

Smoking temptation and susceptibility among non-smokers adolescents in Chisinau, Moldova

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Abstract

Background. Susceptibility to smoking, defined as a lack of a firm commitment not to smoke, is therefore useful in estimating which young people can become smokers and under whose influence the status of susceptibility can change.

Aims. This study aims to assess the association between the susceptibility of tobacco use among non-smoking students and psychosocial and sociodemographic factors.

Methods. The current study is a repeated cross-sectional secondary analysis of data collected using a questionnaire administered in 2015 and 2018 among ninth-grade students in Chisinau, Republic of Moldova. Out of 368 students in 2015 and 819 students in 2018 included in the study as eligible students, 329 students (89.4%) in 2015 and 698 students (85.2%) in 2018 declared themselves as non-smokers.

Results. The prevalence of susceptibility to cigarette smoking among the study participants was 38.6% in 2015 and 50.2% in 2018 ($p < 0.001$). Our result indicates that smoking friends represent a strong predictor of high smoking susceptibility among those who have never smoked. In 2015 the share of susceptible students who had smoking friends was 23.4%, and in 2018 the share reached 31.5% ($p = 0.007$). Parents' smoking or non-smoking status was also an important predictor of smoking susceptibility. Thus, we found that students with non-smoking mothers are less susceptible (2015 - 59.9%; 2018 - 47.1%, $p = 0.025$). The temptation to smoke increased significantly during the period covered by the study from 1.32 (0.67) to 1.48 (0.66) ($p < 0.001$).

Conclusions. The connection between socio-demographic factors (smoking parents or friends) and psycho-emotional factors (the temptation to smoke) will increase the likelihood of smoking among adolescents.

Keywords: smoking susceptibility, depression, smoking temptation, adolescents.

Introduction

The prevalence of cigarette smoking worldwide among children aged 13-15 years during the period 2000-2017 was about 7% or about 24 million (***, 2018). The smoking susceptibility of young people was based on curiosity, intentions to try, and response to a best friend's offer to try. Longitudinal studies in the US showed that out of 31.3% of young people aged 12-17 years old who were susceptible to tobacco use in the first stage of the study, 3.1% of them tried tobacco products in the second stage of the study during the 12 months (Silveira et al., 2020). Susceptible teens are more likely to start smoking and become regular smokers than non-susceptible teens (Pierce et al., 1996). Studies have shown that about one in eight young people in the world who never smoked are susceptible to smoking.

Interventions for young people susceptible to non-smoking policies, banning advertising and tobacco promotion, and anti-smoking education in schools can protect young people from becoming regular smokers (Veeranki et al., 2014).

A significant number of Canadian youth that did not currently use tobacco products or e-cigarettes were susceptible to future tobacco product or e-cigarette use (29.4%). This study also showed high susceptibility to the use of small cigarettes or cigars, hookah, and smokeless tobacco among non-smoker high school students in Ontario, Canada who were susceptible to electronic cigarettes (Cole et al., 2019).

Also, a Spanish study (Santano-Mogena et al., 2021) found that a significantly higher percentage of students (44.4%) experienced electronic cigarettes in the high

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susceptibility group than in the susceptible (27.1%) and non-susceptible groups (9.5%), $p < 0.001$.

Self-efficacy is the key construct in Bandura's Social Cognitive Theory (Bandura, 1997). Behavioral change is facilitated by a personal sense of control. Perceived self-efficacy is the belief of people about their ability to achieve the levels of performance needed to influence events that affect their lives (Bandura, 2004). To prevent risky behavior such as smoking, it is necessary to achieve the highest levels of self-efficacy and to successfully remain non-smokers for as long as possible or for the rest of life (Bandura, 2005).

Depression is a psychiatric illness characterized by a series of symptoms such as depressed mood or loss of interest or pleasure (Cruwys & Gunaseelan, 2016). The mental health of young people and the environment in which they grow and develop are often associated with a tendency to smoke. Adolescent depression may be one of the factors that initiate smoking at a very young age. Studies in the United States show that a higher depressive score indicates a higher likelihood of smoking in the future (Minnix et al., 2011). Another study showed that adolescents who were most susceptible to smoking were women, who had family members or colleagues who smoked and had higher scores of depression (Okoli et al., 2009).

