1	0.463	0.642	0.197	2.095
	[Broken =1.00]	0[a]	.	.	.	.		.	1	.	.
Success in courses at the university	[Good =.00]	-0.789	0.3908	-1.555	-0.023	**4.076**	**1**	**0.043**	**0.454**	0.211	0.977
	[Moderate-low=1.00]	0a	.	.	.	.		.	1	.	.
Age		-0.023	0.0671	-0.154	0.109	0.114	1	0.736	0.978	0.857	1.115
(Scale)		1[b]									

Parallel Curves Test= χ^2=3.490, sd=6, p=0.745; **Model:** χ^2=43.344, sd=6, p<0.001; **Cox & Snell R^2**: 0.229; **Negelkerke R^2**: 0.282

df: degree of freedom, **OR:** Odds Ratio, **SE:** Standard error, **LL:** Lower limit, **UL:** Upper limit
Reference groups: Age of starting smoking (16 years ≤), Monthly expenditure on cigarette (150 TL≤), Family type (Broken family); Success in courses at university (moderate-low), age
Proxy variables: Addiction levels: (0) very mild-mild, (1) moderate, (2) high-very high level; Family type: (0) extended-nuclear family, (1) broken family; Success in courses at university: (0) good, (1) moderate-low

The regression model derived from the sequential regression analysis conducted to determine the effects of the age of initiation of smoking, monthly expenditure on cigarettes, family type, academic performance, and age variables on the levels of smoking addiction among students was found to be statistically significant ($\chi 2$=43.344, sd=6, p<0.001). Alongside the independent variables used in the analysis, it was observed that these variables explained 22.9% of the variance in students' levels of smoking addiction (Cox & Snell R2) and 28.2% (Negelkerke R^2). Considering the odds ratio (OR) values, students who initiated smoking at the age of 15 or younger exhibited smoking addiction levels 3.5 times higher than students who started smoking at 16 years or older. Additionally, it was determined that students with a monthly expenditure on cigarettes of 150 TL or less had lower levels of smoking addiction compared to those who spent more than 150 TL. Among smoking students, those with good academic performance had lower levels of smoking addiction compared to students with moderate to low academic performance (Table 6).

Table 7. Multiple Criteria Logistic Regression Analysis Classification for Predicting the Addiction Levels of Smoker Students

		Predicted				Accuracy Percentage
		Mild	Moderate	High	Total	
Addiction level	Mild	93	0	13	106	87.7
	Moderate	8	0	3	11	0.0
	High	26	0	24	50	48.0
General Percentage						70.1

Given the classification table, the constructed regression model accurately classified the mild addiction group at 87.7%, the moderate addiction group at 0.0%, and the severe addiction group at 48.0%. The overall accuracy percentage for classification was found to be 70.1% (Table 7).

4. Discussion

Among the students participating in the present study, it was determined that 20.8% used cigarettes, with 71.9% starting to smoke after the age of 16. Moreover, 37.1% of the participants had a smoking duration ranging from 0 to 5 years, consuming an average of 20 cigarettes per day. It was found that 61.7% of smoker students spent 150 TL or more monthly on cigarettes, and 44.9% expressed a desire to quit smoking (Table 2). The present study revealed that students who spent more than 150 TL monthly on cigarettes had addiction levels 5.20 times higher when compared to those spending less than 150 TL (Table 6). It is thought that students not facing financial difficulties allocate a more comfortable budget for smoking, resulting in higher cigarette consumption. According to the 2022 data from the Turkish Statistical Institute (TSI), the reasons for initiating tobacco product use in the 15-24 age group were distributed as follows: peer influence 34.4%, imitation 26.7%, curiosity 20.3%, personal problems 5.4%, no specific reason 5.9%, family issues 3.5%, and recreational purposes 3.7%. Examining the distribution of tobacco product use by age group, it was observed that the daily smoking rate increased from 16.4% in 2010 to 19.3% in 2022 among individuals aged 15-24 years [14]. In a previous study, it was noted that individuals who started smoking due to family use or imitation had higher FTND scores [23].

