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Correlates of susceptibility to tobacco use among never-smoking youth in four eastern and southern European countries

Korelaty podatności na używanie tytoniu wśród nigdy niepalącej młodzieży w czterech krajach Europy Wschodniej i Południowej

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of article

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Abstract

Introduction and Objective. Young adults demonstrate the highest prevalence of cigarette and e-cigarette use which justifies conducting research in attempt to identify correlates of the use of cigarettes and e-cigarettes. The aim of the study was to compare predictors related to smoking susceptibility among adolescents in four Eastern and Southern European countries.

Materials and method. The latest data from the Global Youth Tobacco Survey (GYTS), obtained from Latvia (2019), Moldova (2019), Montenegro (2018), and San Marino (2018) were subject to analysis. The research tool was a standardized, anonymous survey questionnaire, consisting of basic questions regarding socio-demographic characteristics, prevalence of tobacco smoking, knowledge and attitudes of young people about and to smoking, access to cigarettes, the role of advertising and the media in tobacco smoking.

Results. Nearly one-third of young adults were prone to smoking in San Marino and a one-fourth in Latvia. In all four analyzed countries, exposure to second-hand smoke (SHS) in public places was a predictor of vulnerability to tobacco use (OR 1.4 – 1.79; p<0.01 in Montenegro; p<0.001 in Moldova). In three analyzed countries, the correlates were: exposure to SHS at home (OR 1.31; p<0.05 in Latvia; 1.51; p<0.01 in Moldova; 1.91; p<0.01 in San Marino), the feeling of comfort (OR 1.59; p< 0.001 in Latvia; 1.45; p< 0.01 in Moldova; 1.41; p< 0.01 in Montenegro), and the opinion that a smoker can easily quit smoking (OR 1.39; p< 0.05 in Latvia; 1.84; p< 0.001 in Moldova; 1.4; p<0.05 in Montenegro).

Conclusions. Political factors (observance of smoking bans in public places and homes) were strongly correlated with tobacco use susceptibility. These results should induce governments to intensify interventions to encourage tobacco-free homes, and control smoking bans in public places.

Key words

youth, susceptibility, Europe, tobacco use, GYTS

Streszczenie

Wprowadzenie i cel pracy. Palenie papierosów i e-papierosów jest najbardziej rozpowszechnione wśród młodych dorosłych, co uzasadnia prowadzenie w tej grupie badań w celu identyfikacji korelacji dotyczących stosowania tych używek. Celem przeprowadzonego przez autorów niniejszej pracy badania było porównanie korelatów związanych z podatnością na palenie wśród młodzieży w czterech krajach Europy Wschodniej i Południowej.

Materiał i metody. Analizie poddano najnowsze dane z GYTS, uzyskane na Łotwie (2019), w Mołdawii (2019), Czarnogórze (2018) i San Marino (2018). Narzędziem badawczym był wystandaryzowany, anonimowy kwestionariusz ankiety, składający się z pytań dotyczących cech społeczno-demograficznych, rozpowszechnienia palenia tytoniu, wiedzy i postaw młodzieży wobec palenia, dostępu do papierosów, roli reklamy i mediów w paleniu tytoniu.

Wyniki. Prawie 1/3 młodych dorosłych była skłonna do palenia w San Marino, a 1/4 na Łotwie. We wszystkich czterech analizowanych krajach narażenie na bierne palenie (SHS) w miejscach publicznych było predyktorem podatności na palenie tytoniu (OR od 1,4 do 1,79; p < 0,01 w Czarnogórze; p < 0,001 w Mołdawii). W trzech analizowanych krajach korelatami były: ekspozycja na SHS w domu (OR 1,31; p < 0,05 na Łotwie; OR 1,51; p < 0,01 w Mołdawii; OR 1,91; p < 0,01 w San Marino), poczucie komfortu (OR 1,59; p < 0,001 na Łotwie; OR 1,45; p < 0,01 w Mołdawii; OR 1,41; p < 0,01 w Czarnogórze) oraz opinia, że palacz może łatwo rzucić palenie (OR 1,39; p < 0,05 na Łotwie; OR 1,84; p < 0,001 w Mołdawii; OR 1,4; p < 0,05 w Czarnogórze).

