

## RESEARCH ARTICLE

# E-cigarette and alternative tobacco products consumption among adolescents in Chisinau, Republic of Moldova – A repeated cross-sectional study

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**Objective:** The main objective of the study was to evaluate e-cigarette and alternative tobacco product use in ninth-grade students from Chisinau. **Methods:** The repeated cross-sectional study collected data using a questionnaire administered in 2015 and 2018 among ninth-grade students in Chisinau, Republic of Moldova. Absolute and relative frequencies of electronic cigarettes and alternative tobacco products ever use were calculated and 2015 data were compared with those collected in 2018. **Results:** The percentage of participants ever using electronic cigarettes in 2015 and 2018 respectively was 42.9% and 59.5% ( $p=0.001$ ), ever using cigars was 14.9% and 15.9% ( $p=0.684$ ), ever using pipes was 3.3% and 4.9% ( $p=0.205$ ), ever using hookah was 17.4% and 21.7% ( $p=0.086$ ), ever using chewing tobacco was 11.6% and 3.9% ( $p=0.039$ ), ever using snus was 4.1% and 6.2% ( $p=0.135$ ), and ever using snuff was 0.5% and 1.1% respectively ( $p=0.518$ ). Exposure of participants to messages promoting electronic cigarettes was 31.0% in 2015 and 65.8% in 2018 ( $p<0.0001$ ). Consumption of electronic cigarettes was significantly associated with sex (boys 62.8% vs. girls 43.6%), school performance (low grades 61.5% vs. high grades 50.0%), exposure to pro e-cigarette messages (exposed 61.4% vs. not exposed 44.0%), perceived e-cigarettes harmfulness (less harmful 66.9% vs. more harmful 39.7%), and use of conventional cigarettes (ever tried 79.8% vs. never tried 24.6%). **Conclusions:** The study showed an important, statistically significant increase in the consumption of electronic cigarettes among ninth-grade students in Chisinau city, from 2015 to 2018 and an increased exposure to electronic cigarette advertising.

**Keywords:** electronic cigarette, alternative tobacco products, adolescents, Moldova

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## Introduction

E-cigarettes or Electronic Nicotine Delivery Systems (ENDS) are battery-operated devices that heat a solution of nicotine, flavorings, and other chemicals to produce an aerosol that is inhaled into the lungs. These systems have become very popular in the last ten years, especially among teenagers [1]. Smokeless tobacco is not a safe alternative to smoking and represents a group of products that includes: chewing tobacco (loose leaf, plug, or twist and may come in flavors), snuff (moist, dry, or in packets, snus), dissolvables (lozenges, sticks, strips, orbs) which, like all tobacco products, affect health [2]. The WHO Global Youth Tobacco Survey (GYTS) report for 2007-2017 shows that 13.4 million children 13-15 years of age use smokeless tobacco products. The average prevalence rate of smokeless tobacco use during 2007-2014 among adolescents aged 13-15 years from Europe was 1.3% in boys and 1.1% in girls [3].

The overall prevalence of smokeless tobacco use among young people aged 13 to 15 years based on various national GYTS studies from 2007 to 2014 was 3.6% (4.7% boys and 2.5% girls). According to the same studies, the lowest

prevalence was found in Europe (1.2%) and the highest in South-East Asia (7.4%) [4].

The prevalence of last 30 days e-cigarette use has increased from 1.5% in 2011 to 20.8% in 2018 among high school students in the United States (US) [5,6] and from 5.5% in 2011 to 29.9% in 2014 among high school students in Poland [7]. An Icelandic study conducted during 2015-2018 among ninth-grade students has shown an increase in e-cigarette consumption from 12.0% in 2015 to 30.5% in 2018 [8].

Another study carried out in the US revealed that e-cigarette consumption increased from 3.3% in 2017 to 4.9% in 2018 among middle school students (10-14 years of age), and from 11.7% in 2017 to 20.7% in 2018 among high school students (14-18 years of age) [9]. In Romania, the ASPIRA study conducted in Targu Mures included 1369 ninth-grade students and found that 38.5% have tried electronic cigarettes, 31.4% cigars, and 21.1% waterpipes [10,11].

E-cigarette consumption among high school students in Minnesota was associated with increased alcohol use and lower academic performance [12]. A nationally representative study of middle and high school students in the USA suggests that curiosity toward e-cigarettes may be a risk factor of future use of these products [13].

