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Prevalence and correlates of e-cigarette perceptions and trial among Mexican adolescents

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Abstract

PURPOSE—Assess the prevalence and correlates of e-cigarette perceptions and trial among adolescents in Mexico, where e-cigarettes are banned.

METHODS—Cross-sectional data were collected in 2015 from a representative sample of middle school students (n=10,146). Prevalence of e-cigarette awareness, relative harm, and trial were estimated, adjusting for sampling weights and school-level clustering. Multilevel logistic regression models adjusted for school-level clustering to assess correlates of e-cigarette awareness and trial. Finally, students who had tried only e-cigarettes were compared with students who had tried: 1) conventional cigarettes only; 2) both e-cigarettes and conventional cigarettes (dual triers); 3) neither cigarette type (never triers).

RESULTS—51% of students had heard about e-cigarettes, 19% believed e-cigarettes were less harmful than conventional cigarettes, and 10% had tried them. Independent correlates of e-cigarette awareness and trial included established risk factors for smoking, as well as technophilia

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Implications and Contribution

This study finds that awareness and trial of e-cigarettes are high among Mexican middle-school students, in spite of e-cigarette marketing and sales bans. Utilization of media technologies and Internet advertising exposure distinguish youth who have tried e-cigarettes from those who have not, highlighting the need for research on these topics.

(i.e., use of more media technologies) and greater Internet tobacco advertising exposure. Exclusive e-cigarette triers (4%) had significantly higher technophilia, bedroom Internet access, and Internet tobacco advertising exposure compared to conventional cigarette triers (19%) and never triers (71%), but not compared to dual triers (6%), even though dual triers had significantly stronger conventional cigarette risk factors.

CONCLUSIONS—This study suggests that adolescent e-cigarette awareness and use is high in Mexico, in spite of its e-cigarette ban. A significant number of medium-risk youth have tried e-cigarettes only, suggesting that e-cigarettes could lead to more intensive substance use. Strategies to reduce e-cigarette use should consider reducing exposures to Internet marketing.

Keywords

e-cigarettes; awareness; trial; Mexico; adolescents; media; marketing; Internet

Worldwide, use of electronic cigarettes, commonly known as “e-cigarettes,” is rapidly increasingly [1], with sales projected to exceed sales of conventional cigarettes by 2023 according to some projections [2]. E-cigarettes are marketed to youth through the Internet [4, 5], social media channels [6], music festivals [7], and even in television ads in countries that permit it [3]. Recent studies show high levels of awareness and increasing rates of trying e-cigarettes among adolescents. However, these studies have been conducted almost exclusively in high-income countries where e-cigarette sales and, in most cases, marketing are allowed. In the middle-income country of Mexico, regulators banned e-cigarette marketing and sales [8, 9], as in most other Latin American countries. This paper aims to evaluate the prevalence and correlates of e-cigarette use among Mexican youth in the context of this regulatory environment.

Background

Prior research indicates a substantial range in adolescents’ awareness and use of e-cigarettes. For example, recent studies indicate that awareness is as high as 93% among Romanian university students (year=2013) [10] and 85% among Finish adolescents (age 12 to 18; year=2013) [5] and as low as 43% among 16 to 30 year olds in Canada (year=2012) [11], where the sales of e-cigarettes with nicotine are banned. Trial and current use of e-cigarettes appears on the rise. Among US high school students, current e-cigarette use increased substantially from 2011 to 2014 (1.5% to 13.4%) [12]. Similar trends have been reported in New Zealand, where the prevalence of trying e-cigarettes amongst 14 and 15 year old youth tripled from 7% in 2012 to 20% 2014 [14]. Recent prevalence estimates for trial of e-cigarettes are particularly high in European countries, ranging from 17% among 12- to 18-year-old Finish youth (year=2013) [5] and 19% among 14 to 17 year olds in North West England (year=2013) [15] up to 24% in Poland (aged 15 to 19; year=2010-2011) [16], 24% in Ireland (aged 16 to 17; year=2014) [17] and 25% in Romania (aged 19 to 24; year=2013) [10]. No estimates regarding youths’ awareness or trial of e-cigarettes have been published for Latin American countries or other low- and middle-income countries (except Romanian university studies).