Wnioski. Czynniki polityczne (przestrzeganie zakazów palenia w miejscach publicznych i domach) były silnie skorelowane z podatnością na używanie tytoniu. Wyniki te powinny zwrócić uwagę rządów i zintensyfikować interwencje zachęcające do wprowadzania domów wolnych od tytoniu oraz kontrole zakazów palenia w miejscach publicznych.

Słowa kluczowe

młodzież, palenie tytoniu, Europa, podatność, GYTS

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INTRODUCTION

Smoking is the leading cause of death [1]. According to the World Health Organization (WHO), 7 million deaths worldwide are directly associated with tobacco use [2]. Smoking is an economic and health problem, especially in underdeveloped countries [3]. More than 80% of the global number of smokers, i.e., 1.3 billion, live in low- and middle-income countries [2]. In Europe, 19.7% of the population smokes every day, the least in the Nordic countries (Norway 12.9%, Finland 12.5%), and the most in Bulgaria (28.2%) [4].

The average smoking rate among youth aged 15–24 has decreased from 20.8% (in 2000) to 14.2% (in 2020), with a slow rate of decline observed in the European region [5]. Most people start smoking before the age of 18 [6] and the habit continues into adulthood [6] and turns into heavier smoking [7]. Young adults may become susceptible to tobacco and experiment with this harmful substance [8]. Non-smokers who are prone to smoking are motivated or predisposed to attempt smoking in the future [9].

The age of smoking initiation is decreasing so that younger and younger people start smoking cigarettes [10]. In 2019, there were 1.07 billion smokers aged 15 and older worldwide [11].

Also, the use of e-cigarettes popular among adolescents is associated with an increased risk of later initiation of smoking [12]. Concurrent use of cannabis, and tobacco as well as dual use of e-cigarettes and cigarettes is becoming very common among young adults [13].

Increasingly, school and home social networks influence health behaviours in young people [14, 15]. Control of the content of social media will be crucial if this trend is to be reversed [15]. Studies have shown that effective interventions can modify smoking susceptibility among adolescents [16]. Additionally, family support is an important asset as it helps adolescents overcome the risk of smoking in early adolescence [17- 18], which can vary depending on the material status, communication with children and parental monitoring and control [19].

Tobacco use and prevention policies are monitored by the World Health Organizations Tobacco Control Convention (Framework Convention on Tobacco Control FCTC), to which 182 countries are currently affiliated [2, 20]. Effective tobacco control policies, awareness of negative effects of smoking, education, and smoking cessation interventions are key to reducing tobacco use [21–23]. Studies show that an increase in cigarette prices and taxes implemented by governments results in a significant decrease in the use of these tobacco products by young people [24–29]. While implementing measures aimed at reducing smoking-related harm, the cooperation of young people and their needs should be taken into account.

Latvia, Moldova, and Montenegro are low- and middle-income European countries that regained their independence only in the late 1990s. A decreased use of tobacco products among young people aged 13 – 15 years was observed in Latvia (from 40.5% in 2011 to 23% in 2019) and in San Marino (from 15% in 2014 to 7.5% in 2018), whereas the Republic of Moldova and Montenegro observed an increased use of tobacco products (from 13.4% in 2008 to 16% in 2019 and from 6% in 2008 to 10% in 2018, respectively) [30].

Young adults demonstrate the highest prevalence of cigarette and e-cigarette use, which justifies conducting research in an attempt to identify correlates of the use of cigarettes and e-cigarettes. The Global Youth Tobacco Survey (GYTS) conducted in 2018 and 2019 in Latvia, Moldova, Montenegro and San Marino may contribute to updating the correlates that predispose young adults to vulnerability to tobacco use. Knowledge of the correlates can enable the development of effective strategies aimed at reducing the prevalence of tobacco use among adolescents. Correlates of vulnerability to smoking include gender, age, social environment (friends, family, school), exposure to second-hand smoke (SHS) at home and outside, and promotion by the tobacco industry [31–36]. These may change over years due to influence of the tobacco industry and implementation of smoke-free policies, as well as preventive measures in many countries.

The aim of the study was to compare correlates related to smoking susceptibility in adolescents in four eastern and southern European countries.

MATERIALS AND METHODS

The latest data from the GYTS obtained from Latvia (2019), Moldova (2019), Montenegro (2018), and San Marino (2018) were subject to analysis. The countries were selected due to the European region and the same time of conducting the study.