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Tobacco products other than cigarettes include pipes, water pipes, cigars, and bidis. The hookah (water pipe/shisha) is a tobacco product whose consumption has increased among teenagers. According to the studies in the USA in 2016, 4.8% of high school students reported current hookah smoking (past 30 days use) and 29.1% of students reported any hookah curiosity or susceptibility [14,15]. In Great Britain, 1.7% of young people used hookah at least monthly and 9.9% had tried hookah in their lifetime [16]. According to Eurobarometer data performed in the 28 member states of the European Union on a representative sample of people 15 years of age or more, the prevalence of ever water pipe use increased from 11.6% in 2009 to 16.3% in 2014 before dropping to 12.9% in 2017. Regular waterpipe use was highest in Austria (3.6%), Latvia (2.5%), and Belgium (2.0%) in 2017 [17].

In the 2013 GYTS study, the rate of current smokeless tobacco users in Moldova among adolescents aged 13-15 was 4.1% and remained the same in 2019 [18]. In 2019, for the first time in this study, it was found that current smokers of other tobacco products among adolescents in Moldova had a rate of 9.5% and ever smokers of other tobacco products a rate of 27.8% [19].

The goal of the present research was to evaluate e-cigarette, hookah (shisha), cigars, pipe, and smokeless tobacco products such as chewing tobacco, snus, and snuff consumption among school children in Chisinau, Republic of Moldova. In addition, the study tested associations between the use of e-cigarettes and a number of socio-demographic variables, exposure to e-cigarette advertising, and regular use of cigarettes.

## Material and methods

The first batch of students from 20 schools in Chisinau was surveyed in 2015 (N = 368; 48.1% girls; mean age = 14.8 years) and was compared with the second batch of students from the same schools who were surveyed in 2018 (N = 819; 48.1% girls; mean age = 14.9 years). Adolescents were recruited in ninth grade because they are the most susceptible age group at risk for tobacco use. The schools were chosen randomly from the city of Chisinau, 17 having the status of high-school and three the status of gymnasium.

The questionnaire was conducted in two stages: the first questionnaire was applied in October-December 2015 and included 368 students, the second one was applied in February-April 2018 and included exactly the same educational institutions, except for a high school that did not have ninth-grade students enrolled during 2017-2018. After obtaining the authorization from the selected schools, all students attending the ninth grade were invited to participate. Students who wished to participate and provided written consent from their parents or legal guardians received a computer-assisted self-administered questionnaire. Students completed the questionnaire voluntarily, and a project researcher was present at all times to provide

assistance and solve problems. This study was approved by the Ethics Commission for Scientific Research of the University of Targu Mures and adhered to the principles of the Helsinki Declaration.

This research used the questionnaire from the ASPIRE-Romania study but adapted it for adolescents in the Republic of Moldova [20]. E-cigarettes and alternative tobacco products (ATPs) use were assessed by two questions. The first one was "Which of the following products have you ever tried?". Response options included "Yes" or "No" for e-cigarettes, cigar, pipe, hookah, chewing tobacco, snus (or other oral tobacco products), and snuff (or other nasal tobacco products). The second one was "On how many of the last 30 days have you smoked e-cigarettes?" (seven categories, from none to daily).

The e-cigarette harm perceptions and promotion of e-cigarettes were assessed in two other questions. Comparative harm was measured using the question "How harmful are electronic cigarettes in your opinion?". Response options included: "Less harmful than conventional cigarettes", "Equally harmful", "More harmful than conventional cigarettes", "Not at all harmful", and "I don't know". In addition, exposure to e-cigarette promotion messages was measured with the question "During the last month, have you seen/heard any messages promoting electronic cigarettes?". Experimentation with conventional cigarettes was measured with a single question: "Have you ever tried smoking conventional cigarettes, even just a few puffs?". Response options included: "No" or "Yes".

Absolute and relative frequencies were computed for all variables. The Chi-square test was used to compare the differences in the prevalence of e-cigarette and ATP use between the 2015 and 2018 measurements and to test the correlates of e-cigarette and ATP use. The statistical analyses were performed using SPSS version 22.0. The cutoff for statistical significance was set at 0.05.

## Results

The mean age of the subjects included in the 2015 sample was 14.8 years (SD 0.4) and of those in the 2018 sample 14.9 years (SD 0.5). The other socio-demographic characteristics of the participants are presented in Table I.