Thus, this study aimed to examine the association between family characteristics, psychosocial factors and smoking susceptibility among the currently non-smoking youth in Chisinau.

Material and method

Research protocol

Our study was a cross-sectional research, and included students from Chisinau, Moldova. The Ethics Commission of Scientific Research of the University of Târgu Mureș approved this research, where the ASPIRA program was implemented.

a) Period and place of the research

Data were collected using a self-completed questionnaire, in October-December 2015 and repeated in February-April 2018 in Chisinau, Republic of Moldova.

b) Subjects and groups

Our study included ninth-grade students from Chisinau in 2015 ($N = 368$) and 2018 ($N = 819$). The schools were selected based on several inclusion criteria: to be located in the city, not in suburbs, to be in the 9th grade; to be of general type without a specific profile (sports, etc.); to accept voluntary participation in the study. Within each district of the city, we have identified the schools that corresponded to the imposed criteria, and 20 schools were randomly selected (3 gymnasiums, and 17 high schools) (Topadă et al., 2021). In cases where the school refused, another school was invited to join the study.

Out of 368 students in 2015, and 819 students in 2018 who were included in the study, 329 students (89.4%) in 2015 and 698 students (85.2%) in 2018 declared themselves non-smokers. The status of a non-smoker was assigned automatically to those who replied that they had never smoked, not even a part of a cigarette; smoked only a part of a cigarette, or smoked a couple of times, but

did not smoke regularly (regular smoking means that they smoked at least 5 packs, <100 cigarettes throughout their life). We used these criteria because the U.S. Centers for Disease Control defines a non-smoker as a person who has smoked <100 cigarettes in a lifetime (Pomerleau et al., 2004).

c) Applied tests

Students from involved schools completed a questionnaire that took them approximately 45 minutes. The questionnaire was completed using the computer during the Informatics and Computer class in 2015 and on paper in 2018 when the questionnaires were distributed during the class time. The questionnaire included questions about tobacco use behaviors, perceptions, and attitudes related to tobacco and sociodemographic characteristics. Parental consent and student approval were obtained before data collection. Detailed information about the questionnaire used in this research can be found in the study of Abram and co-authors (Ábrám et al., 2015; Nădășan et al., 2016).

Smoking temptation

The Temptations to Try Smoking instrument is used to assess the temptations to try smoking in several situations among non-smokers. The final version of this instrument contains five factors: Negative Affect, Positive Affect, Social pressure, Curiosity, and Weight control (Pallonen et al., 1998; Plummer et al., 2001). This instrument has 10 items which are assessed on a five-point Likert scale (from Not at all tempted 1 - Extremely tempted 5). The following ten situations: (1) while talking and relaxing; (2) when things are not going my way and I am frustrated; (3) with friends at a party; (4) when others are talking about how much they like cigarettes; (5) when I am afraid I might gain weight; (6) while having a good time; (7) when I am very anxious and stressed; (8) when I want to fit in with a crowd; (9) when I want to know how a cigarette tastes (10) when I want to lose weight; A smoking temptation scale was created by summing the ten situation scores (range: 10–50), with a score of 10 indicating youth who responded "Not tempted at all" to each situation, and a score of 50 indicating youth who responded "Extremely tempted" to each situation (Hudmon et al., 1997).

Self-efficacy

Self-efficacy was assessed using a 5-point Likert scale (1-Not confident at all to 5-Extremely confident) beginning with the phrase, "How confident are you that you can resist smoking when..." followed by 10 sample scenarios. Examples of the scenarios included: "I am angry about something or someone"; "Things are not going my way and I am frustrated"; "My friends offer me a cigarette"; and "I want to be part of a crowd." To obtain a mean overall Self-efficacy or Temptation score, sum scores from all items and divide by 10 (Minnix et al., 2011).

Smoking Susceptibility

Smoking susceptibility was measured by using 4 items from Pierce et al.: 1) "If one of your best friends was to offer you a cigarette, would you smoke it?"; 2) "At any time during the next year do you think you will try smoking a cigarette?"; 3) "Do you think you might try cigarette smoking in the next 6 months and 4) "Do you think you might try cigarette smoking in the next 30 days?"