A globally standardized methodology involving a two--stage sample design was utilized in the cross-sectional study. Primary and secondary schools were randomly selected, and the questionnaire was completed by all students aged 13–18 years in selected classes [37–40].

Data from Latvia, Moldova, Montenegro, and San Marino were obtained from students of primary schools, in grades 7–9, aged 13–15 years and older, and from secondary school students, in grade 1. A detailed description of the methodology is described elsewhere [37–41]. The overall response rate was as follows: Latvia – 70.7%, Moldova – 93.3%, Montenegro – 92.6% and San Marino – 92.0%). The study is a continuation of an earlier study on Eastern and Central European countries: Czech Republic, Slovakia, Slovenia, Lithuania and Romania) [41].

Only never smokers were included in the study to assess the correlates of vulnerability to smoking. These people claimed to have never tried or experimented with smoking cigarettes. The following sample size was considered in the current analysis: Latvia – 2,201 out of 4,226, Moldova – 2,992 out of 4,717, Montenegro – 3,048 out of 4,216 and San Marino 481 out of 624. Scientific, technical and ethical supervision was provided by: the Ministry of Health of the Republic of Latvia, the Centre for Disease Prevention and Control of Latvia, the National Agency for Public Health in the Republic of Moldova, the Ministry of Health of Montenegro and the Institute of Public Health, and finally, by the Health Authority in San Marino.

The following consent was obtained for conducting the research in the four analyzed countries: the Ministries of Education, Ministries of Health, the Ethics Committee; the respondents' parents also gave their consent for the research to be conducted [42].

The research tool was a standardized, anonymous questionnaire completed independently by the students. It consisted of basic questions regarding socio-demographic characteristics (age, gender, parents' education, pocket money,

smoking by peers and parents, exposure to SHS at home and in public places), the prevalence of tobacco smoking, knowledge and attitudes of young people about and to smoking, access to cigarettes, as well as the role of advertising and media in tobacco smoking [43, 44].

In order to assess susceptibility to the use of tobacco products, the respondents were asked whether they would use any form of tobacco within the subsequent 12 months and whether they would use tobacco if offered by friends. Young adults who answered 'definitely not' were classified as not susceptible, while those who answered 'definitely yes', 'probably yes', and 'probably not' were classified as susceptible to tobacco use.

In the four analyzed countries of eastern and southern Europe, univariate and multivariate logistic regression analyses were used to examine correlates associated with susceptibility to smoking. Results are presented using odds ratios (OR) with 95% confidence intervals and p-values. The multivariate analysis comprised statistically significant data included in the univariate analysis ($p < 0.05$). The STATISTICA version 13.3 software licensed by the Medical University of Łódź in Central Poland was used to compile the results.

RESULTS

In San Marino, nearly one third of young adults were prone to smoking, and one fourth in Latvia. In Moldova (15.3%) and Montenegro (16.2%), the proportions of young people prone to smoking were lower (Fig. 1). Detailed data are included in the supplementary materials (Tab. S1).

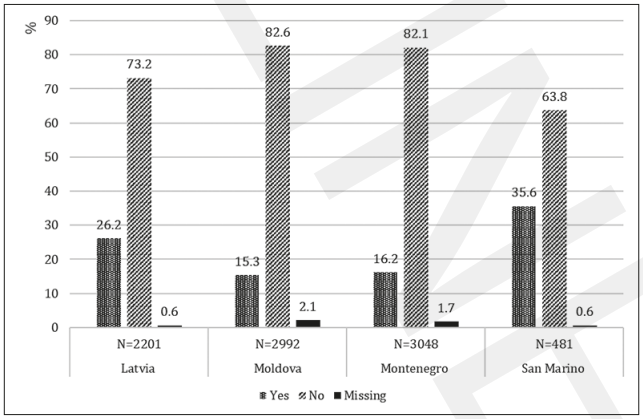

Figure 1. Susceptibility to tobacco use among never-smoking youth in four Eastern and Southern European countries.

Results of the univariate analysis of factors related to susceptibility to smoking among never-smokers are presented in Table 1 and in the multivariate analysis in Table 2.

