



Original Article

Factors Related to Tobacco Cessation Attempts Among Turkish Adolescents: A Structural Equation Model Analysis

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Abstract

OBJECTIVE: The Turkish Global Youth Tobacco Survey (GYTS) 2017 revealed that 17.9% of students aged 13-15 used tobacco products and 7.7% smoked cigarettes. Given the high prevalence of smoking, it is important to evaluate the factors associated with quit attempts among adolescents. This study aimed to identify the factors associated with Turkish adolescents' attempts to quit smoking using Structural Equation Model (SEM) analyses.

MATERIAL AND METHODS: This study utilized the data from GYTS 2017, which is a cross-sectional, nationally representative, school-based study carried out below 18-year-olds. The study population (n = 18 985) consisted of students who had smoked cigarettes within the past year. After excluding inconsistent responses, 9735 students remained for the analysis. The outcome was an attempt to quit smoking within the past year. Structural Equation Model (SEM) was used for data analysis. The model had good fit (CFI = 0.917, TLI = 0.900, RMSEA = 0.032).

RESULTS: Of the 9735 students, 66.4% were male. In the past 12 months, 56.3% (95%CI: 55.3%-57.3%) of smokers attempted to quit. Exposure to anti-tobacco policies ($\beta = 0.114$. $P < .001$) had positive direct effects, whereas sociodemographic factors ($\beta = -0.086$. $P < .001$), nicotine dependency ($\beta = -0.037$. $P = .008$) and exposure to second-hand smoke ($\beta = -0.051$. $P < .001$) had negative direct effects on quit attempts.

CONCLUSION: More than half of the smokers attempted to quit, and nicotine dependence predicted quit attempts. Exposure to second-hand smoke decreased cessation attempts. Anti-tobacco policies such as sale restrictions and warnings of the dangers of tobacco products should be given high priority and enforced fully since they are the strongest predictors of quit attempts.

KEYWORDS: adolescent, quit attempts, tobacco, tobacco cessation

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INTRODUCTION

One of the greatest public health threats the world has ever faced is tobacco, which is referred to as the “tobacco epidemic” by the World Health Organization (WHO).¹ Each year, more than 8 million people die as a result of tobacco use, and smoking is among the top 5 risk factors leading to mortality.^{1,2} Smoking is also a major threat among youth.³ Globally, the estimated number of adolescents aged 13 to 15 years who smoke cigarettes or use smokeless tobacco products is approximately 50 million.⁴ The 2017 Global Youth Tobacco Survey (GYTS) conducted in Türkiye revealed that among students aged 13 to 15 years, 17.9% (23.2% of boys and 12.1% of girls) were currently using tobacco products and 7.7% (9.9% of boys and 5.3% of girls) were smoking cigarettes.⁵ The most recent data obtained from the Turkish Statistical Institute indicated that 19.3% (9.0% of girls and 29.0% of boys) among the 15-24 age group in 2022 were currently smoking cigarettes.⁶

Smoking at young ages is a strong predictor of smoking in adulthood.^{7,8} Previous studies revealed that initiation of tobacco use occurs primarily at younger ages.^{9,10} If a person does not start smoking regularly by age 25, he or she is unlikely to become a smoker. This finding alone indicates the unique opportunity for interventions aimed at preventing smoking initiation among people aged 25 and younger.¹⁰ So the first step of tobacco control programs is to decrease smoking incidence among young people.¹ However, because the prevalence of smoking is very high, it is also important to help teenagers quit. Although progress has been made in improving cessation treatments and services, achieving high rates of cessation remains difficult worldwide.¹⁰ In this context, understanding the factors associated with young people's attempts to quit is crucial.

There is a limited number of studies examining factors associated with quit attempts. Studies show that gender,^{11,12} age,^{13,14} parental education level,¹⁵ age at smoking initiation¹⁶ and household tobacco exposure^{14,17,18} are associated with quit attempts. A cross-sectional study of 1312 adolescent students in Nepal revealed that smokers who were prepared to quit smoking in the future were more likely to have made attempts to quit.¹² Level of dependence,¹⁹⁻²¹ trying other tobacco

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products,^{14,19} increasing cigarette taxes,¹⁵ seeking help to quit smoking^{12,22-24} were also associated with quit attempts. A cross-sectional study of 11 142 adolescents aged 12 to 18 years in Korea found that adolescent smokers who had seen graphic warnings were more likely to try to quit than those who did not.¹⁶

To our knowledge, there is no study evaluating the factors associated with quit attempts among Turkish adolescents. Hence, the aim of this study is to identify the factors associated with quit attempts among Turkish adolescents using data from the 2017 GYTS in Türkiye via Structural Equation Model (SEM) analysis.

