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Exposure to e-cigarette advertising and provaping websites, and the social acceptability of their use among nicotine users

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ABSTRACT

Objectives. To evaluate the prevalence of exposure to Internet communications on and advertising of electronic cigarettes (e-cigarettes) and their association with perceptions of the social acceptability of e-cigarettes in Mexico.

Methods. Data were analyzed from eight surveys (2018–2021) of an online sample of Mexican adult (> 18 years) smokers and dual users (of combustible and electronic cigarettes). Self-reported exposure to e-cigarette advertising across various marketing channels was assessed, as well as visits to e-cigarette websites. Logistic regression analysis was used to evaluate the association between perceptions of the social acceptability of e-cigarette use and level of advertising exposure and visits to e-cigarette websites.

Results. The Internet and outside e-cigarette stores were where exposure to advertising most occurred, as reported by 47.4% and 46.8% of respondents, respectively. Respondents who noticed e-cigarette advertisements on the Internet (adjusted odds ratio (OR) 1.43, 95% confidence intervals (CI) 1.25, 1.63), outside e-cigarette stores (adjusted OR 1.31, 95% CI 1.14, 1.50), and in temporary outlets (adjusted OR 1.16, 95% CI 1.01, 1.34), and those who visited e-cigarette websites (adjusted OR 1.48, 95% CI 1.25, 1.76) were more likely to perceive e-cigarettes as socially acceptable. Noticing advertisements across more channels was also associated with higher perceived social acceptability of e-cigarette use.

Conclusions. Being exposed to e-cigarette marketing, either online or through traditional marketing channels, is associated with perceived social acceptability of e-cigarette use, as is contact with provaping sites. Regulatory options to avoid the proliferation of promotional websites disguised as opinion or user sites need to be considered.

Keywords Electronic nicotine delivery systems; advertising; marketing; vaping; Mexico.

In most countries, electronic cigarettes (e-cigarettes) still comprise a relatively small segment of the nicotine market, yet e-cigarette use (referred to as vaping) has grown steadily around the world, especially among young people (1). Favorable public perceptions of these new nicotine products have been essential in expanding the e-cigarette market. While the scientific community continues to debate the potential public health impact of the availability of these devices, consumer decisions about their use often depend on information they obtain through social media (2). The impact of online information and other

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marketing efforts on the perceived social acceptability of these products has not been explored in low- and middle-income countries.

Perceived social acceptability, defined as how much someone thinks that a behavior or product is accepted by others – especially family, friends, and peers – can influence consumers' intentions to use these products. Previous studies have shown that perceived social acceptability is especially important among teenagers and young adults who place a great value on peer acceptance (3, 4). Traditionally, media advertising and promotions reinforce the perceived social acceptability and normalization of innovative products (5). However, since marketing of tobacco and nicotine products through traditional media has become increasingly restricted or even banned, most marketing is done through the Internet or in physical locations such as stores, bars, or events (6).

As in many low- and middle-income countries, e-cigarettes are banned in Mexico but the illegal market provides relatively easy access to these products through online and physical stores as well as vending machines (7). Difficulties in enforcing regulations on these products have enabled these physical locations, online advertising, and social media influencers to promote these products as risk-free or almost risk-free, accessible, and desirable (8). In addition, provaping websites and profiles (primarily advocates of vaping but also vending sites that have information sections or blogs) often contain favorable information about these products, presented as purely informational or benefiting public health (9).

This study aimed to evaluate Mexican nicotine users' (smokers and dual users (those who smoke and use other nicotine products, especially e-cigarettes)) self-reported exposure to e-cigarette advertising in physical outlets or through the Internet, including provaping websites, as well as their associations with perceived social acceptability of e-cigarette use. Because e-cigarettes are banned in Mexico, we hypothesized that online exposure would be higher than in physical outlets. Furthermore, we hypothesized that higher exposure to advertising, as well as visiting provaping websites, would be positively associated with perceptions of e-cigarettes as socially acceptable. Our results should inform future approaches to assessing the influence of different advertising or information outlets and their impact on public perceptions, as well as regulatory efforts to target these exposures.