In all four analyzed countries, exposure to SHS in public places was a factor of susceptibility to tobacco use (OR ranging from 1.4 and p<0.01 in Montenegro to 1.79 and p<0.001 in Moldova). In three of the analyzed countries, the correlates were: exposure to SHS at home (OR 1.31; p<0.05 in Latvia; 1.51; p<0.01 in Moldova; 1.91; p<0.01 in San Marino), the feeling of comfort (OR 1.59; p< 0.001 in Latvia; 1.45; p< 0.01 in Moldova; 1.41; p< 0.01 in Montenegro), and the opinion that a smoker can easily quit smoking (OR 1.39; p< 0.05 in Latvia; 1.84; p< 0.001 in Moldova; 1.4; p<0.05 in Montenegro).

Table S1. Susceptibility to tobacco use among never-smoking youth from Latvia, Moldova, Montenegro, San Marino

Characteristics*	Latvia N=2201 n (%)	Moldova N=2992 n (%)	Montenegro N=3048 n (%)	San Marino N=481 n (%)
At any time during the next 12 months do you think you will use any form of tobacco?				
Definitely yes	20 (0.9)	19 (0.6)	34 (1.1)	4 (0.8)
Probably yes	42 (1.9)	83 (2.8)	36 (1.2)	25 (5.2)
Probably not	313 (14.2)	237 (7.9)	259 (8.5)	103 (21.4)
Definitely not	1812 (82.4)	2592 (86.7)	2663 (87.4)	347 (72.2)
Missing n (%)	14 (0.6)	61 (2.0)	56 (1.8)	2 (0.4)
If one of your best friends offered you a cigarette or another tobacco product, would you use it?				
Definitely yes	41 (1.9)	16 (0.5)	26 (0.9)	3 (0.6)
Probably yes	54 (2.5)	64 (2.2)	31 (1.0)	25 (5.2)
Probably not	324 (14.7)	216 (7.2)	279 (9.1)	94 (19.6)
Definitely not	1773 (80.5)	2657 (88.8)	2686 (88.1)	358 (74.4)
Missing n (%)	9 (0.4)	39 (1.3)	26 (0.9)	1 (0.2)
Susceptible to tobacco use[b]				
Yes	575 (26.2)	456 (15.3)	494 (16.2)	171 (35.6)
No	1613 (73.2)	2472 (82.6)	2501 (82.1)	307 (63.8)
Missing n (%)	13 (0.6)	64 (2.1)	53 (1.7)	3 (0.6)

b – chi2 test for heterogeneity across countries, $p < 0.001$; country by country comparison: Latvia vs Moldova ($p < 0.001$), Latvia vs Montenegro ($p < 0.001$), Latvia vs San Marino ($p < 0.001$), Moldova vs Montenegro ($p > 0.05$), Moldova vs San Marino ($p < 0.001$), Montenegro vs San Marino ($p < 0.001$).
* percentages calculated for observed values

The following variables positively correlated with smoking susceptibility: in Latvia and Moldova this was receiving more money per week for personal expenses (OR 1.46; p < 0.01 Latvia; OR 1.69; p < 0.01 Moldavia); in Latvia and Montenegro, it was peer smoking (OR 2.01; p < 0.01 Latvia; OR 2.04; p < 0.001 Montenegro), and in Moldova and San Marino it was lack of knowledge about the harmful effects of SHS (OR 1.48; p < 0.05 Moldova; OR 1.96; p < 0.05 San Marino). Correlates of susceptibility to tobacco use included: in Montenegro – the sight of people smoking at school (OR 1.3; p < 0.05), lack of knowledge about harmful effects of smoking (OR 3.32; p < 0.001), lack of anti-smoking education at school (OR 1.32; p < 0.05), whereas in Moldova, the correlates included female gender (OR 1.29; p < 0.05), exposure to advertising or promotion of tobacco use in outlets (OR 1.76; p < 0.001), and watching people using tobacco on TV, video clips or in movies (OR 1.29; p < 0.05). Respondents who believed that smokers had fewer friends (OR 0.62; p < 0.001 in Latvia; OR 0.7; p < 0.05 in Montenegro) and looked less attractive (OR 0.73; p < 0.05 in Montenegro; OR 0.56; p < 0.05 in San Marino), were less likely to start using tobacco.

Age, parental smoking, school discussions on reasons for smoking and anti-smoking education provided by parents at home appeared to be insignificant factors of smoking susceptibility in all four analyzed countries (p > 0.05).

DISCUSSION

The results obtained in the study reveal a high vulnerability to smoking among students who have never smoked in two of the four analyzed countries – Latvia and San Marino.