MATERIAL AND METHODS

We conducted a secondary analysis in 2023 of the data collected in the 2017 Turkish GYTS. The GYTS is a cross-sectional study conducted by the Ministry of Health General Directorate of Public Health, and supported by WHO and the US Centers for Disease Control and Prevention (CDC).

The Turkish Global Youth Tobacco Survey Database

The GYTS is a school-based survey that uses a self-administered questionnaire to monitor tobacco use among youth and to support the implementation and evaluation of tobacco prevention and control programs.²⁵ The Turkish Global Youth Tobacco Survey (GYTS) uses a globally standardized methodology that includes a two-stage sampling design in which schools are selected with a probability proportional to the number of students, and the classes within selected schools are chosen randomly. A total of 122 040 eligible students (7th and 8th grades of primary school and 1st and 2nd grades of high school) completed the survey. The overall response rate was 82.8%.²⁵ The GYTS utilized a self-administered questionnaire completed in class.

The survey consists of 56 core questions designed to collect data on the following 7 areas:

1. Young people's knowledge and attitudes about cigarette smoking
2. Prevalence of cigarette smoking and use of other tobacco products among young people
3. The role of media and advertising in young people's cigarette use
4. Access to cigarettes
5. Tobacco-related curriculum in schools
6. Environmental tobacco smoke
7. Cessation of cigarette smoking²⁵

In this study, participants who had used tobacco in the past 12 months were selected as the study population (n = 18 985). After excluding inconsistent responses, 9735 students (51.3%) remained for the analysis.

Outcome

The outcome was an attempt to stop smoking during the past 12 months.

Predictors

We hypothesized that sociodemographic, social, and environmental factors would be associated with attempts to quit smoking. Therefore, we classified the predictors (latent factors) into the following categories:

- Sociodemographic factors (age, gender, weekly pocket money, parents' work and educational status)
- Level of nicotine dependence (smoking per day, smoking as the first thing in the morning, the interval between 2 smoking sessions)
- Exposure to second-hand smoking (exposure to smoking at home, in any enclosed public places, or in any outdoor public places)
- Promoting factors for tobacco use (exposure to advertising in stores, at events, or on the internet)
- Anti-tobacco policies (exposure to sale restriction signs, anti-tobacco media messages, TV spots)

Statistical Analysis

Data cleanup and cross-checking were conducted before the analysis, and inconsistent responses were excluded. Categorical data were presented as percentages and frequencies. Categorical variables were compared with the chi-square test. The Structural Equation Model (SEM) was used to assess the direct or indirect associations between the attempts to cease and the predictors. The cut-off values suggested by Hu and Bentler were used in assessing the model fit.²⁶ The level of statistical significance was accepted as $P < .05$.

RESULTS

Descriptive Findings

A total of 9735 participants were included in the analyses. Socio-demographic characteristics of the respondents are presented in Table 1. Among all, 6068 (62.5%) were above 15 years old and 6460 (66.8%) were males.

Most of the students (57.9%) stated that they smoked less than 6 cigarettes per day, whereas 7.6% of the students smoked more than 20 cigarettes per day. Among all, 5.1% always smoked tobacco as the first thing in the morning, and 68.5% of them smoked their following cigarettes within 1 hour (Table 2).

Among the participants, 5,484 (56.3%, 95% CI = 55.3%-57.3%) stated that they had tried to quit smoking within the past 12 months. Among those who had attempted to quit, 4 957 (58.7%) received neither professional help nor advice to stop smoking. Most of the students (58.7%) stated that they would be able to stop smoking if they wanted to. The majority of the students reported that they were exposed to second-hand smoke at their homes (63.4%), at any enclosed public places (85.3%), or at any outdoor public places (85.8%).

Main Points

- Quit attempts are highly prevalent, but there are no cessation programs for adolescents in Türkiye.
- Anti-tobacco policies are the most accurate predictors of quit attempts and should be fully enforced.
- As exposure to second-hand smoke both indoors and outdoors decreases quit attempts, there is a need to enforce and expand smoking bans.

