

DIFFERENT INFLUENCES ON SMOKING HABITS RELATED TO AN ONLINE TOBACCO PREVENTION PROGRAM

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Abstract

Tobacco control experts must concentrate their efforts to prevent smoking and to promote cessation before adolescents become addicted to nicotine. Our aim was to determine different factors associated with tobacco use among high school students. 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. The aim of this study is to assess the association between the susceptibility of tobacco use and psychosocial and sociodemographic factors. 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. 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. The temptation to smoke increased significantly during the period covered by the study from 1.32 (0.67) to 1.48 (0.66) ($p < 0.001$). In conclusion the connection between socio-demographic factors (smoking parents or friends) and psycho-emotional factors (temptation to smoke) will increase the likelihood of smoking among adolescents.

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

1. INTRODUCTION

A particular problem for public health is smoking among the rising generation as it has been shown that approximately 2/3 experience their first cigarette by the age of 18 and 2/5 of adult smokers start smoking regularly at age up to 16 years. The young generation is the future of the nation. The health of the young generation represents a good investment for the country in the future. One of the determining factors affecting the health of adolescents is tobacco consumption. The formation of the behavior of the adult takes place in childhood and adolescence, respectively the change of this behavior or the influence on its formation must intervene during this period, therefore it is necessary to study the predictors of smoking and the basis of its susceptibility. The basis of knowledge, attitudes and practices, according to psychological studies, is laid in the adolescent period.

The prevalence of cigarette smoking worldwide among children aged 13–15 years-old during the period 2000–2017 were about 7% or about 24 million [1]. The smoking susceptibility of young people was based on curiosity, intentions to try, and response to a best friend's offer to try. Some 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 period [2]. Susceptible teens are more likely to start smoking and become regular smokers than non-susceptible teens [3]. 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 [4].

A significant number of Canadian youths that did not currently use tobacco products or e-cigarettes was susceptible to future tobacco product or e-cigarette use (29.4%). This study also showed a high susceptibility to the use of small cigarettes or cigars, hookah and smokeless tobacco among non-smokers high school students in Ontario, Canada who were susceptible to electronic cigarettes [5].

Also, a Spanish study [6] found that a significantly higher percentage of students (44.4%) experienced electronic cigarettes in the high 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 [7]. 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 [8]. In order 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 the life [9].

Depression is a psychiatric illness characterized by a series of symptoms such as depressed mood or loss of interest or pleasure [10]. The mental health of young people and the environment in which they grow and develop is 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 [11]. 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 [12].

Thus, the aim of this study was to examine the association between family characteristics, psychosocial factors and smoking susceptibility at the currently non-smoking youth.

2. MATERIALS AND METHODS

The general purpose of the study was to evaluate the effectiveness of different intervention models addressed to adolescents in the Republic of Moldova, regarding the fight against smoking among students, with a preventive character and to protect the health of adolescents. We also set out to study the habits of regular cigarette smoking among 9th grade students. At the same time, we studied the habits regarding the consumption of electronic cigarettes and alternative tobacco products among 9th grade students in the municipality of Chisinau. Another objective was to investigate the psychosocial aspects of students in relation to tobacco consumption and we evaluated the impact of the anti-smoking legislation in dynamics (2015-2018) on the prevalence of smoking among students. The study was initiated as a continuation of the ASPIRA study from Târgu Mureș, Romania, extended to the Republic of Moldova. It was a cross-sectional, prevalence study carried out in 20 institutions in Chisinau randomly chosen according to predetermined criteria for inclusion and exclusion of schools from the study.

Our study was a cross-sectional research, and 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 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) [13]. In cases where the school refused, another school was invited to join the study. Students from involved schools completed a questionnaire that took them approximately 45 minutes. The questionnaire included questions about tobacco use behaviors, perceptions and attitudes related to tobacco and sociodemographic characteristics. Parental consent and student approval were obtained prior to data collection. Detailed information about the questionnaire used within this research can be found in the study of Abram and co-authors [14, 15]. The Ethics Commission of Scientific Research of the University of Targu Mures approved this research.

Out of 368 students in 2015, and 819 students in 2018 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 non-smoker was assigned automatically to those who replied that they had never smoked, not even a part of a cigarette; or smoked only a part of a cigarette or smoked a couple of times, but they 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 [16].

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 [17, 18]. 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 [19].

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 [11].

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?) [20]. 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 [5, 21]. (Cronbach’s α) of 0.8994 for first lot (2015) and 0.8673 for second lot (2018). According to some studies, this scale has proven to be a valid predictor of future initiations of smoking [3].