Table 1. Associates of susceptibility to tobacco use among never-smoking youth from Latvia, Moldova, Montenegro, and San Marino – univariable analysis

Variables	Latvia N=2201		Moldova N=2992		Montenegro N=3048		San Marino N=481	
	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value
Age								
13 years or younger (ref.)	1.00		1.00		1.00			
14 years	1.22 (0.97-1.52)	0.09	1.25 (0.96-1.63)	0.10	1.10 (0.86-1.42)	0.44	1.25 (0.78-2.02)	0.35
15 years or older	1.18 (0.93-1.50)	0.18	1.40 (1.08-1.81)	0.01	1.40 (1.11-1.76)	<0.01	1.36 (0.86-2.16)	0.18
Gender								
Female	1.16 (0.96-1.41)	0.12	1.24 (1.01-1.52)	0.04	0.98 (0.81-1.88)	0.83	1.05 (0.72-1.53)	0.81
Male (ref.)	1.00		1.00		1.00		1.00	
Parental smoking								
Yes (one or both)	1.19 (0.98-1.45)	0.09			1.41 (1.15-1.71)	<0.001	1.16 (0.76-1.77)	0.48
No (ref.)	1.00		NA		1.00		1.00	
Exposure to secondhand smoke (SHS) at home								
Yes	1.51 (1.22-1.87)	<0,001	2.05 (1.63-2.62)	<0.001	1.53 (1.26-1.86)	<0.001	2.00 (1.32-3.02)	<0.01
No (ref.)	1.00		1.00		1.00		1.00	
Exposure to SHS in public places								
Yes	1.75 (1.44-2.12)	<0,001	2.04 (1.67-2.50)	<0.001	1.67 (1.36-2.04)	<0.001	1.83 (1.25-2.69)	<0.01
No (ref.)	1.00		1.00		1.00		1.00	
Money available per week for own expenses								
more	1.58 (1.24-2.00)	<0,001	1.80 (1.38-2.36)	<0.001	1.28 (1.04-1.58)	0.02	1.51 (1.03-2.21)	0.03
none or little (ref.)	1.00		1.00		1.00		1.00	
Peers smoking								
Yes	2.40 (1.97-2.91)	<0,001			2.72 (2.23-3.32)	<0.001	1.66 (1.10-2.52)	0.02
No (ref.)	1.00		NA		1.00		1.00	
Feel comfortable								
More	1.83 (1.48-2.26)	<0,001	1.67 (1.36-2.09)	<0.001	1.66 (1.35-2.02)	<0.001	1.72 (1.18-2.52)	0.01
Less or not different (ref.)	1.00		1.00		1.00		1.00	
Smoking makes young people look more/less attractive								
Less attractive					0.58 (0.47-0.72)	<0.001	0.49 (0.32-0.74)	<0.001
More attractive					1.62 (1.23-2.13)	<0.001	1.54 (0.86-2.76)	0.14
No differences (ref.)	NA		NA		1.00		1.00	
People who smoke have more/less friends								
Less friends	0.53 (0.42-0.66)	<0.001			0.70 (0.56-0.88)	<0.01	0.37 (0.21-0.68)	<0.01
More friends	0.95 (0.74-1.22)	0.70			1.12 (0.86-1.47)	0.40	1.49 (0.92-2.40)	0.10
No differences (ref.)	1.00		NA		1.00		1.00	
Knowledge about the harmful effects of SHS								
No	1.66 (1.18-2.34)	<0,01	1.39 (1.04-1.86)	0.02	2.17 (1.64-2.88)	<0.001	1.97 (1.12-3.46)	0.02
Yes (ref.)	1.00		1.00		1.00		1.00	
Knowledge about the harmful effects of smoking								
No	1.72 (1.14-2.60)	0.10			4.82 (3.59-6.48)	<0.001	0.68 (0.28-1.67)	0.40
Yes (ref.)	1.00				1.00		1.00	
Anti-smoking education at home								
No	1.23 (1.00-1.50)	<0.05					1.00 (0.67-1.48)	0.99
Yes (ref.)	1.00		NA		NA		1.00	
Seen anyone smoking inside or outside the school property								
No (ref.)	1.00		1.00		1.00		NA	
Yes	1.23 (1.01-1.49)	0.04	1.20 (0.98-1.47)	0,08	1.68 (1.37-2.06)	<0.001		
School discussion about why people use tobacco								
No	1.14 (0.93-1.41)	0.21					1.23 (0.84-1.81)	0.28