Decisions made in Türkiye in 1980, in line with the liberalizations in the tobacco sector in Türkiye, removed tobacco from the control of the state monopoly ("TEKEL") and positioned international tobacco companies in a decisive role. The entry of these companies into the Turkish market led to an increase in activities such as advertising and promotions, contributing to a rapid increase in

cigarette consumption. The first anti-tobacco law in Türkiye came into effect in 1996. This law prohibited tobacco use, as well as all forms of advertising and promotion, in public spaces such as health and education facilities, public transportation, etc. Additionally, it empowered television channels to broadcast informative programs about the harms of smoking and prohibited the sale of tobacco products to individuals under the age of 18 years. Despite the comprehensive nature of this law, its effect on reducing tobacco use did not reach a satisfactory level due to the inadequacy of its sanctions. In 2004, Türkiye became a party to the "WHO Framework Convention on Tobacco Control (FCTC)." Thanks to the harmonization efforts of the law enacted in 1996 and the FCTC, the "Law on the Prevention and Control of Harmful Effects of Tobacco Products" was put into effect in 2008. This new law expanded smoke-free areas and implemented a smoking ban in the accommodation and hospitality sectors. These areas were declared 100% smoke-free zones. With this law, Türkiye became the 5th country in Europe and the first in the Middle East and Central Asia to have smoke-free airspace. In Türkiye, there was a decrease in tobacco consumption during the period 2009-2011. However, from 2013 to 2018, there was a sharp increase in tobacco consumption, resembling the levels seen in the year 2000 [19]. According to the Global Youth Tobacco Survey (GYTS) conducted among students aged 13-15 years in 2017, it was determined that, despite not reaching the age of 18 years, 73.3% of the participating students could purchase cigarettes from informal sources [5]. It is thought that the majority of the students in the present study starting smoking after the age of 16 can be attributed to various reasons, and it is due to the ineffectiveness of many tobacco control measures implemented in Türkiye.

In the present study, based on the results of Sequential Logistic Regression Analysis conducted to identify factors influencing smoking addiction among students who smoke, it was determined that the level of smoking addiction in students who started smoking at the age of 15 and below is 3.5 times higher than that of those who started smoking at the age of 16 and above (Table 6). In the literature, the study carried out by Yakar and Pirinçci (2019) revealed that the age of starting to smoke increases the level of addiction, with individuals who start smoking before the age of 15 having higher levels of addiction [24]. The study carried out by Selçuk et al. (2018) revealed a higher level of addiction in students who start smoking at an early age, smoke more cigarettes, and are more encouraged to smoke [25]. Other studies also determined that individuals with higher scores of smoking addiction are more likely to start smoking due to curiosity, emulation, and peer influence [23,26]. It is well-known that smoking addiction leads to fatal diseases and preventing addiction results in a significant decrease in morbidity and mortality rates [27]. A study carried out by Babjakova et al. (2020) revealed that 55.6% of students had not received sufficient education about smoking addiction [28]. To overcome curiosity and interest in smoking and reduce smoking addiction, it is recommended to start providing informative and educational lessons about smoking addiction in preschool education institutions in Türkiye, in collaboration with children's families.

Examining the levels of addiction among students who smoke, it was determined that 29.3% were mildly addicted, 6.6% were moderately addicted, and 17.4% were severely addicted. The FTND score mean was found to be 3.90±2.72 (min.-max.=0-10) (Table 3). According to the FTND results in the study conducted by Kaya and Ergün (2020), it was found that "51.3% of the participating students were moderately addicted, and 26.9% had a high level of smoking addiction" [29]. In the study by Terzi et al. (2019), individuals in the group of smokers were found to have a higher level of addiction [30]. Additionally, in the present study, the analysis conducted to predict the levels of addiction among students who smoke correctly classified the excessive addiction group of students by 48.0%. The overall accuracy percentage for classification was found to be 70.1% (Table 7). In conclusion, it can be said that the model generally yielded good results. Particularly, multidisciplinary studies addressing students in the excessive addiction group in our research are considered necessary.