Table 1. Sociodemographic Characteristics of the Participants

		n	%
Age	< 13	58	0.6
	13-15	3587	36.9
	> 15	6068	62.5
Gender	Male	6460	66.8
	Female	3210	33.2
Weekly pocket money* *Average USD-TRY exchange rate in 2017 = 3650	I usually don't have any spending money	554	5.7
	1-10 TRY	1868	19.3
	10.1-20 TRY	1706	17.6
	20.1-30 TRY	1666	17.2
	30.1-40 TRY	1031	10.6
	40.1-50 TRY	1175	12.1
	More than 50 TRY	1691	17.4
Parents' working status	Father only	5213	57.3
	Mother only	537	5.9
	Both	2495	27.4
	Neither	859	9.4
Father's education	Illiterate	444	4.9
	Literate	533	5.8
	Primary school	2200	24.0
	Secondary school	2286	25.0
	High school	2444	26.7
Mother's education	Higher education	1244	13.6
	Illiterate	886	9.7
	Literate	610	6.7
	Primary school	2958	32.3
	Secondary school	2314	25.2
	High school	1696	18.5
	Higher education	706	7.7

Table 2. Pattern of Tobacco Use and Dependency Level of the Participants

		n	%
Daily frequency of smoking	Less than 1 cigarettes per day	1228	12.6
	1 cigarette per day	1205	12.4
	2 to 5 cigarettes per day	3201	32.9
	6 to 10 cigarettes per day	2084	21.4
	11 to 20 cigarettes per day	1266	13.0
Smoking tobacco as the first thing in the morning	More than 20 cigarettes per day	738	7.6
	Never	6215	63.8
	Sometimes	3024	31.1
Inter-cigarette interval	Always	496	5.1
	Never	2148	22.1
	Within 60 minutes	2208	22.7
	1 to 2 hours	2310	23.7
	> 2 to 4 hours	1315	13.5
	> 4 hours but less than 1 day	559	5.7
	1 to 3 days	685	7.0
	4 days or more	510	5.2

Figure 1 shows the proportion of participants responding yes to the exposure/observation of tobacco control measures. The majority of the students reported that they had seen or heard anti-tobacco media messages on television, radio, internet, billboards, posters, newspapers, magazines, or movies during the past 30 days.

Findings of the SEM

The CFI and TLI of the model were 0.917 and 0.900, respectively. The RMSEA was 0.032. The fit measures indicated that the data had a good fit for the hypothesized model.

Level of nicotine dependency negatively influenced the attempt to stop smoking ($\beta = -0.037, P = .008$). Exposure to anti-tobacco policies ($\beta = 0.114, P < .001$) had positive direct effect. Exposure to second-hand smoke ($\beta = -0.051, P < .001$) had negative direct effect on quit attempts. Promoting factors were not significant ($P = .141$). (Figure 2)

Sociodemographic factors ($\beta = -0.086, P < .001$) had negative direct effects on quit attempts. Age ($\beta = 0.029, P = .012$), gender ($\beta = -0.111, P < .001$), weekly pocket money ($\beta = 0.315, P < .001$), parents' employment status ($\beta = .062, P < .001$), and the education status of both the mother ($\beta = 0.812, P < .001$) and the father ($\beta = 0.670, P < .001$) were significantly associated with quit attempts. Older students, males, those receiving higher weekly pocket money, students having both parents employed, and students whose parents had a higher level of education were less likely to have quit attempts.

DISCUSSION

This study revealed that more than half of the adolescents attempted to quit smoking within the previous year, and sociodemographic factors, low nicotine dependency level, not being exposed to second-hand smoke, and exposure to anti-tobacco policies increased quit attempts.

Studies from different parts of the world show that quit attempts are prevalent among adolescents. Quit attempts among young adults and adolescents were reported as 60.6% in the United States,²⁷ 66.5% in Nepal¹² and 70.3% in Korea.¹⁶ Similarly, our findings showed that 56.3% of adolescent smokers had quit attempts within the previous year. This finding indicates that more than half of the smokers among adolescents developed an intention to quit, which creates an opportunity for delivering smoking cessation support for this age group. Yet among the ones who had attempted to