Table 1. Associates of susceptibility to tobacco use among never-smoking youth from Latvia, Moldova, Montenegro, and San Marino – univariable analysis (continuation)

Variables	Latvia N=2201		Moldova N=2992		Montenegro N=3048		San Marino N=481	
Yes (ref.)	1.00		NA		NA		1,00	
School discussion about the health effects of smoking								
No	1.07 (0.89-1.30)	0.47	1.08 (0.86-1.36)	0.52	1.35 (1.11-1.65)	<0.01	1.09 (0.73-1.61)	0.68
Yes (ref.)	1.00		1.00		1.00		1.00	
Seen people using tobacco when watching TV, videos, or movies								
No (ref.)	1.00		1.00				1.00	
Yes	1.25 (1.02-1.52)	0.03	1.42 (1.16-1.75)	<0.001	1.07 (0.86-1.32)	0.55	1.56 (1.00-2.43)	<0.05
Exposure to advertisements at point-of-sale								
No (ref.)	1.00		1.00		1.00		1.00	
Yes	1.41 (1.14-1.74)	<0.01	2.19 (1.77-2.72)	<0.001	1.24 (1.01-1.53)	0.04	1.82 (1.10-3.02)	0.02
Difficulty in quitting smoking by a smoker								
Difficult (ref.)	1.00		1.00		1.00		1.00	
Not difficult	1.52 (1.17-1.97)	<0.01	1.54 (1.22-1.93)	<0.001	2.00 (1.63-2.46)	<0.001	1.40 (0.66-2.96)	0.38

OR – odds ratio; N/A – data not available

This is confirmed by previous analyses based on GYTS and WHO data [35, 45], revealing the highest percentage of young Europeans prone to smoking.

In the past, Latvia, Moldova, and Montenegro were controlled by the Soviet Union. In San Marino, the living standards are similar to those in Italy.

Differences in the percentage of people prone to smoking between studies may be due to prevention, legislation, influence of the tobacco industry, as well as cultural and social norms. All countries included in the current analysis have made efforts to combat the tobacco epidemic through the MPOWER activities of the WHO.

In all four analyzed countries, exposure to SHS in public places was associated with increased susceptibility to smoking among adolescent non-smokers, which is in line with other studies [35, 46–49]. This indicates a need to create smoke-free public places.

Exposure to SHS at home in three of the four analyzed countries (except Montenegro) was also associated with susceptibility to smoking. This fact was also confirmed by studies conducted in other countries, and indicates there is a need to implement activities related to the promotion of tobacco-free homes [50, 51]. It is up to us to introduce a ban on smoking in homes or cars. In two of the four analyzed countries – Latvia and Moldova – pocket money was a risk factor for susceptibility to tobacco use. This is confirmed by previous GYTS results from Bangladesh, Cyprus, and Greece [52, 53]. Parental control over how children spend their money may reduce the vulnerability to cigarette use among adolescents, not only non-smokers. On the other hand, it has been shown that children whose parents have an authoritarian parenting style are more likely to become smokers [54]. High cigarette prices may prevent the initiation of smoking in young people [25]. Similarly, in Latvia and Montenegro, adolescents whose peers are smokers were more likely to start smoking. This is confirmed by studies conducted in other countries [35, 46, 52, 55–63]. A desire for peer acceptance and the sense of belonging to a group can also influence smoking habits [64, 65]. Non-smokers are more likely to smoke cigarettes than their peers if they have easier access to cigarettes [66], thereby increasing the risk of the first smoking experience [35, 62]. Being surrounded by peer smokers does not necessarily mean that non-smokers will start the habit of smoking. It is important to implement educational activities for young smokers to show them how to quit smoking and refrain from smoking in the company of non-smokers. Adolescents who claimed (except for the countries where no data were available) that smoking makes them less attractive and those who smoke have fewer friends demonstrated a lower risk of susceptibility to smoking.

In the countries of the former Eastern Bloc – Latvia, Moldova, Montenegro – the opinion that a smoker can easily quit smoking, and tobacco helps people feel comfortable in social situations, was associated with susceptibility to smoking. Young people often deny and minimize smoking-related health risks; besides, they do not often consider themselves 'smokers'.