In the present study, it was found that the rank average of groups of male students on the FTND scale is higher than that of female students, and they are more addicted to cigarettes compared to females ($p<0.05$) (Table 4). Considering the results of the Global Adult Tobacco Survey conducted in 2008, 2012, and 2016, men, individuals aged 25-44, and those living in urban areas had higher tobacco usage rates compared to women and individuals in other age groups [19]. In 2020, 36.7% of men and 7.8% of women globally smoked cigarettes [2]. According to the 2022 Turkish Statistical Institute datas, the rate of individuals aged 15 and above who use tobacco products daily increased from 28.0% in 2019 to 28.3% in 2022. This rate was determined to be 41.3% in males and 15.5% in females in 2022 [14]. According to the Global Youth Tobacco Survey 2017 datas, male students were found to use cigarettes at a higher rate than female students (9.9% and 5.3%, respectively) [5]. The present study revealed that students with low and moderate academic performance are 2.20 times more likely to be addicted to cigarettes when compared to students with good academic performance ($p<0.05$) (Table 6). Furthermore, the Paired Logistic Regression Analysis conducted in the present study identified being male, having a broken family, and having moderate or low academic performance as factors influencing students' smoking status (Table 5). Some studies in the literature indicated that there is a relationship between smoking addiction and age of starting smoking, duration of use, and quantity of use independent of gender [24,25]. In a study carried out by Babjakova et al. in 2020, it was reported that the prevalence of smoking addiction is higher in women than in men [28]. In a study carried out by Yalçın et al. in 2021, it was found that men have a higher prevalence of smoking addiction [31]. Additionally, other studies also reported that individuals with high academic achievement and low addiction scores are more knowledgeable about smoking addiction, and their quit rates are also higher [29,31,32]. In this context, it is considered important to expand the scope and content of education on cigarette addiction and provide it to all segments of society. Most smokers who are aware of the dangers of tobacco want to quit. Worldwide, counseling and medication were shown to more than double the chances of a smoker successfully quitting [2].

In this study, it was determined that students with a family income higher than expenses are more likely to be cigarette-dependent compared to students with an equal family income and expenses ($p<0.05$). Additionally, the present study found that students from broken families are more prone to smoking addiction than those from nuclear families ($p<0.05$) (Table 4). Studies consistently showed a higher prevalence of smoking among individuals with higher income levels and those with a history of adverse experiences [33,34]. In a study carried out by Ergin and İpek (2021), an increase in household income was associated with an increase in both cigarette and alcohol consumption [35]. It was reported in the literature that the influence of family pressure and peer environments contributes to an increase in cigarette and other substance use [36–38]. Factors such as divorce or a high number of individuals in the family, which may harm emotional bonds, can escalate substance use. It has been observed that divorced or broken family structures serve as significant predictors of alcohol and cigarette use among adolescents [39]. In contrast to our study's findings, Kaya and Ergün (2020) identified that students with low economic status and those living with their peers exhibit higher rates of cigarette use [29]. This suggests that the prevalence of cigarette use may vary depending on multiple factors. Some socioeconomic advantages are associated with increased access to and use of cigarettes, while socioeconomic disadvantages and negative family structures affect cigarette use in certain situations. Recognizing the complexity of these factors, it is important to create awareness across all segments of society and implement diverse initiatives and projects to reduce cigarette use and, consequently, smoking addiction.

5. Conclusions and Suggestions

In this study, the factors influencing cigarette use and addiction among university students were identified. Gender, academic performance, family income, and family structure were found to be effective variables in smoking addiction. Students who started smoking at an earlier age exhibited higher levels of smoking addiction when compared to those who started later in life. In light of these findings, it is recommended to plan and develop effective and innovative interventions in order to prevent the initiation and progression of cigarette use and addiction in Türkiye. Moreover, it is recommended that university students be provided with educational programs that teach the harms of smoking and the importance of addiction, fostering internalization and raising awareness.

Limitations of the study

Since the study was conducted in a single foundation university in the southern part of Türkiye, the results achieved here cannot be generalized to the entire specified population.

Acknowledgments

There is nothing to declare.

Ethical Statement

The necessary ethical approval was obtained by applying to the Institutional Review Board for Non-Interventional Research in Health Sciences of Hasan Kalyoncu University (Decision No: 2022/3; Decision Date: 01.01.2023). Moreover, written permission was obtained from the university administration. The research adhered to the principles of the Helsinki Declaration. Verbal consent was obtained from university students who voluntarily participated in the research.

Conflict of interest

There is nothing to declare.