The correlates of trying e-cigarettes are generally similar to those reported for cigarettes, and include being male, Caucasian (in the US), having a history of cigarette smoking, having parents and friends who smoke and having higher sensation seeking tendencies [10, 13, 15, 16]. Furthermore, perceiving e-cigarettes as less harmful than conventional cigarettes is associated with trial [13]. Focus groups and survey data indicate that the top reasons for e-cigarette experimentation among adolescents are curiosity, appealing flavors and peer influences [16, 18, 19].

Some data suggest that the percentage of youth who only smoke e-cigarettes and not conventional cigarettes is increasing. For example, while traditional cigarette use declined among middle and high school youth in the US between 2011 and 2014, current use of e-cigarettes increased significantly [12]. Indeed, the 2014 US National Youth Tobacco Survey indicated that current e-cigarette use has surpassed current use of cigarettes [12]. Some evidence indicates that exclusive e-cigarette use is being undertaken by adolescents whose levels for established smoking-related risk factors are intermediate between the levels among nonusers of any cigarette type and those among adolescents who use either just cigarettes or both types of cigarette [18]. Exclusive e-cigarette use amongst these “medium risk” youth is of potential public health concern because they may not have initiated nicotine use in the absence of e-cigarettes, and their use of e-cigarettes may prompt progression to conventional cigarette use.

E-cigarettes in Mexico

The Federal Commission for the Regulation of Sanitary Risks (COFEPRIS) regulates tobacco products and has banned the importation, distribution, marketing and sales of e-cigarettes in Mexico [8]. Nevertheless, in 2012, approximately 5% of adult Mexican smokers had tried e-cigarettes, comparable to other middle-income countries [20]. The Internet provides information about e-cigarettes in Mexico. For example, the main auction website in Mexico (i.e., Mercadolibre, like E-bay), recently had over 80 e-cigarette ads, and Google searches for e-cigarettes provide over 80,000 hits with more than 20 online stores in the first six pages of the search. Advertising claims include implicit and explicit health-related messages and smoking cessation topics, as in other research [21].

Mexican adolescents' Internet use may increase their exposure to e-cigarette marketing, however, Internet and e-cigarette use may both reflect tendencies to adopt new technologies. The concept of “technophilia” draws attention to the “pleasure, affection, and emotional qualities” that accompanies new technology adoption [22]. To the extent that e-cigarettes represent new technologies, their adoption may also be associated with greater technophilia and resulting use of diverse novel technologies.

For this study of early adolescents in Mexico, we hypothesize that e-cigarette awareness and trial will be relatively low compared to countries allowing e-cigarette sales and marketing. We also hypothesize that e-cigarette awareness and trial will be associated with established risk factors for conventional cigarette use, as well as with Internet use and “technophilia.” Finally, we hypothesize that adolescents who only tried e-cigarettes will have a profile of established cigarette risk factors that is intermediate between that which characterizes

adolescents who have not tried any cigarette type and adolescents who have tried conventional cigarettes.

Methods

Sampling

We analyzed cross-sectional data from first year students in public middle schools (i.e., usually 12-13 years old) selected using stratified random sampling in Mexico's three largest cities (Mexico City, Guadalajara, Monterrey). Sampling strata were based on: a) high and low socioeconomic marginalization using 2010 census data for census tracts where schools were located; and b) city-specific tertiles of retail establishment density, using Mexico's National Statistical Directory of Economic Units to identify commercial establishments likely to sell tobacco within school census tracts. Within each of these six strata, three or four schools were randomly selected with selection probability proportional to the number of students in each school, with a quota of 20 schools per city. Where a school did not agree to participate, a replacement school was selected randomly from the same stratum. Passive parental consent was used, with students providing active consent. Spanish language, self-administered questionnaires were based on prior, validated surveys and pretested to ensure comprehension. The protocol was approved by the Mexican National Institute of Public Health ethics committee, and data were collected in February and March 2015.