In Montenegro, The fact that people smoke on or outside school premises, lack of knowledge about the harmful effects of smoking, and lack of school discussions about health consequences of smoking, were significant factors for smoking vulnerability, as confirmed by other studies [55, 67]. In Moldova, Kazakhstan, Azerbaijan and Kyrgyzstan the population are hardly aware of the negative health effects of smoking [68]; it is therefore important to promote anti-smoking activities in schools and to disseminate knowledge about such harmful effects. In Moldova, while watching people using tobacco on TV and in films, adolescents were more prone to develop smoking habits. This fact was also confirmed by other studies [69]. Similar to other studies, exposure to advertisements in outlets in Moldova also influenced smoking habits [70, 71]. A complete ban on tobacco advertising in outlets contributed to limited experimental smoking in young people [72].

The current study confirms the high susceptibility to smoking among the youth in San Marino (35.6%) and Latvia (26.2%). In Poland, 22% of never-smoking students were susceptible to smoking [55], and living in households with a ban on smoking, seeing school staff smoking, having friends who smoke, and having no advice in school about the harm in smoking tobacco, were important correlates for smoking susceptibility [55].

Table 2. Associations of susceptibility to tobacco use among never-smoking youth from Latvia, Moldova, Montenegro, and San Marino – multivariable analysis

Variables	Latvia N=2201		Moldova N=2992		Montenegro N=3048		San Marino N=481	
	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value	OR (95%CI)	p-value
Age								
13 years or younger (ref.)			1.00		1.00			
14 years			1.17 (0.88-1.55)	0.29	0.96 (0.71-1.29)	0.78		
15 years or older			1.27 (0.96-1.68)	0.10	1.03 (0.77-1.38)	0.85		
Gender								
Female			1.29 (1.02-1.62)	<0.05				
Male (ref.)			1.00					
Parental smoking								
Yes (one or both)					1.17 (0.90-1.52)	0.24		
No (ref.)			NA		1.00			
Exposure to second-hand smoke (SHS) at home								
Yes	1.31 (1.04-1.66)	<0.05	1.51 (1.17-1.95)	<0.01	1.21 (0.93-1.58)	0.15	1.91 (1.21-3.01)	<0.01
No (ref.)	1.00		1.00		1.00		1.00	
Exposure to SHS in public places								
Yes	1.45 (1.17-1.80)	<0.001	1.79 (1.41-2.27)	<0.001	1.40 (1.09-1.79)	<0.01	1.57 (1.02-2.41)	<0.05
No (ref.)	1.00		1.00		1.00		1.00	
Money available per week for own expenses								
more	1.46 (1.13-1.88)	<0.01	1.69 (1.26-2.25)	<0.001	1.16 (0.91-1.48)	0.24	1.44 (0.95-2.19)	0.09
none or little (ref.)	1.00		1.00		1.00		1.00	
Peers smoking								
Yes	2.01 (1.63-2.49)	<0.001			2.04 (1.62-2.58)	<0.001	1.19 (0.75-1.90)	0.45
No (ref.)	1.00		NA		1.00		1.00	
Feel comfortable								
More	1.59 (1.26-2.00)	<0.001	1.45 (1.15-1.82)	<0.01	1.41 (1.12-1.77)	<0.01	1.46 (0.96-2.21)	0.08
Less or not dif (ref.)	1.00		1.00		1.00		1.00	
Smoking makes young people look more/less attractive								
Less attractive					0.73 (0.55-0.96)	<0.05	0.56 (0.34-0.90)	<0.05
More attractive					1.63 (1.15-2.32)	<0.01	1.34 (0.69-2.59)	0.38
No differences (ref.)	NA		NA		1.00		1.00	
People who smoke have more/fewer friends								
Less friends	0.62 (0.48-0.80)	<0.001			0.70 (0.52-0.95)	<0.05	0.54 (0.28-1.05)	0.07
More friends	0.88 (0.68-1.15)	0.35			0.71 (0.50-1.00)	<0.05	1.32 (0.76-2.29)	0.32
No differences (ref.)	1.00		NA		1.00		1.00	
Knowledge about the harmful effects of SHS								
No	1.37 (0.92-2.04)	0.13	1.48 (1.07-2.05)	<0.05	1.36 (0.94-1.97)	0.10	1.96 (1.03-3.74)	<0.05
Yes (ref.)	1.00		NA		1.00		1.00	
Knowledge about the harmful effects of smoking								
No	1.06 (0.63-1.79)	0.81			3.32 (2.26-4.89)	< 0,001		
Yes (ref.)	1.00				1.00			
Anti-smoking education at home								
No	1.21 (0.97-1.51)	0.09						
Yes (ref.)	1.00		NA		NA			
Seen anyone smoking inside or outside the school property								
No (ref.)	1.00				1.00		NA	
Yes	1.05 (0.84-1.30)	0.79			1.30 (1.01-1.68)	<0.05		
School discussion about why people use tobacco								
No								