METHODS

Study sample and data collection

This was a cross-sectional study of an open cohort of Mexican adult smokers and/or e-cigarette users, recruited from a marketing research consumer panel, who completed online surveys on exposure to communications on and advertising of electronic cigarettes. The surveys were self-administered and eight consecutive surveys were conducted every 4 months with about 1 500 participants (November 2018, n = 1 501; March 2019, n = 1 035; July 2019, n = 799; November 2019, n = 703; March 2020, n = 631; July 2020, n = 667; November 2020, n = 684; and March 2021, n = 814). According to this design new participants were able to take part in each survey, while a proportion of them who were interested in the study were followed through all the waves of the study. We only used data from participants responding to the survey for the first time and excluded 857 participants who did not respond to the marketing part of the questionnaire; thus our final analytic sample comprised 5 977 participants. Participants had to be older than 18 years and have smoked or used e-cigarettes in the previous month. We used quotas for education (i.e., at least 500 respondents with high school or lower education) and current e-cigarette use in the previous month (at least 500 respondents), thus oversampling respondents who use e-cigarettes. Surveys were administered in Spanish using questions from the International Tobacco Control survey (10) and took about 21.49 (median) minutes to complete. Respondents provided consent before completing the survey and data from each respondent were anonymized – the survey company provided a database with only consecutive identification numbers to identify participants along the surveys. The survey company also provided a standard incentive for participation to all respondents. All study procedures were approved by the Institutional Review Board and Ethics Committee of the National Institute of Public Health of Mexico (CI 1572).

Smoking and e-cigarette use

Participants were asked to report how often they smoked cigarettes ("How often do you currently smoke cigarettes?"). All participants were current smokers (i.e., they had smoked in the previous 30 days). Data on the number of cigarettes smoked per day (CPD) were used to classify participants' smoking frequency as: (a) non-daily smoker (reference category); (b) daily smoker, ≤ 5 CPD; and (c) daily smoker, > 5 CPD. Among daily smokers, 5 CPD is the median among Mexican smokers (11). Information on the frequency of e-cigarette use ("In a typical week, how many days do you vape?") was combined with frequency of combustible cigarette smoking for information on the consumption of both products. Respondents who reported that they had used both combustible cigarettes and e-cigarettes in the previous 30 days were classified as dual users. A variable called e-cigarette use frequency was created with the following categories: a) only current and exclusive smoker (reference category); b) occasional dual user (1–2 days a week of e-cigarette use); and c) frequent dual user (3 days a week to every day of e-cigarette use).

Dependent variable

The perception of smokers and e-cigarette users of the social acceptability of e-cigarettes was assessed through the following question: "What do you think is the general public's attitude towards e-cigarette use?" Responses were dichotomized to reflect positive perceptions: high disapproval, some disapproval, neither approval nor disapproval, don't know (reference category), and some approval or high approval.

Exposure to e-cigarette marketing

Exposure to e-cigarette marketing and advertisements was measured by asking participants about the traditional channels through which they had noticed any e-cigarette advertisements in the previous 30 days: mail; pubs and bars; advertisements inside e-cigarette stores; advertisements outside e-cigarette stores; festivals, sports events, or concerts; and temporary outlets. Because of concerns about collinearity, responses to this

series of questions were used to derive a summary index with four levels: no exposure (reference), one or two channels, three or four channels, and five or more channels.

Participants also reported whether they had noticed marketing through online advertisements in the previous 20 days, namely: e-mail and social media (Facebook, Twitter, YouTube, Instagram, or Snapchat). These two variables were used to derive a dichotomous measure of exposure to online advertisement: no (reference category) or yes.