Measurement

E-cigarette awareness, use and perceptions—Students were provided a brief description of an e-cigarette, then asked about awareness (“Have you ever heard of e-cigarettes?”) and trial (“Have you ever tried an e-cigarette?”). Those who had tried e-cigarettes were asked: “Did the last e-cigarette you smoke have a particular flavor?” (no flavor; tobacco flavor; menthol; mix of tobacco and menthol; fruit flavor; other flavor; don't know). Perceived relative harm of e-cigarette was assessed by asking: “Do you think that electronic cigarettes are more, less or equally dangerous as normal cigarettes?”, with “don't know” as a response option. Responses were combined with awareness (i.e., unaware of e-cigarettes; aware, but don't know risk; aware, and perceive as equally or more risky; aware, and perceive as less risky), with the first two categories combined in analyses of e-cigarette trial.

Primary independent variables—Established risk factors for conventional cigarette use were assessed, including: parent smoker (either vs. none); sibling smoker (any vs. none); smoking among five closest friends (any vs. none); positive expectancies about conventional cigarettes, adapting five questions from prior research [23] (e.g., “Smoking is cool”; $\alpha=0.89$); 4-item scale of sensation-seeking [24] (i.e., “I like to do frightening things”; $\alpha=0.80$) which has been validated for Mexican youth [25]; trial of alcohol (“Have you ever had any alcoholic beverage to drink--more than just a few sips?”) [26]; and trial of drugs (marijuana, cocaine).

Conventional cigarette smoking status involved four categories: current use in the prior 30 days; experimenters tried cigarettes, but not in the prior 30 days; susceptible never smokers,

were not entirely closed to smoking, assessed with two validated questions about intention to smoke both during the next year and if a friend offered a cigarette [27]; and non-susceptible, never smokers (i.e., indicated “definitely not” to both susceptibility questions).

Having Internet access in one's bedroom (no vs. yes) indicated ease of access without parental monitoring. Internet exposure to tobacco advertising involved asking “When you are on the Internet, how often do you see advertising for cigarettes or any other tobacco product?” (responses recoded as 0=No Internet use/“never”; 1=“rarely”/“sometimes”; 2=“mostly”/“always”). As a proxy for technophilia [22], the number of media electronic devices students reported using (i.e., smartphone, tablet, computer) were summed (range 0-3).

Socio-demographic risk factors included age, sex, whether the student currently worked, and educational attainment of parents, using the highest level reported for either parent (completed primary school; completed secondary school; completed high school or technical school; completed university or more; don't know for both parents).

Analysis

All analyses were undertaken using STATA 13. For assessing the prevalence of e-cigarette outcomes (i.e., awareness, harm relative to conventional cigarettes, trial, flavor of last e-cigarette), prevalence estimates were adjusted using sampling weights. Multilevel logistic models that adjusted for clustering at the school level (xtmelogit) were estimated, regressing e-cigarettes awareness and trial on study variables. After dividing the sample into never users, e-cigarette only users, conventional cigarette only users, dual users, chi-square tests and one-way analysis of variance (F-test) were used to assess differences between exclusive e-cigarette users and each of the other three groups.

Results

Participants

The school participation rate was 92% (60/65). In participating schools, 84% of students participated, with 5% having parents who refused permission, 0.02% of students refusing, and 11% students absent the day of the survey. 10,146 students participated (Mexico City n=3502, Guadalajara n=3461 and Monterrey n=3183). Participants missing data on e-cigarette awareness (n=80) and trial (n=36) were excluded.