(Pierce et al., 1996; Pierce et al., 1995). The four response options were “Definitely not”, “Probably not”, “Probably yes” and “Definitely yes”. The participants who answered “Definitely not” to the four questions were classified as not susceptible to smoking. Those who answered “Probably yes” or “Definitely yes” to any question were classified as highly susceptible. Those who did not meet these descriptions and answered “Probably not” were classified as susceptible (Aleyan et al., 2018; Cole et al., 2019). This score had internal reliability (Cronbach’s α) of 0.8994 for the first lot (2015) and 0.8673 for the second lot (2018). According to some studies, this scale has proven to be a valid predictor of future initiations of smoking (Pierce et al., 1996).

Current tobacco non-smokers in our study were students who had never tried tobacco and those who had tried it but had not used it in the last 30 days. This category of students was currently classified as non-smokers and passed the susceptibility test.

Depression

Depression was assessed using the Center for Epidemiological Studies Depression Scale for Children (CES-DC), a 20-item scale suitable for estimating past-week depressive symptoms in children and adolescents (Fendrich et al., 1990). A total score was computed by summing the scores for the individual responses (options were 0 = less than a day, 1 = 1-2 days, 2 = 3-4 days, and 3 = 5-7 days), except for 4 positive questions where the score taken was completely reversed at the time of data processing. These questions were: “I felt like I was just as good as other kids.” “I felt like something good was going to happen.” “I was happy.” and “I had a good time.” The CES-D Ro Scale total score was dichotomized as less than 16 versus 16 or more based on previously established cutoffs (Stevens et al., 2013). Students were divided into two groups based on their scores: low depression = CES-DC < 16; high depression = CES-DC \geq 16.

d) Statistical processing

Statistical analyses were performed using SPSS version 22.0. We considered the P-value of <0.05 as statistically significant with a range of confidence of 95% (95% CI). The Chi-square test was used to compare differences in the prevalence of susceptibility and non-susceptibility between the 2015 and 2018 measurements.

Results

The average age of the students in the study group was 14.8 years old in 2015 and 14.9 years old in 2018. In the study group of non-smokers, there were 159 (48.3%) boys, 170 (51.7%) girls in 2015, and 334 (47.9%) boys, 364 (52.1%) girls in 2018. A number of 125 students (37.9%) in 2015 and 252 students (36.1%) in 2018 had a depressive mood one week before completing the questionnaire. The temptation to smoke among non-smokers increased significantly, the results show that the group averages for the temptation to try cigarettes differ statistically in 2018 compared to 2015 ($p < 0.001$). Self-efficacy also increased insignificantly in the two years of study (Table I).

The susceptibility of tobacco use among school children increased in the years of study from 38.6% in 2015 to 50.2% in 2018 of total non-smokers (Fig. 1).

Table I
Socio-demographic characteristics of the ninth-grade students, Chisinau, in 2015 and 2018.

Variables	2015	2018	P
	(n=329)	(n=698)	
	Mean (SD)	Mean (SD)	
Age (years), mean \pm SD	14.8 \pm 0.49	14.9 \pm 0.53	0.02*
Self-efficacy	3.99 (1.50)	4.09 (1.40)	0.3*
Smoking temptation	1.32 (0.67)	1.48 (0.66)	$p < 0.001^*$
Gender			
Boys	159 (48.3)	334 (47.9)	0.998**
Girls	170 (51.7)	364 (52.1)	
Depressed Mood	125 (37.9)	252 (36.1)	0.561**
Smoking susceptible	127 (38.6)	350 (50.2)	< 0.001**

*Value of p was calculated using the t-test

**Chi-square test, two-tailed p

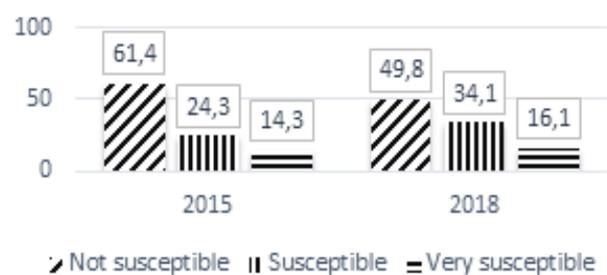


Fig 1 – Susceptibility of smoking among never-smoking school students.