The data regarding the exposure to pro e-cigarette messages, the perceptions and consumption of e-cigarettes, and ATPs in 2015 and 2018 are reported in Table II.

Life-time prevalence of conventional and e-cigarettes use as well as the consumption of some ATPs was significantly higher in male participants. The proportion of male vs. female students ever trying conventional cigarettes was 61.4% vs. 38.6% in 2015 ( $p=0.001$ ) and 58.6% vs. 41.4% in 2018 ( $p<0.0001$ ). The proportion of male vs. female students ever trying e-cigarettes was 64.6% vs. 35.4% in 2015 ( $p<0.0001$ ) and 59.6% vs. 40.4% in 2018 ( $p<0.0001$ ). Significant differences between male and female participants were also observed regarding consumption of cigars (65.5% vs. 34.5% in 2015,  $p=0.029$  and 70.0% vs.

**Table I. Socio-demographic characteristics of ninth-grade students from Chisinau, Republic of Moldova, 2015 and 2018**

Variables	2015 sample (N=368)		2018 sample (N=819)		p
	N	%	N	%	
Sex					
Male	191	51.9	425	51.9	0.998
Female	177	48.1	394	48.1	
Ethnicity					
Moldavian	353	95.9	779	95.1	0.54 <sup>*</sup>
Ukrainian	3	0.8	4	0.5	
Russian	5	1.4	20	2.4	
Other	7	1.9	16	2.0	
School grades					
Mostly between 8 - 10	125	34.0	244	29.8	0.628
Mostly between 7 - 9	131	35.6	316	38.6	
Mostly between 6 - 8	75	20.4	167	20.4	
Mostly between 5 - 7	27	7.3	71	8.7	
Mostly less than 6	10	2.7	21	2.6	

<sup>\*</sup> Chi-square test was applied after merging into two subcategories, Moldavian vs. All other ethnics

**Table II. Exposure to pro e-cigarette messages, perceptions, and behaviors regarding e-cigarettes and alternative tobacco products among ninth-grade students from Chisinau, Republic of Moldova, 2015 and 2018**

Variables	2015 sample		2018 sample		p	
	N	%	N	%		
Exposure to pro e-cigarette messages						
No	254	69.0	280	34.2	<0.0001	
Yes	114	31.0	539	65.8		
How harmful are e-cigarettes in your opinion?						
More harmful than conventional cigarettes	49	13.3	107	13.1	0.862	
Equally harmful as conventional cigarettes	65	17.7	127	15.5		
Less harmful than conventional cigarettes	150	40.8	358	43.7		
E-cigarettes are not at all harmful	27	7.3	60	7.3		
I don't know	77	20.9	167	20.4		
Have you ever tried smoking (even one or two puffs)?						
No	202	54.9	362	44.2	0.001	
Yes	166	45.1	457	55.8		
Which of the following products have you ever tried?						
E-cigarettes	No	210	57.1	341	41.6	<0.0001
	Yes	158	42.9	487	59.5	
Cigar	No	313	85.1	689	84.1	0.684
	Yes	55	14.9	130	15.9	
Pipe	No	356	96.7	778	95.0	0.205
	Yes	12	3.3	40	4.9	
Hookah	No	304	82.6	641	78.3	0.086
	Yes	64	17.4	178	21.7	
Chewing tobacco	No	362	98.4	787	96.1	0.039
	Yes	6	1.6	32	3.9	
Snus	No	353	95.9	768	93.8	0.135
	Yes	15	4.1	51	6.2	
Snuff	No	366	99.5	810	98.9	0.518
	Yes	2	0.5	9	1.1	

30.0% in 2018,  $p < 0.0001$ ) and chewing tobacco (68.8% vs. 31.3% in 2018,  $p = 0.052$ ).

The overall correlates of ever trying e-cigarettes and various ATPs among the ninth-grade participants are presented in Table III.

### Discussions

E-cigarettes and ATPs are listed as a public health problem that must be controlled by legislation in Moldova in 2015 [21]. E-cigarettes are gaining ground among young people. While some countries experience a shift from conventional cigarette use to e-cigarettes [22], our study shows that among adolescents in Chisinau the use of e-cigarettes and some ATPs is on the rise along with conventional cigarettes. Over the three years covered by the study, statistically significant increases were observed regarding the use of conventional cigarettes, e-cigarettes, and chewing tobacco. The most remarkable increase was recorded in the consumption of e-cigarettes (from 42.9% of respondents ever trying e-cigarettes in 2015, to 58.4% of respondents in 2018). The significant increase in e-cigarettes use may be related to the increase in their promotion as a smoking cessation method. Those who promote e-cigarettes in Moldova more and more actively refer to the ENSP Guide for the treatment of tobacco addiction which although it does not recommend health professionals to indicate the e-cigarette for smoking cessation suggests not contradicting the choice of a patient who opts for the e-cigarette instead of the conventional one, and to some studies that would demonstrate the effectiveness of this method [23-25].