Table 1 shows participant characteristics. About half of the students (51%; 49% weighted) had heard about e-cigarettes, a fifth (19%; 17% weighted) believed e-cigarettes were less harmful than conventional cigarettes, and a tenth (10%; 10% weighted) had tried them. Most (71%) reported trying neither e-cigarettes nor conventional cigarettes, 4% reported exclusively trying e-cigarettes, 19% reported trying only cigarettes, and 6% reported trying both. The most prevalent flavor of the last e-cigarette tried was fruit flavor (40%), followed by unflavored (21%) and menthol flavor (13%) (See Figure 1).

Correlates of e-cigarette awareness—Statistically significant, independent correlates of higher awareness of e-cigarettes (Table 2) included being older ($AOR_{13 \text{ v } <11 \text{ or } 12} = 1.13$),

male ($AOR_{\text{female v male}}=0.85$), and having higher parental education ($AOR_{\text{high school v primary or less}}=1.47$; $AOR_{\text{university v primary or less}}=1.41$), as well as cigarette smoking among parents ($AOR=1.21$), siblings ($AOR=1.23$), and friends ($AOR=1.38$). Compared to non-susceptible never-smokers, susceptible never-smokers, experimenters, and current smokers were all more aware of e-cigarettes ($AOR=1.28, 1.48, 1.30$, respectively). Trial of alcohol ($AOR 1.32$), higher sensation seeking ($AOR 1.09$), technophilia ($AOR=1.09$), Internet access in the bedroom ($AOR 1.24$), and Internet tobacco advertising exposure ($AOR_{\text{never vs. rarely}}=1.35$; $AOR_{\text{never vs. mostly/always}}=1.55$), were independently associated with greater awareness of e-cigarettes.

Correlates of e-cigarette trial—Factors associated with greater likelihood of having tried e-cigarettes (Table 2) included being male ($AOR_{\text{female vs male}} 0.72$), having parents with lower education ($AOR_{\text{secondary vs primary}} 0.70$; $AOR_{\text{high school vs primary}} 0.67$; $AOR_{\text{university vs primary}} 0.66$), and smoking amongst siblings ($AOR 1.47$) or friends ($AOR 1.37$). Compared to non-susceptible never-smokers, e-cigarettes trial was more likely amongst susceptible never smokers ($AOR=1.52$), experimenters ($AOR=2.50$), and current cigarette smokers ($AOR=3.13$). Trial was also associated with trial of alcohol ($AOR 1.34$) or other drugs ($AOR 2.03$), higher sensation seeking ($AOR 1.14$), technophilia ($AOR 1.17$), Internet tobacco advertising exposure ($AOR_{\text{never vs. mostly/always}}=1.45$), and perceptions that e-cigarettes are less harmful than conventional cigarettes ($AOR 3.27$).

Correlates of different cigarette and e-cigarette usage groups—Established risk factors for cigarette use generally showed that dual triers had the strongest risk profile, followed by cigarette only triers, e-cigarette only triers and never triers of either cigarette type (Table 3). Exclusive e-cigarette triers and dual triers were not significantly different from each other with regard to being male, perceived safety of e-cigarettes compared to conventional cigarettes, bedroom Internet access, Internet tobacco advertising exposure, and technophilia. However, exclusive e-cigarette triers were significantly more likely to exhibit these characteristics than either exclusive conventional cigarette triers or never triers.

Discussion

Our study found that half (51%) of Mexican secondary school students were aware of e-cigarettes and 10% had tried them, which is lower than in many high-income countries, but surprisingly high given the young age of the sample. Trial amongst this early adolescent sample in 2015 was twice as high as amongst established adult smokers in Mexico during 2012 (5%) [20]. These findings are striking given that COFEPRIS, the Mexican federal agency that regulates tobacco, had banned the importation, distribution, sales and marketing of e-cigarettes. The 2008 General Tobacco Control Law is not explicit about e-cigarettes, and COFEPRIS' regulatory claims were based on the similarity of appearance between traditional tobacco products and e-cigarettes [8], which are increasingly distinct from conventional cigarettes in appearance and involve e-cigarette liquids or cartridges. Although penalties consisted in the seizure of devices and a fine [9], one Mexican vaping website [29] characterized e-cigarettes purchases from international websites as low risk, stating that customs authorities who intercept shipments would only send it back to the factory and charge minor shipment costs. These low risks and ambiguities in the law may not only

explain the longstanding existence of Mexican websites and mall stands that openly sell e-cigarettes, but also the relatively high prevalence of awareness and trial of e-cigarettes amongst Mexican youth.