The third measurement about e-cigarettes marketing included two questions on searching for and visiting websites with e-cigarette information online in the previous 30 days. Respondents were classified into three groups: No, I have not searched or visited websites or don't remember (reference category); Yes, I have searched for information; and Yes, I have visited websites. These last two categories are not mutually exclusive.

Demographic variables

Participants provided information on the following demographic variables: their sex (female (reference category), male); age (18–29 years (reference category); 30–39 years; 40–49 years; 50+ years); and education (middle school or lower (reference category); high school, technical studies or some college; and university or higher). In addition, household income estimated in Mexican pesos (MXN) was categorized as: < 8 000 MXN a month (reference category); 8 001–15 000 MXN a month; 15 001–20 000 MXN a month; > 20 000 MXN a month; and I don't know.

Information about the period when the data of each participant were collected (designated as a wave of the study, with one to eight waves) was recorded.

Statistical analysis

Univariate analysis was used to determine characteristics of the study population including description of the channels through which participants reported seeing advertisements about e-cigarettes. The prevalence of exposure to advertising through each channel was estimated according to frequency of smoking and e-cigarette use (i.e., exclusive smoker; occasional dual user/1–2 days a week of e-cigarette use; and frequent dual user/3 days a week to every day of e-cigarette use).

Crude and adjusted logistic regression analysis was used to evaluate the association between perceived social acceptability and exposure to online and traditional e-cigarette advertisements through each channel. Adjusted models controlled for exposure through all other channels and for smoking, e-cigarette use behavior, and sociodemographic covariates. These models were then re-estimated using the summary index with four levels of exposure, controlling for the same covariates. The associations (odds ratios (OR)) were considered statistically significant at a p-value < 0.05, with a two-tailed 95% confidence intervals (CI). Stata version 15 (StataCorp, College Station, TX, USA) was used for all the analyses.

RESULTS

The sample comprised 5 977 Mexican smokers and e-cigarette users: 51.9% were male and 36.5% were aged 18–29 years (Table 1). More than half (59.1%) of the participants had a high school/technical school/some college education and 31.5% had a university degree or higher. Just over half of the respondents (56.1%) were non-daily smokers, while 23.2% were daily smokers who smoked more than 5 CPD. A third of the participants (34.0%) were dual users; 13.2% were frequent dual users, using e-cigarettes 3 days a week to every day. With regard to the use of e-cigarettes by family and friends, 37.3% of participants' family members and/or partners used e-cigarettes as did 23.8% of their friends.

Self-reported exposure to advertisements for e-cigarettes and e-liquids (see Table 1) was highest for the Internet (reported by 47.4% of respondents) and outside stores that sell e-cigarette devices and e-liquids (46.8% of respondents). Exposure was less common through email (14.0% of respondents) and the postal service (13.6% of respondents).