Authors' contributions

S.A.: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Supervision, Validation, Writing - original draft, Writing - review & editing. A.B.C.: Conceptualization, Data curation, Investigation, Methodology, Software, Supervision, Validation, Writing - original draft, Writing - review & editing. Z.Ç.: Conceptualization, Investigation, Software, Supervision, Validation, Writing - original draft, Writing - review & editing. E.D.: Data curation, Software, Supervision, Validation, Writing - original draft, Writing - review & editing. M.Ö.Ç.: Data curation, Software, Supervision, Validation, Writing - original draft, Writing - review & editing. S.P.: Data curation, Software, Writing - original draft, Writing - review & editing. S.A.: Data curation, Software, Writing - original draft, Writing - review & editing. All authors read and approved the final manuscript.

References

[1] Türkiye Halk Sağlığı ve Kronik Hastalıklar Enstitüsü. Dünya Tütünsüz Günü 31 Mayıs 2021 [Online]. Avaliable: https://www.tuseb.gov.tr/tuhke/uploads/genel/files/tutunsuz_gunu.pdf

[2] WHO. Tobacco. World Health Organization; 2023. [Online]. Avaliable: https://www.who.int/news-room/factsheets/detail/tobacco#:~:text=Around%2080%25%20of%20the%20world's,(WHO%20FCTC)%20in%202003.

[3] Delgado-Lobete, L., Montes-Montes, R., Vila-Paz, A., Cruz-Valiño, J-M., Gándara-Gafo, B., Talavera-Valverde, M-Á., Santos-Del-Riego, S. "Individual and Environmental Factors Associated with Tobacco Smoking, Alcohol Abuse and Illegal Drug Consumption in University Students: A Mediating Analysis", *International Journal of Environmental Research and Public Health*, 17(9), 3019, 2020. https://doi.org/10.3390/ijerph17093019.

[4] Kose, E., Ozcebe, H. "Tobacco epidemic keeps spreading among Turkish youth", *Eurasian Journal of Pulmonology*, 19(3), 139–145, 2017. https://doi.org/10.5152/ejp.2017.27880.

[5] Türkiye Halk Sağlığı Kurumu. Küresel Gençlik Tütün Araştırması Türkiye Raporu. Ankara: T.C. Sağlık Bakanlığı; 2017. [Online]. Erişim: https://hsgm.saglik.gov.tr/depo/birimler/tutun-ve-madde-bagimliligi-ile-mucadele-db/dokumanlar/KGTA-2017_pdf.pdf

[6] Demirbağ, B.C., Tavacı, S. "Sigara içen üniversite öğrencilerinin sosyo-demografik özellikleri", *Gümüşhane Üniversitesi Sağlık Bilimleri Dergisi,* 1(3), 179–188, 2012.

[7] Bilici, B.P., Özer, Z.Y., Bozdemir, N. "Çukurova üniversitesi öğrencilerinin sigara içme durumu ve tütün kontrol yasasına bakışları", *Turkish Journal of Family Medicine and Primary Care*, 17(1), 157–167, 2023. https://doi.org/10.21763/tjfmpc.1179544.

[8] Aydın, G.Ş., Eryiğit, T., Nurdan, S. "Üniversite öğrencilerinin sigaraya başlama nedenleri ve kullanma oranları", *Lapseki Meslek Yüksekokulu Uygulamalı Araştırmalar Dergisi*, 3(6), 1–14, 2022.

[9] Arslan, H.N., Terzi, O., Dabak, S., Peksen, Y. "Substance, cigarette and alcohol use among high school students in the provincial center of Samsun, Turkey", *Erciyes Tıp Dergisi/Erciyes Medical Journal*, 34(2), 79–84, 2012. https://doi.org/10.5152/etd.2012.19.

[10] Yengil, E., Çevik, C., Demirkıran, G., Akkoca, A.N., Özler, G.S., Özer, C. "Smoking among medical school students and attitudes against smoking", *Konuralp Tıp Dergisi,* 6(3), 1-7, 2014. https://doi.org/10.18521/ktd.34618.

[11] Kartal, M., Midik, O., Buyukakkus, A. "Tobacco smoking and its effect on quality of life of medical students in Ondokuz Mayıs University", *Turkish Thoracic Journal/Turk Toraks Dergisi*, 13(4), 11–17, 2012. https://doi.org/10.5152/ttd.2012.03.