Our results regarding the correlates of trying e-cigarettes are consistent with previous studies. Greater likelihood of trial was associated with being male [10, 13, 14, 15, 16], having parents [14, 15, 18] or friends [11, 13] who smoke, susceptibility to and prior use of conventional cigarettes [10, 13, 14, 15, 16, 17], higher sensation seeking [18], positive smoking expectancies [18], and alcohol [14] and drug use [14]. Our study also indicated that the importance of perceiving e-cigarettes are less harmful than conventional cigarettes (AOR=3.27), which has also been found among US middle and high school students [13, 18]. Although longitudinal research is necessary to determine whether this perception precedes or follows from e-cigarette trial, study results on the relationship between trial and both technophilia and Internet tobacco advertising exposure are suggestive of their promotional effects on risk perceptions (see below), with similar cross-sectional associations amongst young adults in the US [4]. Governments need to implement effective strategies for communicating with youth about the known and unknown relative risks of e-cigarettes.

Our finding that 4% of youth had exclusively tried e-cigarettes but not conventional cigarettes suggests that e-cigarettes may recruit medium-risk adolescents to experiment with nicotine consumption. As in prior research with slightly older US youth [18], an array of established risk factors for conventional cigarette use was stronger amongst those who had only tried e-cigarette when comparing this group to those who have tried neither type of cigarette. Furthermore, youth who had only tried e-cigarettes had a weaker risk profile than those who had only tried conventional cigarettes. Also similar to that research, youth who had tried both e-cigarettes and conventional cigarettes (6%) had the strongest risk profile. Those who had only tried e-cigarettes were younger than those who had tried conventional cigarettes, as in a Welsh study [30], suggesting that the progression to regular cigarette use may happen at later ages. Youth may gradually replace conventional cigarettes with e-cigarettes, which could explain dramatic increases in exclusive e-cigarette use while conventional cigarette use has declined in the US [12, 18]. While this pattern may turn up over time in Mexico, our data are unclear about this shift, as ever use of traditional cigarettes (25%) remains more prevalent than trial of e-cigarettes (10%). In the absence of such data, it is important to consider recent longitudinal studies of youth who exclusively used e-cigarettes, indicating that they are much more likely to progress to cigarette use than those who have not used e-cigarettes. [31, 32]

As expected, the media environment appears to be an important influence on early adolescent use of e-cigarettes. Report of greater exposure to tobacco promotions through the Internet and greater technophilia were consistently associated with awareness and trial of e-cigarettes. Furthermore, exclusive e-cigarette users had significantly higher technophilia, bedroom Internet access, and Internet tobacco advertising exposure compared to conventional cigarette triers and never triers, but not when compared to dual triers, even though dual users had significantly stronger conventional cigarette risk factors. This is concerning, as Internet marketing of e-cigarettes has grown rapidly around the world [33], reaching youth when marketing is banned through other media channels [4, 5, 6]. As

recommended for conventional tobacco products, Internet marketing of e-cigarettes that could promote use amongst non-smokers should be banned [34] with additional strategies considered for regulating other Internet content that promotes youth e-cigarette use.