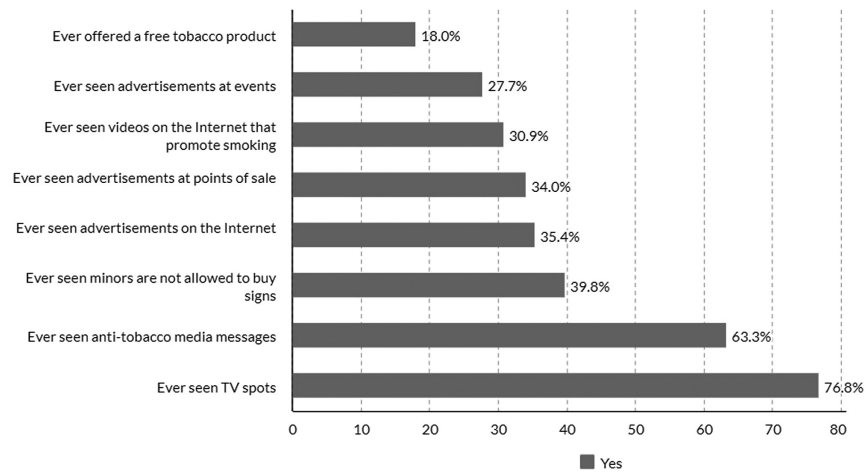


Figure 1. Exposure/observation of anti-tobacco policies and advertisements about tobacco products.

quit, nearly 60% received no professional help. This finding reveals that adolescents need smoking cessation support. However, in Türkiye, smoking cessation clinics are limited in number, and these clinics are mostly located at tertiary care levels, which restrains access to care.²⁸ Moreover, there are neither cessation programs nor clinics designed particularly for adolescents in Türkiye. Given that the prevalence of smoking among 15- to 24-year-olds has risen since 2016 until now, and as of 2022, it is reported as 19.3% (9.0% of girls and 29.0% of boys), we expect that the need for cessation services will increase as well.⁶ Adolescents are also a vulnerable group and might face barriers to accessing effective smoking cessation resources. Given the high prevalence of quit attempts, we need to set up programs and provide adolescent-focused cessation services in Türkiye.²⁹

The Framework Convention on Tobacco Control (FCTC), the first international treaty negotiated under WHO’s authority and developed in response to the global tobacco pandemic, incorporates evidence-based policies that have the potential to reduce adolescent tobacco use.³⁰ The Framework Convention on Tobacco Control (FCTC) covers measures such as public awareness campaigns, prohibiting tobacco advertising, and preventing the sale of tobacco products to

minors. These laws and measures discourage young people from attempting to access cigarettes and contribute to the denormalization of smoking. Our findings indicated that the implementation of anti-tobacco policies was the strongest estimator of quit attempts. Adolescents who had seen anti-tobacco media messages, TV spots, or sale restriction signs were more likely to have quit attempts. In a study conducted among 1199 high school students in Ankara, the capital city of Türkiye, findings indicated that the interventions identified as the most effective tobacco control strategies were TV spots and sale restrictions for minors.³¹ Anti-tobacco policies, as outlined in the FCTC, are recognized as important measures in fostering an environment that encourages and supports young people’s attempts to give up smoking.

Our findings revealed that exposure to second-hand smoke at homes and public areas was remarkably high, and adolescents who had been exposed to passive smoking were less likely to have had quit attempts. Previous studies also indicated that adolescents who had been exposed to second-hand smoke at their homes had fewer quit attempts compared to those who were not exposed.^{17,18} Regular exposure to second-hand smoke, particularly in social settings, can normalize smoking behavior, lessen the perceived damage

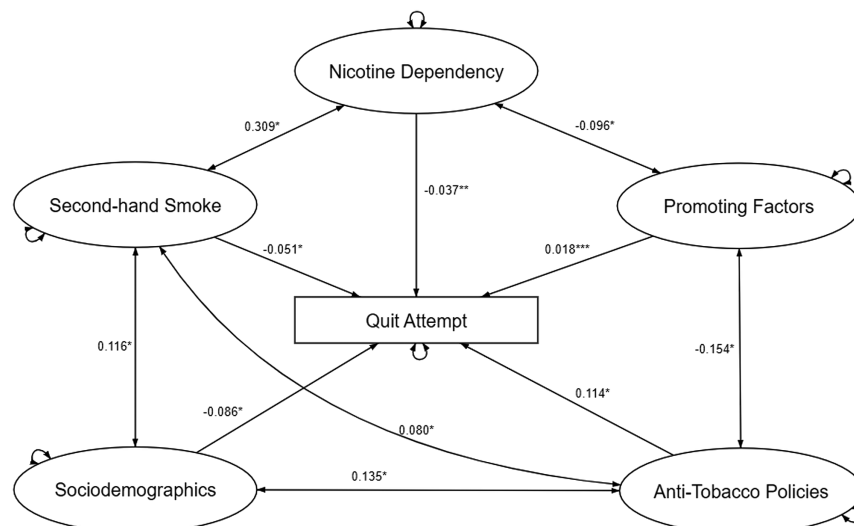


Figure 2. Pathway estimates for SEM. (* $P < .001$, ** $P < .01$, *** $P > .05$).