[12] Fallin, A., Roditis, M., Glantz, S.A. "Association of campus tobacco policies with secondhand smoke exposure, intention to smoke on campus, and attitudes about outdoor smoking restrictions", *American Journal of Public Health*, 105(6), 1098–1100, 2015. https://doi.org/10.2105/AJPH.2014.302251.

[13] Duran, S., Gözeten, A. "Üniversite öğrencilerinde sigara içme davranışı, yalnızlık ve stresle baş etme biçimleri arasındaki ilişkinin incelenmesi", *Bozok Tıp Dergisi,* 7(1), 1-7, 2017.

[14] Türkiye İstatistik Kurumu. Türkiye Sağlık Araştırmaları 2022 Verileri, [Online]. Erişim: https://data.tuik.gov.tr/Bulten/Index?p=Turkiye-Saglik-Arastirmasi-2022-49747.

[15] Akfert, K.S., Cakici, E., Cakici, M. "Üniversite öğrencilerinde sigara-alkol kullanımı ve aile sorunları ile ilişkisi", *Anadolu Psikiyatri Dergisi*, 10(1), 40–47, 2009.

[16] Ozcebe, H., Guciz Dogan, B., İnal, E., Haznedaroglu, D., Bertan, M. "Smoking habits and the related sociodemographic characteristics in university students", *Turkish Thoracic Journal*, 15(2), 42–48, 2014. https://doi.org/10.5152/ttd.2013.29.

[17] Atay, Ö.B., Kurçer, M.A. "Sigara içmeyen üniversite öğrencilerinin sigaraya karşı tutumları ve etkileyen faktörler", *TSK Koruyucu Hekimlik Bülteni*, 11(3), 265–272, 2012.

[18] Karadağ, G., Lafçı, D. "Gaziantep Üniversitesi Sağlık Yüksekokulu öğrencilerinin sigara içme durumları ve sağlıklı yaşam biçimi davranışları", *ERÜ Sağlık Bilimleri Fakültesi Dergisi*, 3(1), 1–15, 2015.

[19] Saraçoğlu, S., Öztürk, F. "Türkiye'de tütün kontrol politikaları ve tütün tüketimi üzerine bir değerlendirme", *Politik Ekonomik Kuram*, 4(1), 20–44, 2020. https://doi.org/10.30586/pek.730271.

[20] Ulusal Tütün Kontrol Programı, 2006. [Online]. Erişim: https://www.resmigazete.gov.tr/eskiler/2006/10/20061007-8.htm

[21] Heatherton, T.F., Kozlowski, L.T., Frecker, R.C., Fagerstrom, K. "The Fagerström Test for Nicotine Dependence: a revision of the Fagerstrom Tolerance Questionnaire", *British Journal of Addiction*, 86(9), 1119–1127, 1991. https://doi.org/10.1111/j.1360-0443.1991.tb01879.x

[22] Uysal, M.A., Kadakal, F., Karşidağ, C., Bayram, N.G., Uysal, O., Yilmaz, V. "Fagerstrom test for nicotine dependence: Reliability in a Turkish sample and factor analysis", *Tuberkuloz ve Toraks*, 52(2), 115–121, 2004.

[23] Doğan, M.B., Kotan, H., Akbulut, S. "Bir vakıf üniversitesindeki öğrencilerin sigara kullanımı, nikotin bağımlılık düzeyi ve ilişkili faktörlerin incelenmesi", *Fenerbahçe Üniversitesi Sağlık Bilimleri Dergisi*, 2(2), 455–469, 2022. https://doi.org/10.56061/fbujohs.1137421.

[24] Yakar, B., Pirinçci, E. "Bir üniversite hastanesi polikliniğine başvuran hastaların sigara ve alkol bağımlılık düzeylerine etki eden faktörler", *Kahramanmaraş Sütçü İmam Üniversitesi Tıp Fakültesi Dergisi*, 14(2), 57–65, 2019. https://doi.org/10.17517/ksutfd.473723.