The study results are consistent with Ronit's model of technophilia, where greater use of media technologies is indicative of the emotional appeal and likelihood of adopting other innovative technologies [22]. Technophile students might be attracted to e-cigarettes precisely because they see them as innovative, high-tech “gadgets.” Nevertheless, exposure to Internet content may still matter, as even reviews for e-cigarettes can be found side by side with reviews of tablets, mobile phones, and cameras, including on specialized technology sites [35]. Future research should consider comprehensive assessment of technophilia, as our thinking about this concept was refined after survey administration. Enhanced measurement would address the affective dimensions of technology use, as well as its frequency, not just the range of media modalities used. A deeper understanding these dimensions of technophilia could help explain the surprising finding that e-cigarette trial was associated with lower parental education, as adolescents from lower socioeconomic status groups can also experience lower parental monitoring of their media use [36]. Future research should explore the role of socioeconomic status, technological orientation, and e-cigarette use, particularly the use of more sophisticated e-cigarette devices that are visually distinct from conventional cigarettes. Understanding whether the diffusion of e-cigarette “innovations” is similar to the uptake and spread of other technologies will likely require a social network approach, as well as a clearer understanding of the role played by marketing exposures and e-cigarette access.

This study has a number of limitations, including the inability to determine causal relationships from cross-sectional data. Our measurement of e-cigarette use and perceptions was limited. More detailed measurement will be necessary to better understand patterns of uptake and progression, as well as the factors that account for them. This would include assessment of e-cigarette constituents, such as nicotine and flavors, since regulations could prohibit both. Flavors appear to make conventional cigarettes appealing for youth [37], and flavors may also promote trying e-cigarettes [19]. Our study is consistent with this suggestion, since most youth who tried e-cigarettes favored fruit flavors (40%), compared to unflavored (21%) or even menthol (13%). Nevertheless, other cross-sectional studies have reported no association between flavors and e-cigarettes choice amongst teens [38, 39], indicating that longitudinal research may be necessary on this topic.

Because Internet penetration in Mexico remains relatively low and concentrated in the major urban areas, adolescents from rural settings or smaller cities may be less likely to be exposed to e-cigarette marketing and displays in public areas, such as malls. However, three-quarters of Mexicans live in urban areas, and we sampled the three largest urban areas, so our results are reasonably generalizable. Nevertheless, students who attend private middle schools have relatively higher socioeconomic status and may therefore be more likely to have Internet access, a range of media platforms for accessing the Internet, and be more able to buy e-cigarettes online or other places. If this is the case, our study may have underestimated the awareness and consumption of e-cigarettes.

Despite its weaknesses, this is the first study to examine e-cigarette use amongst Latin American adolescents or youth. The results indicate that current legislation in Mexico has had limited, if any, impact on e-cigarette use among early adolescents, suggesting that stronger legislation and implementation is needed. After data collection for this study, the Mexican Supreme Court ruled that e-cigarettes sales should be allowed [40], which will likely make access even easier for Mexican youth. Efforts to strengthen the laws around e-cigarettes in Mexico and other countries should consider WHO recommendations [34], such as banning sales to minors; prohibiting e-cigarette marketing that targets or makes e-cigarettes appealing to non-smokers; prohibiting their use where smoking is banned; banning unproven health claims; and requiring warnings on health risks and the addictiveness of nicotine. Indeed, these and other measures may help keep e-cigarettes from recruiting medium-risk youth to become lifelong users, which our findings and other research suggests could be happening. That e-cigarettes trial is characterized by greater technophilia and Internet advertising exposure highlights the need for research in this area, so that effective strategies may be developed to address these risk factors. Future research should better understand trajectories of use, particularly the role played by the new media environment and e-cigarette policies in shaping these trajectories.

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Figure 1.
Self-reported flavor of the last e-cigarette smoked by Mexican middle school students,
February and March 2015.