associated with smoking, and make quitting more challenging. Our findings also showed that environmental tobacco exposure in public settings was a stronger predictor of low quit attempts compared to being exposed to second-hand smoke at home. These results highlight the significance of the FCTC's suggested actions related to minimizing second-hand smoke exposure in public places.³⁰ While indoor smoking restrictions are a useful tool, they are not adequately implemented in Türkiye. A study conducted in Türkiye revealed that almost one-third of the indoor public places, such as cafés and pubs, violated the smoke-free law and continued to violate the ban after paying the fines.³² There are also studies that demonstrate the effectiveness of expanding the smoke-free law to include outdoor areas.^{33,34} So, the indoor smoking ban should be enforced, and further efforts should be made to expand the regulations pertaining to outdoor smoking. Implementing smoke-free policies in both indoor and outdoor public places is a crucial step for supporting adolescents in their quit journey.

Our findings revealed that low nicotine dependency increased quit attempts. Studies in the literature showed that nicotine dependence could be both positively and negatively associated with quit attempts.¹⁹⁻²¹ In research involving young adults in the United States,¹⁹ the factors influencing attempts to quit smoking among daily smokers varied based on the level of nicotine dependence. Quit attempts were more likely among those with lower levels of dependency. According to another study, among those who smoked less, the incidence of quit attempts was slightly higher compared with heavier smokers.²¹ Due to the significant addictive properties of nicotine, adolescents with high levels of nicotine dependence may encounter considerable challenges when initiating quit attempts.

This study showed no significant association between being exposed to tobacco advertisements and quit attempts. These promoters might be more of an incentive to start smoking rather than quitting. Similarly, qualitative research conducted in New Zealand also indicated that the tobacco retail displays promoted smoking and undermined cessation attempts among youth.³⁵

Our results showed that as age increased, quit attempts were adversely affected. When compared to the younger age group, older ages had fewer quit attempts. This finding is in line with previous studies.^{13,14} Studies related to the association of gender with quit attempts have shown mixed results. Our findings revealed a higher incidence of quit attempts among females compared to male students. However, a study conducted in Nepal using data from GYTS indicated that male smokers were more likely to make quit attempts compared to female smokers.¹² The impact of gender on quit attempts might be related to several sociocultural factors in different countries.

Our findings also revealed that students getting higher weekly pocket money and having more educated and employed parents had fewer quit attempts. All these findings might be related to financial factors; those who were more sensitive to price increases had more quit attempts. A prospective study conducted in the United States among adolescents and young

adults showed that participants who had more educated parents were less likely to attempt to quit after tax increases.¹⁵ We suggest that adolescents having a higher socioeconomic status are less sensitive to price changes.

The strength of this study is the use of the most current nationwide representative data of Turkish adolescents and utilization of the SEM analysis in a large sample. Yet our study has several limitations. The Turkish Global Youth Tobacco Survey (GYTS) data were obtained through self-report, which might result in information bias related to smoking status, quit attempts, and other associated factors. Also, after excluding the inconsistent responses, only half of the study participants remained in the final analyses. Because of the cross-sectional design of the study, a cause-and-effect relationship cannot be established. Our analysis did not involve recent data. Lastly, our analysis was limited to adolescents who had used tobacco in the past 12 months, and we cannot make any inferences about the teenagers who had been successful in quitting smoking.

CONCLUSION

In conclusion, while the prevalence of quit attempts was considerably high among Turkish adolescents, the majority received no professional cessation support. There is a need to provide age-appropriate tobacco cessation services that address the unique challenges and motivations of adolescents. It is also important to fully adopt and enforce anti-tobacco policies, such as sale restrictions and warnings of the dangers of tobacco, since these measures are the strongest predictors of quit attempts. As exposure to second-hand smoke both indoors and outdoors decreases quit attempts, there is a need to enforce and expand smoking bans. Adolescents with high addiction levels should be given high priority as they have fewer quit attempts. Tax increases should be designed to affect high socioeconomic groups as well.

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

Ethics Committee Approval: This study was designed in accordance with the principles of the Helsinki Declaration and with the approval of Marmara University, School of Medicine, Ethics Committee (approval number: 09.2022.538; date: April 4, 2022).

Informed Consent: Informed consent was not available since the data was collected from 2017 Turkish GYTS.

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