In Table II, the susceptible and highly susceptible were placed in one category of “susceptible” to make a comparison on several criteria between those susceptible in 2015 and 2018. The percentage of susceptible boys was not higher than of girls, but there was no statistically significant difference between those in 2015 and those in 2018 ($p = 0.052$). In 2015, the percentage of susceptible girls was almost similar to that of boys (18.8% girls / 19.5% boys), while in 2018 there was a significant increase in susceptibility among girls ($p = 0.024$).

The level of parental education did not significantly influence the rate of susceptible versus non-susceptible students. However, in the years of study from 2015 to 2018, it was found that the number of susceptible parents increased significantly among those with a low level of education. Thus, the rate of those who were susceptible to having a father with a low level of education in 2015 was at a rate of 26.1%, and in 2018 of 35.9% ($p=0.001$). Susceptible students whose mother has a low level of education have rates of 19.8% in 2015 and 28.1% in 2018 ($p=0.004$).

The father’s smoking or non-smoking status did not significantly influence the rate of those who were susceptible, but the mother’s smoking status, in particular, shows that a non-smoking mother has significantly more non-susceptible students (Table III). Close friends are one of the most significant factors influencing the likelihood of being a smoker or not. Both in 2015 and 2018, it was found that the closest non-smoking friends will lead to non-susceptible behavior towards smoking, and the smoking friends respectively to a susceptible behavior ($p < 0.001$).

Table II

Sociodemographic factors associated with susceptibility to tobacco use among never smoking youth from Chişinău.

Variables	2015 (n=329)		p	2018 (n=698)		p	P ^a
	Susceptible	Non-susceptible		Susceptible	Non-susceptible		
	n (%)	n (%)		n (%)	n (%)		
Gender							
Boys	64 (19.5)	95 (28.9)	0.480*	174 (24.9)	160 (22.9)	0.323*	0.052*
Girls	62 (18.8)	108 (32.8)		176 (25.3)	188 (26.9)		0.024*
Family education level							
Father low level of education	86 (26.1)	129 (39.2)	0.383*	251 (35.9)	234 (33.5)	0.199*	0.001*
Father high level of education	40 (12.2)	74 (22.5)		99 (14.3)	114 (16.3)		0.380*
Mother low level of education	65 (19.8)	107 (32.5)	0.842*	196 (28.1)	209 (29.9)	0.277*	0.004*
Mother high level of education	61 (18.5)	96 (29.2)		154 (22.1)	139 (19.9)		0.201*

*Chi-squared test, two-tailed p; **Value of p was calculated using the t-test.

a. test comparing susceptible students in 2015 to susceptible in 2018.

Table III

Attitudes towards smoking, the influence of colleagues or family, the depressive level, and the temptation to smoke, according to the state of susceptibility.

Variables	2015 (n=329)		p	2018 (n=698)		p	P ^a
	Susceptible	Non-susceptible		Susceptible	Non-susceptible		
	n (%)	n (%)		n (%)	n (%)		
Family influence							
Father non-smoker	89 (27.1)	160 (48.6)	0.092*	254 (36.4)	257 (36.8)	0.702*	0.003*
Father smoker	37 (11.2)	43 (13.1)		96 (13.8)	91 (13.0)		0.261*
Mother non-smoker	114 (34.6)	197 (59.9)	0.011*	293 (42.0)	329 (47.1)	<0.001*	0.025*
Mother smoker	12 (3.7)	6 (1.8)		57 (8.2)	19 (2.8)		0.006*
Brothers non-smoking	106 (32.2)	182 (55.3)	0.139*	292 (41.8)	280 (40.1)	0.307*	0.003*
Brothers-smoking	20 (6.1)	21 (6.4)		58 (8.3)	68 (9.7)		0.211*
Friends non-smoking	49 (14.9)	130 (39.5)	<0.001*	130 (18.6)	196 (28.1)	<0.001*	0.141*
Friends-smoking	77 (23.4)	73 (22.2)		220 (31.5)	152 (21.8)		0.007*
Depressed Mood	65 (19.8)	60 (18.2)	0.409*	144 (20.6)	108 (15.5)	0.293*	0.751*
Boys	27 (8.2)	20 (6.1)	0.344*	54 (7.7)	37 (5.3)	0.596*	0.791*
Girls	38 (11.6)	40 (12.1)		90 (12.9)	71 (10.2)		0.541*
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)		
Self-efficacy	3.74 (1.46)	4.14 (1.51)	0.424**	3.98 (1.33)	4.19 (1.47)	0.458**	0.452**
Smoking temptation	1.53 (0.81)	1.18 (0.54)	0.359**	1.64 (0.79)	1.31 (0.44)	0.365**	0.461**

*Chi-squared test, two-tailed p; **Value of p was calculated using the t-test.

a. test comparing susceptible students in 2015 to susceptible in 2018.