Table 1

Characteristics of secondary school student participants in Mexico, 2015

Characteristics of study participants	n=10,146
Sex	
Male	50%
Female	50%
Age	
11 or 12	61%
13	34%
14 or more	4%
Student currently working	17%
Parental education level	
Primary school	16%
Secondary school	36%
High school or technical school	24%
University or more	16%
Unknown	9%
Sensation seeking (1-5), Mean (SD)	2.88 (1.05)
Alcohol use (ever use)	45%
Drug use (ever use)	13%
Technophilia (0-3), Mean (SD)	1.78 (1.01)
Internet access in bedroom	69%
Internet tobacco ad exposure	
Never	50%
Rarely/sometimes	42%
Mostly/always	8%
Parent smokes *	43%
Sibling smokes *	16%
Friend smokes *	35%
Positive smoking expectancies * (1-5), Mean(SD)	1.82(0.92)
Smoking status *	
Never smoker, not susceptible	57%
Never smokers, susceptible	19%
Experimenters	16%
Current smokers	8%
Awareness & perceived risks of e-cigarettes **	
Unaware of e-cigarettes	49%
Aware, but don't know risk	15%
Aware, and perceive as equally or more risky	18%
Aware, and perceive as less risky	18%

* conventional cigarettes

** compared to conventional cigarettes

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Table 2
Bivariate and adjusted correlates of awareness and trial of e-cigarettes among Mexican youth

	Aware of e-cigarettes				Tried e-cigarettes			
	%	OR	CI 95%	AOR	%	OR	CI 95%	AOR
Sex								
Male	53	ref.			12	ref.		
Female	50	0.87 ^c	(0.80-0.95)	0.85 ^c	9	0.67 ^c	(0.59-0.76)	0.72 ^c
Age								
11 or 12	50	ref.			9	ref.		
13	55	1.20 ^c	(1.10-1.32)	1.13 ^a	11	1.15 ^a	(1-1.33)	0.90
14 or more	51	1.17	(0.94-1.44)	1.11	18	2.09 ^c	(1.59-2.75)	1.20
Student currently working								
No	52	ref.			10	ref.		
Yes	47	0.94	(0.84-1.05)	0.88 ^a	13	1.37 ^c	(1.16-1.62)	1.04
Parent's education								
Primary school	45	ref.			15	ref.		
Secondary school	48	0.98	(0.86-1.11)	1.06	10	0.57 ^c	(0.47-0.68)	0.70 ^c
High or technical school	58	1.33 ^c	(1.16-1.53)	1.47 ^c	9	0.49 ^c	(0.40-0.61)	0.67 ^c
University or more	59	1.26 ^b	(1.08-1.48)	1.41 ^c	9	0.49 ^c	(0.39-0.62)	0.66 ^c
Unknown	49	0.83	(0.69-1.00)	0.96	10	0.55 ^c	(0.42-0.72)	0.84
Sensation seeking (1-5)								
		1.27 ^c	(1.22-1.33)	1.09 ^c		1.63 ^c	(1.52-1.74)	1.14 ^a
Alcohol use (ever use)								
No	46	ref.			6	ref.		
Yes	57	1.93 ^c	(1.77-2.11)	1.32 ^c	16	3.25 ^c	(2.81-3.75)	1.34 ^c
Drug use (ever use)								
No	51	ref.			8			
Yes	57	1.60 ^c	(1.41-1.82)	1.12	27	4.64 ^c	(3.98-5.41)	2.03 ^c
Technophilia (0-3)								
		1.23 ^c	(1.18-1.29)	1.09 ^c		1.27 ^c	(1.19-1.37)	1.17 ^c
Internet access in bedroom								
No	41				8			