The proportion of adolescents 15 years of age ever using conventional cigarettes in our study has increased substantially from 45.1% in 2015 to 55.8% in 2018. The increase in the prevalence of conventional cigarette consumption in Moldova may be due to the inefficiency of the implemented programs. Thus, although the WHO Framework Convention on Tobacco Control has been actively implemented, some studies show its lack of impact in low- and middle-income countries [27-28]. Another cause of the increase in prevalence may be high rates of students who have access to the purchase of cigarettes, this being demonstrated by the results of GYTS studies (43.9% in 2013 and 55.8% in 2019) [18-19,26].

Our findings indicate that ATPs are less popular among students compared to e-cigarettes. The most popular one among students in Chisinau is hookah. One in five adolescents included in the study tried this product at least once in his/her lifetime. Although there was a small increase in prevalence from 17.4% in 2015 to 21.7% in 2018, the change was not statistically significant. According to a previous study from 2019, current smokers of hookah or shisha in Moldova were 5.9% of adolescents aged 13-15 years [26]. The smaller figures given in the GYTS study compared to ours could be related to the fact that it reports hookah consumption in the last 30 days and the sample included a large number of participants from rural areas of

Table III. Correlates of e-cigarette and alternative tobacco products use among ninth-grade students from Chisinau, Republic of Moldova, 2015-2018

Correlates																
Types of products ever used	Sex			School grades			Exposure to pro e-cigarette messages			Belief about harmfulness of e-cigarettes			Ever tried conventional cigarettes			
	Male N (%)	Female N (%)	P	Grades <8 N (%)	Grades >8 N (%)	P	No N (%)	Yes N (%)	P	I don't know N (%)	Not harmful at all or less harmful than conventional cigarettes N (%)	Equally or more harmful than conventional cigarettes N (%)	No N (%)	Yes N (%)	P	
E-cigarettes	Yes	387 (62.8)	249 (43.6)	<0.0001	228 (61.5)	448 (50.0)	<0.0001	235 (44.0)	401 (61.4)	<0.0001	100 (41.0)	398 (66.9)	138 (39.7)	139 (24.6)	497 (79.8)	<0.0001
	No	229 (37.2)	322 (56.4)		143 (38.5)	408 (50.0)		299 (56.0)	252 (38.6)		144 (59.0)	197 (33.1)	210 (60.3)	425 (75.4)	126 (20.2)	
Cigar	Yes	127 (20.6)	58 (10.2)	<0.0001	79 (21.3)	106 (13.0)	<0.0001	52 (9.7)	133 (20.4)	<0.0001	33 (13.5)	102 (17.5)	50 (14.4)	2 (0.4)	183 (29.4)	<0.0001
	No	489 (79.4)	513 (89.8)		292 (78.7)	710 (87.0)		482 (90.3)	520 (79.6)		211 (86.5)	493 (82.9)	298 (86.6)	562 (99.6)	440 (70.6)	
Pipe	Yes	34 (5.5)	18 (3.2)	0.047	31 (8.4)	21 (2.6)	<0.0001	8 (1.5)	44 (6.7)	<0.0001	12 (4.9)	26 (4.4)	14 (4.0)	1 (0.2)	51 (8.2)	<0.0001
	No	582 (94.5)	552 (96.8)		340 (91.6)	794 (97.4)		526 (98.5)	608 (93.3)		232 (95.1)	568 (95.6)	334 (96.0)	563 (99.8)	571 (91.8)	
Hooka	Yes	129 (20.9)	113 (19.8)	0.623	78 (21.0)	164 (20.1)	0.714	81 (15.2)	161 (24.7)	<0.0001	25 (10.2)	167 (28.1)	50 (14.4)	63 (11.2)	179 (28.7)	<0.0001
	No	487 (79.1)	458 (80.2)		293 (79.0)	652 (79.9)		453 (84.8)	492 (75.3)		219 (89.8)	428 (71.9)	298 (85.6)	501 (88.8)	444 (71.3)	
Chewing tobacco	Yes	27 (4.4)	11 (1.9)	0.016	24 (6.5)	14 (1.7)	<0.0001	18 (3.4)	20 (3.1)	0.764	10 (4.1)	16 (2.7)	12 (3.4)	5 (0.9)	33 (5.3)	<0.0001
	No	589 (95.6)	560 (98.1)		347 (93.5)	802 (98.3)		516 (96.6)	633 (96.9)		234 (95.9)	579 (97.3)	336 (96.6)	559 (99.1)	590 (94.7)	
Snus	Yes	29 (4.7)	37 (6.5)	0.183	19 (5.1)	47 (5.8)	0.656	18 (3.4)	48 (7.4)	0.003	12 (4.9)	30 (5.0)	24 (6.9)	4 (0.7)	62 (10.0)	<0.0001
	No	587 (95.3)	534 (93.5)		352 (94.9)	769 (94.2)		516 (96.6)	605 (92.6)		232 (95.1)	565 (95.0)	324 (93.1)	560 (99.3)	561 (90.1)	
Snuff	Yes	8 (1.3)	3 (0.5)	0.165	6 (1.6)	5 (0.6)	0.094	3 (0.6)	8 (1.2)	0.235	1 (0.4)	7 (1.2)	3 (0.9)	2 (0.4)	9 (1.4)	0.05
	No	608 (98.7)	568 (99.5)		365 (98.4)	811 (99.4)		531 (99.4)	645 (98.8)		243 (99.6)	588 (98.8)	345 (99.1)	562 (99.6)	614 (98.6)	