[25] Selçuk, K.T., Avcı, D., Mercan, Y. "Üniversite öğrencilerinde sigara bağımlılığı, sigarayı bırakmaya yönelik istek ve öz-etkililik", *Clinical and Experimental Health Sciences*, 8(1), 36-43, 2018. https://doi.org/10.5152/clinexphealthsci.2017.420.

[26] Abu-elenin, M.M.M,. Atalla, A.A.E.O., El-Salamy, R.M. "Cigarette smoking among medical students and some associated risk factors", *Tanta Medical Journal*, 45(4), 206, 2017. https://doi.org/10.4103/tmj.tmj_3_17.

[27] Selby, P., Zawertailo, L. "Tobacco addiction", *New England Journal of Medicine*, 387(4), 345–354, 2022. https://doi.org/10.1056/NEJMcp2032393.

[28] Babjakova, J., Weitzman, M., Vondrova, D., Filova, A., Kollar, B., Stofko, J., Jurkovicova, J., Argalasova, L. "E-Cigarette use among university students in Slovakia", 1-12, 2020. https://doi.org/10.20944/preprints202002.0103.v1.

[29] Kaya, M., Ergün, A. "Sağlık bilimleri öğrencilerinin sigara içme durumu, etkileyen faktörler ve ikincil sigara dumanı ile ilgili farkındalık düzeyleri", *Journal of Academic Research in Nursing*, 6(3), 416–425, 2020. https://doi.org/10.5222/jaren.2020.04696.

[30] Terzi, O., Kumcagiz, H., Terzi, M., Dundar, C. "Üniversite öğrencilerinde sigara kullanımı ve nikotin bağımlılık düzeylerinin belirlenmesi", *ADDICTA: The Turkish Journal on Addictions*, 6(4), 168–181, 2019. https://doi.org/10.5152/addicta.2020.19134.

[31] Bektaş, M.Y., Yalçin, E., Karahan, T.F. "Comparison of Exhaled Carbon Monoxide and Fagerstrom Test for Nicotine Dependency in Non-Cigarette Nicotine Addicts", *Turkish Journal of*

Family Medicine and Primary Care, 15(3), 472–478, 2021. https://doi.org/10.21763/tjfmpc.802741.

[32] Uzer, F., Uzun, R. "Sigara bırakma polikliniğine başvuran kişilerin genel sağlık durumları ve sigara bırakma oranları", *Akdeniz Medical Journal*, 6(1), 100–105, 2020. https://doi.org/10.17954/amj.2019.2025.

[33] Bektaş, M., Öztürk, C. "Sigara kullanımı önleme programının geliştirilmesi ve programın etkinliğinin değerlendirilmesi", *Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi*, 34, 1–21, 2012.

[34] Ulukoca, N., Gökgöz, Ş., Karakoç, A. "Kırklareli Üniversitesi öğrencileri arasında sigara, alkol ve madde kullanım sıklığı", *Fırat Tıp Dergisi*, 18(4), 230–234, 2013.

[35] Ergin, M., İpek, E. "Türkiye'de hanehalkı sigara tüketiminin belirleyicileri", *Ömer Halisdemir Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 14(2), 478–494, 2021. https://doi.org/10.25287/ohuiibf.715513.

[36] Avan, H., Nacar, D. "Adölesanlarda madde bağımlılığı farkındalığının belirlenmesi", *Kırşehir Ahi Evran Üniversitesi Sağlık Bilimleri Dergisi*, 7(2), 89–97, 2023.

[37] Chisom, H.I., Beatrice, O., Iyanuoluwa, O.O., Oluwatoyin, B. "Risk factors associated with substance abuse among adolescents", *International Neuropsychiatric Disease Journal*, 18(1), 11–24, 2022. https://doi.org/10.9734/indj/2022/v18i130214.

[38] Yalman, E. "Ebeveyn ve akran ilişkilerinin genç kızlarda madde kullanımına etkisi", *Journal of International Scientific Researches*, 4(2), 372–391, 2019. https://doi.org/10.21733/ibad.536682.

[39] Arslan, G. Ortaöğretimde Öğrenim Gören Ergenlerde Görülen Problem Davranışların Aile Sorunları, Aile Yapısı Açısından İncelenmesi, Yüksek Lisans Tezi, Pamukkale Üniversitesi, Denizli, 2012.