	Aware of e-cigarettes				Tried e-cigarettes			
	%	OR	CI 95%	AOR	%	OR	CI 95%	AOR
Internet tobacco ad exposure								
Yes	55	1.54 ^c	(1.41-1.70)	1.24 ^c	11	1.40 ^c	(1.20-1.63)	1.07
Never	46	ref.			8	ref.		
Rarely/sometimes	57	1.62 ^c	(1.47-1.76)	1.35 ^c	11	1.37 ^c	(1.19-1.58)	1.01
Mostly/always	60	2.05 ^c	(1.73-2.42)	1.55 ^c	18	2.43 ^c	(1.96-3.00)	1.45 ^c
Parent smokes[*]								
No	49	ref.			8	ref.		
Yes	55	1.44 ^c	(1.32-1.57)	1.21 ^c	13	1.67 ^c	(1.47-1.91)	1.07
Sibling smokes[*]								
No	50	ref.			9	ref.		
Yes	58	1.57 ^c	(1.4-1.77)	1.23 ^b	19	2.49 ^c	(2.15-2.90)	1.47 ^c
Friend smokes[*]								
No	47	ref.			6	ref.		
Yes	60	1.89 ^c	(1.72-2.07)	1.38 ^c	18	3.17 ^c	(2.76-3.63)	1.37 ^c
Positive smoking expectancies[*]								
Never, not susceptible	46	ref.			4	ref.		
Never, susceptible	56	1.73 ^c	(1.54-1.94)	1.28 ^c	11	2.74 ^c	(2.26-3.32)	1.52 ^c
Experimenter	59	2.10 ^c	(1.86-2.37)	1.48 ^c	19	5.45 ^c	(4.54-6.54)	2.50 ^c
Current smoker	61	2.29 ^c	(1.94-2.70)	1.30 ^d	32	11.19 ^c	(9.14-13.7)	3.13 ^c
Perceived risks of e-cigarettes^{**}								
Equal or more risky					11	ref.		ref.
Less risky					29	3.29 ^c	(2.74-3.95)	3.27 ^c
Don't know risk or unaware of e-cigs					5	0.47 ^c	(0.39-0.57)	0.57 ^c

^a p<0.05^b p<0.01; p<0.001.^{*} conventional cigarettes

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** compared to conventional cigarettes

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Table 3

Student characteristics by trial of e-cigarettes, conventional cigarettes, or both

	No trial (n=7,180) 71%	E-cigarette only trial (n=452) 4%	Cigarette only trial (n=1,923) 19%	Dual trier (n=592) 6%
Sex				
Male	48% ^c	60%	52% ^c	57%
Age				
11 or 12	64% ^b	61%	53% ^a	52% ^a
13	33%	34%	39%	39%
14 or more	3%	6%	7%	9%
Student currently working	15%	17%	22% ^b	24% ^b
Parental education level				
Primary school	13% ^c	23%	22%	23%
Secondary school	36%	33%	39%	34%
High school or technical school	25%	21%	20%	21%
University or more	17%	15%	11%	13%
Unknown	9%	8%	7%	9%
Sensation seeking, (1-5), Mean (SD)	2.73 (1.04) ^c	3.21 (1.08)	3.19 (0.98)	3.45 (0.97) ^c
Alcohol use (ever use)	35% ^c	54%	72% ^c	81% ^c
Drug use (ever use)	6% ^c	20%	26% ^b	44% ^c
Technophilia, (0-3), Mean (SD)	1.76 (1.01) ^c	1.96 (1.03)	1.71 (1.01) ^c	2.04 (0.97)
Internet access in bedroom	68% ^c	75%	65% ^c	76%
Internet tobacco ad exposure				
Never	54% ^c	44%	46% ^c	40%
Rarely/sometimes	40%	41%	45%	48%
Mostly/always	6%	15%	9%	12%
Parent smokes [*]	38% ^c	48%	54% ^a	59% ^c
Sibling smokes [*]	11% ^c	20%	26% ^c	36% ^b
Friend smokes [*]	26% ^c	45% ^c	58% ^c	73% ^c
Positive smoking expectancies [*] 1-5 Mean (SD)	1.61 (0.79) ^c	2.08 (1.05)	2.27 (1.00) ^c	2.62 (0.98) ^c
Awareness & perceived risks of e-cigarettes ^{**}				
Aware, and perceive as less risky	14% ^c	47%	18% ^c	52% ^c
Aware, and perceive as equally or more risky	18%	17%	18%	21%
Unaware of e-cigarettes or don't know risk	66%	36%	64%	27%

^a p<0.05 vs. e-cigarette only^b p<0.01 vs. e-cigarette only

^c
p<0.001 vs. e-cigarette only.

*
conventional cigarettes

**
compared to conventional cigarettes

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