As data analysis the Chi-square test was used to compare differences in the prevalence of susceptibility and non-susceptibility between the 2015 and 2018 measurements. Statistical analyzes 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).

3. 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.

The present study represents a research on tobacco consumption among 9th grade students in Chisinau, Republic of Moldova in the period 2015-2018 and includes several objectives. A general trend of increasing cigarette consumption was observed among students in Chisinau in the period 2015–2018. Despite fairly strict regulations on tobacco use in Moldova, adolescents still reported a significant increase in the prevalence rate of cigarette use in the past 30 days from 45.1% in 2015 to 55.8% in 2018. The proportion of boys versus girls who had ever tried conventional cigarettes was 61.4% versus 38.6% in 2015 ($p=0.001$) and 58.6% versus 41.4% in 2018 ($p<0.001$). From the analysis of the study, it was found that the number of young people who smoke and have smoking friends is significantly higher. The presence of at least one close friend who smokes is a risk factor for students' tobacco use. The results of the study showed an important, statistically significant

increase in the consumption of electronic cigarettes among 9th grade students. Our findings indicate that alternative tobacco products are less popular among students compared to e-cigarettes. The most popular among students in Chisinau is hookah. One in five teenagers included in the study tried this product at least once in their life.

The susceptibility of tobacco use among school children has been increasing in the years of study from 38.6% in 2015 to 50.2% in 2018 of total non-smokers. The temptation to smoke among non-smokers has 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).

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

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

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

In the study that includes students who declared themselves non-smokers according to the definition given by the Center for Disease Control, we set out to study the motivational profile and predisposition of students to tobacco consumption. It was assessing the susceptibility and temptation to smoke among students and it was studied the correlations of socio-demographic and environmental factors with susceptibility to smoking. A significant association was found between susceptibility to smoking and sociodemographic characteristics (sex, smoking parents/friends/siblings) among adolescents. The psycho-emotional state of adolescents significantly influenced the state of susceptibility, especially self-efficacy, the temptation to smoke and decisional balance. The results suggested that tobacco prevention programs should include family smoking prevention strategies because nonsmoking parents are a positive factor in reducing the chances of those who are susceptible to try tobacco.

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 father's smoking or non-smoking status did not significantly influence the rate of those who are susceptible, but the mother's smoking status in particular shows that a non-smoking mother has significantly more non-susceptible students (Table II). Close friends have been shown to be one of the

most significant factors influencing the likelihood of being a smoker or not. Both in 2015 and in 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 ($p < 0.001$). 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 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 II. 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.

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

Variables	2015 (n=329) / n (%)			2018 (n=698) / n (%)			p ^a
	Susceptible	Non-susceptible	p	Susceptible	Non-susceptible	p	
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 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*
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*
	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

4. DISCUSSION

The environment in which the adolescent lives is very important for his further development and the addictions which he 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 [22, 23]. Although, some studies show that smoking susceptibility is higher among boys than girls [24, 25], our study did not find a significant gender difference. But we found that during the study period from 2015 to 2018, the share 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 [26, 27, 28]. 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, also should not be underestimated the importance of students' social interactions in smoking [15, 29].

Wilkinson et al. (2008) [30] 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 perception that smoking is harmful [31, 32].

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 [33]. While other studies show that self-efficacy contributes to the initiation and continuation of smoking behavior [34].

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 [35, 36, 37], and other studies suggest that smoking may develop in an attempt to cope with depression or anxiety [38, 39]. The susceptibility status in our study was not significantly influenced by the depressive states identified in adolescents.

5. CONCLUSIONS

The present research finds a general trend of increasing cigarette consumption among students in Chisinau in the period 2015–2018. The results of the study showed an important, statistically significant increase in the consumption of electronic cigarettes among 9th grade students. We found a significant association between smoking susceptibility and sociodemographic characteristics (gender, smoking parents/friends / siblings) among adolescents in Chisinau. The risk of starting smoking is significantly higher among students who have close friends who are smokers or smoking mothers. The results suggested that tobacco prevention programs should include family smoking prevention strategies, as non-smoking parents have been shown to be a positive factor in reducing the odds of those who are susceptible. Despite the fact that between the two surveys the legislation was approved that prohibits the advertising of tobacco products, drastically regulates electronic cigarettes and prohibits the sale of tobacco products that do not burn, the effects of this legislative intervention were

not observed in the results of those who consume electronic cigarettes and alternative tobacco products.

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