Table 2. Associations of susceptibility to tobacco use among never-smoking youth from Latvia, Moldova, Montenegro, and San Marino – multivariable analysis (continuation)

Variables	Latvia N=2201		Moldova N=2992		Montenegro N=3048		San Marino N=481	
Yes			NA		NA			
School discussion about the health effects of smoking								
No					1.32 (1.05-1.66)	<0.05		
Yes (ref.)					1.00			
Seen people using tobacco when watching TV, videos, or movies								
No (ref.)	1.00		1.00				1.00	
Yes	1.06 (0.85-1.33)	0.58	1.29 (1.02-1.63)	<0.05			1.25 (0.76-2.05)	0.39
Exposure to advertisements at point-of-sale								
No (ref.)	1.00		1.00		1.00		1.00	
Yes	1.23 (0.97-1.55)	0.08	1.76 (1.39-2.23)	<0.001	1.00 (0.79-1.28)	0.98	1.63 (0.92-2.88)	0.09
Difficulty in quitting smoking by a smoker								
Difficult (ref.)	1.00		1.00		1.00			
Not difficult	1.39 (1.03-1.88)	<0.05	1.84 (1.41-2.40)	<0.001	1.40 (1.08-1.81)	<0.05		

OR - odds ratio; N/A - data not available

Prevention should mostly focus on enforcing existing legislation, creating a fashion for non-smoking, and reducing social acceptance of smoking. School-based interventions need to be further improved to obtain the maximum benefit as a preventive factor for tobacco initiation and smoking [55].

This study is one of only a few that provides an insight into the prevalence and potential correlates of vulnerability of adolescent never-smokers to tobacco use in southern and eastern European countries. Numerous determinants of susceptibility to smoking have been studied, including personal and environmental issues.

The analysis concerned a cross-sectional GYTS study conducted on a large number of participants and was representative for the whole country all four countries studied. The

questionnaire based on GYTS standards enabled direct comparison of the analyzed countries and trend assessments. In order to assess susceptibility to smoking, adolescent respondents were asked two questions which are often used while determining the extent to which adolescents are predisposed to smoking initiation. The obtained results can be monitored in the WHO database and compared with those obtained in other countries, and may be important as they might help to implement effective preventive actions among young people in other countries.

A weaknesses of the study was that the GYTS questionnaire, apart from the basic questions, contained additional questions selected depending on issues typical for a particular country. This meant that some variables were not available in all the analyzed countries. The low overall response rate in Latvia (70.7%) and some missing data in responses, as well as different years of data collection, may have influenced the results and conclusions.

The study was limited to a non-smoking population, but adolescents may use other tobacco products. This provides an opportunity for other researchers to focus on the non-tobacco population in future studies.

CONCLUSION

Results indicate that a high proportion of young never-smokers from Southern and Eastern European countries are susceptible to tobacco use.

Political factors (observance of smoking bans in public places and homes) proved to be correlates of susceptibility to smoking in all analyzed countries. Also, socio-environmental factors, such as lack of knowledge about the harmful effects of SHS, the belief that quitting smoking is easy, peer smoking, and the feeling of comfort experienced by smokers, were strongly correlated with tobacco use susceptibility among young people. Slight differences in susceptibility to tobacco use were related with the opinion that people who smoke have fewer friends and look less attractive. These factors should be taken into consideration when planning and implementing anti-tobacco activities among adolescents.

It is necessary to reduce the incidence of new smokers by preventing their susceptibility to tobacco use. The results of this study can help in identifying priorities and granting funds for promoting education and health programmes for the young population. Exposure to SHS in public places calls for enforcement of current legislation and the creation of smoke-free environments. The results should induce governments to intensify interventions to encourage tobacco-free homes and control smoking bans in public places.

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