The distributions of the temptation scale of cigarette consumption within each group of susceptible / non-susceptible students for both years of study were presented in Table III. Among those susceptible, the averages were different from those of 2015 (mean: 1.53, 95% CI: 0.72–2.34) and students in 2018 (mean: 1.64, 95% CI: 0.85–2.43), but there was no significant increase in the temptation of those susceptible between the two years of study ($p = 0.461$).

According to our study, no significant associations were found between self-efficacy and susceptibility to smoking. Also, the depressive symptoms in respondents did not significantly influence the ratio of smoking status in both study years.

Discussion

The environment in which the adolescents live is very important for their further development and the

addictions which they will have. Thus, students who come from families with parents with higher education and non-smokers are less likely to be smokers in the future. Susceptibility and temptation to smoke are two indicators studied to identify a target group at risk who are prone to experience new things, especially cigarette smoking (Veeranki et al., 2015; Mattingly et al., 2021). Although some studies show that smoking susceptibility is higher among boys than girls (Wilkinson et al., 2008a; Etter et al., 2002), our study did not find a significant gender difference. But we found that during the study period from 2015 to 2018, the proportion of susceptible girls increased significantly ($p=0.024$).

We found substantial variations in the samples studied; for example, among those who are susceptible to cigarettes in both years of study, the group of friends has the greatest influence on the susceptibility of tobacco use, indicating that adolescents may be influenced by best friends. This finding

may also suggest that both susceptible and non-susceptible teens were significantly influenced by their close friends' tobacco use behavior. In addition, previous research indicates that friends not only influence the susceptibility to tobacco use but also the temptation to smoke, the young age to start smoking, and the willingness to try new things in terms of tobacco use (Ábrám & Nădășan, 2018; Thrul et al., 2014; Ferencz et al., 2015). Recent studies suggest that although virtual friendships have become more common, teenagers who are subject to web-based interventions such as ASPIRE, which aims to reduce their susceptibility and temptation to smoke, give significant results, though the importance of students' social interactions in smoking should not be underestimated (Nădășan et al., 2017; Khalil & Prokhorov, 2020).

Wilkinson et al. (2008b) suggested that parental smoking not only directly influences behavior; it also moderates their children's attitudes towards smoking and therefore influences their children's behavior. In practice, our findings suggest that adolescents, especially those exposed to smoking parents, may have a higher rate of susceptibility to tobacco use, especially adolescents from families where the mother smokes. Given the very important role of the mother in children's perceptions of things and their role in social connections during adolescent development, non-smoking housing, and vehicle initiatives can improve the response to second-hand smoking prevention interventions, but cannot shape the perception that smoking is harmful (Wu & Chaffee, 2020; Ossip et al., 2018).

The findings of our study suggested that susceptibility is not significantly influenced by self-efficacy among students. However, several studies consider self-efficacy to be a protective factor in smoking-related behavior (Veselska et al., 2009). While other studies show that self-efficacy contributes to the initiation and continuation of smoking behavior (Veselska et al., 2011).

Depressive symptoms have been associated with adolescent smoking in two diametrically opposite directions. According to the literature review, we found that some studies suggest that depressed adolescents are more likely to start smoking (Chaiton et al., 2009; Boden et al., 2010; Weiss et al., 2011), and other studies suggest that smoking may develop in an attempt to cope with depression or anxiety (Rodriguez et al., 2005; Munafò et al., 2008). The susceptibility status in our study was not significantly influenced by the depressive states identified in adolescents.

Conclusions

1. We found a significant association between smoking susceptibility and sociodemographic characteristics (gender, smoking parents/friends/siblings) among adolescents in Chisinau, Moldova.

2. The risk of starting smoking is significantly higher among students who have close friends who are smokers or smoking mothers.

3. The results suggest that tobacco prevention programs should include family smoking prevention strategies, as non-smoking parents are a positive factor in reducing the odds of those who are susceptible.

Conflicts of interests

The authors declare no conflict of interests.

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