the country where there are no places for smoking hookah and no shisha products are sold. Another fairly common alternative tobacco product noted among the studied population is cigar with a consumption rate of 14.9% in 2015 and 15.9% in 2018. Because in the Republic of Moldova the consumption of cigars was studied only in the group of "other tobacco products", we do not have national studies to be able to compare our results. Studies in other countries show that cigars are popular among adolescents 15 years of age. For example, in neighboring Romania, the prevalence was 31.4% (2014), while in the US was 6.9% (2016-2017) and in the EU 0.71% (2017) [10, 29-30]. Other ATPs such as snus, pipe, chewing tobacco, and snuff seem to arouse much less interest among the high-school pupils in Chisinau, only snus being tried by a little over 5% of the participants (Table II). Overall, our findings seem to be in line with another previous report about ATPs among adolescents in the Republic of Moldova which showed that the prevalence of any smokeless tobacco such as snuff and chewing tobacco, was below 5% [26]. However, we detected a notable and statistically significant increase in the prevalence of chewing tobacco, from 1.6% in 2015 to 3.9% in 2018.

The advertising of e-cigarettes was prohibited by law in Moldova as well as their sale to minors [21]. Nevertheless, our results suggest that e-cigarette promotion messages have become more visible to teenagers. Thus, the percentage of pupils noticing e-cigarette advertisements has doubled within three years, increasing from 31.0% in 2015 to 65.8% in 2018. However, the higher exposure to e-cigarette promoting messages apparently did not translate into significant changes in students' perception regarding the hazards of e-cigarettes. According to a study by Singh et al., exposure to e-cigarette advertising is associated with the current use of e-cigarettes among young people, and higher exposure to e-cigarette advertising is associated with higher chances of use [31].

About half of the respondents included in our study, both in 2015 and 2018, believed that e-cigarettes are less harmful than cigarettes or not at all harmful. In addition, another fifth of the participants in both samples declared not knowing how harmful are e-cigarettes. The percentage of adolescents perceiving e-cigarettes at least as harmful as conventional cigarettes was low (about 30% in both assessments) (Table II). Global studies suggest that teens who perceive e-cigarettes as less harmful than cigarettes are more likely to use them [32-33].

The statistical tests performed in our study indicate that e-cigarette use and the consumption of several ATPs are associated with the sex of the respondents, their school grades, their exposure to messages promoting e-cigarettes, their beliefs about the hazards of e-cigarettes, and their lifetime prevalence of using conventional cigarettes. E-cigarettes, cigars, pipes, and chewing tobacco were associated with the sex of participants (the use of these products was more prevalent in boys than girls). On the other hand, the

experimentation with some products such as hookah, snus, and snuff was equally distributed among male and female students (Table III). Gender differences with e-cigarettes are parallel to those previously found with traditional smoking [34-37]. The 2019 GYTS in Moldova found the same significant differences for current e-cigarette users (prevalence was 16.8% boys and 8.4% girls), ever e-cigarette users (40.0% boys and 23.2% girls). Ever smokeless tobacco users were no exception (5.3% boys and 2.7% girls) and current shisha smokers had the same significant difference (7.4% boys and 4.4% girls) [19]. Studies show that the causes of gender-dependent smoking differ: men smoke for the enhancing effects of nicotine, while women smoke to regulate their mood or to demonstrate their social status. In many countries and ethnic groups, the habit of smoking among women is condemned as a result of cultural, psychosocial, and socioeconomic factors [38-40]. Several European and USA studies have found that the use of e-cigarettes among adolescents is more common among boys than girls [41-44].

Low grades in school were significantly associated with using several ATPs but not hookah, snuff, and snus. Hypothetically, hookah, snus, and snuff were considered less risky in some studies than conventional cigarettes, so students with relatively high grades were also consumers of these products. Another cause may be that hookah has been shown to be used by students as a tool to make friends, having a social role of communication and recognition in the group [45-46].

This study also found a significant association between exposure to messages promoting e-cigarettes and a higher prevalence of experimenting with e-cigarettes (Table III). In this respect, our study confirms an almost generally accepted fact that tobacco, e-cigarettes, and ATPs advertisement targeting young people may significantly influence their use among this population [47]. Likewise, limiting and banning the advertising of e-cigarettes could reduce the risk of initiation of using these products [48]. Interestingly, exposure to e-cigarette advertisements was associated not only with experimentation with the very same product but also with ever trying cigars, pipes, hookah, and snus (Table III). This finding suggests that e-cigarette promoting messages may have a larger, non-specific influence on the behavior of the adolescents.

An impressive share of high school students in Chisinau considered that e-cigarettes are less harmful than conventional cigarettes (Table II). The statistical analysis revealed that respondents who declared that e-cigarettes were either less harmful than conventional cigarettes or not at all harmful were more likely to experiment with electronic cigarettes. In addition, these students were also more likely to experiment with hookah (Table III). Previous studies have found that exposure to tobacco products and misconceptions about the harm caused by tobacco use are associated with e-cigarette use among young people [49-52].

Ever trying conventional cigarettes was significantly associated with the consumption of both e-cigarettes and all the other ATPs with no exception. A vast number of publications support the observation that adolescents who have ever tried to smoke conventional cigarettes are more likely to smoke e-cigarettes [53-58]. Many studies also acknowledge the relationship between experimentation with conventional cigarettes on the one hand and trying e-cigarettes, cigars, hookah, and other ATPs [59-61].

This is the first study collecting and reporting data on the consumption of ATPs among ninth-grade pupils in Chisinau, Republic of Moldova. Also, for the first time in the Republic of Moldova, the prevalence of specific smokeless tobacco products was investigated.

This study has some limitations. Firstly, due to its cross-sectional design, the study cannot conclude with certainty regarding the causal nature of the relationships between the tested variables. Secondly, the participants were selected from the city of Chisinau which is the capital of the country and is the most developed socio-economic locality in the country, possibly limiting the generalization of results throughout the republic. Finally, answers to the questionnaire may suffer from recall and social desirability bias.

## Conclusions

The results of the study showed an important, statistically significant increase in the consumption of e-cigarettes among ninth-grade students in Chisinau city, from 2015 to 2018. The participants' exposure to e-cigarette advertising has also increased significantly from 2015 to 2018. Consumption of e-cigarettes was significantly associated with sex (boys more likely ever trying e-cigarettes), school performance (pupils with low grades in school more likely to try e-cigarettes), exposure to pro e-cigarette messages, perception of e-cigarettes harmfulness (respondents believing e-cigarettes are less harmful than conventional cigarettes or not at all harmful more likely to use the product), and use of conventional cigarettes (participants ever trying conventional cigarettes more likely to try e-cigarettes).

## Authors' contribution

AT – Study design, data collection, writing the draft of the manuscript, final approval for publication

VN - Study design, statistical analysis, interpretation of data, critical review of the manuscript, final approval for publication

MT- Study design, interpretation of data, critical review of the manuscript, final approval for publication

AZ - Study design, study supervision, critical review of the manuscript, final approval for publication

## Conflict of interest

None to declare.

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