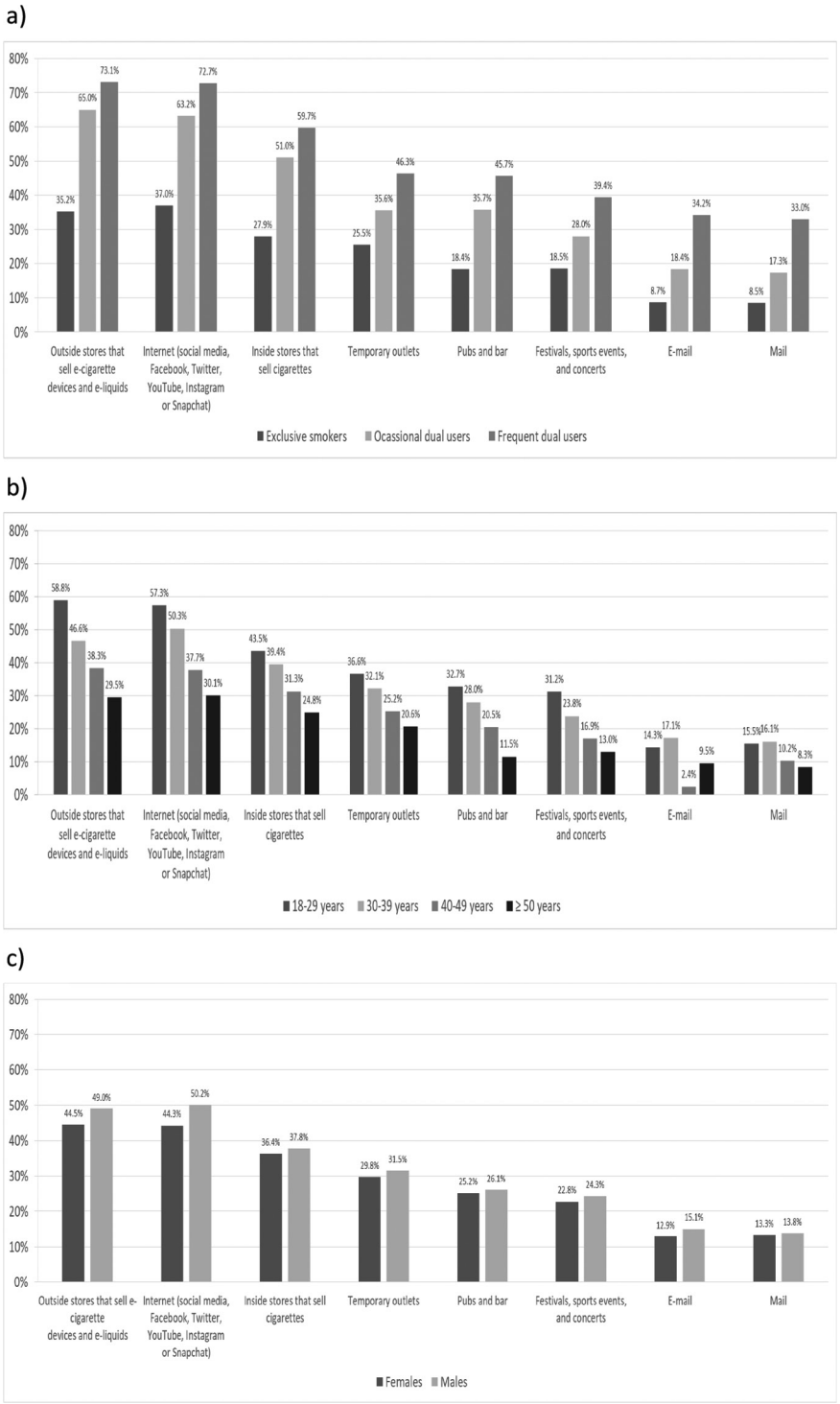
The prevalence of exposure to e-cigarette advertising varied by frequency of e-cigarette use, with a higher prevalence

TABLE 1. Characteristics of smokers and e-cigarette users, Mexico, 2018–2021

Characteristic	% (n = 5 977)
Sex	
Female	48.1
Male	51.9
Age group, in years	
18–29	36.5
30–39	30.2
40–49	16.7
≥ 50	16.6
Education	
University or higher	31.5
Middle school or lower	9.4
High school/technical school/some college	59.1
Frequency and intensity of smoking	
Non-daily	56.1
Daily ≤ 5 cigarettes	20.7
Daily > 5 cigarettes	23.2
Frequency and intensity of smoking/e-cigarette use	
Smoker only	66.1
Occasional dual user/e-cigarette use 1–2 days a week	20.8
Frequent dual user/e-cigarette use 3 days a week to every day	13.2
Use of e-cigarettes by partner/family	
No	62.7
Yes	37.3
Use of e-cigarettes by friends	
No	76.2
Yes	23.8
Noticed e-cigarette and e-liquid print advertising in the following place in the previous 30 days	
Mail	13.6
Internet (social media, Facebook, Twitter, YouTube, Instagram, Snapchat)	47.4
E-mail	14.0
Pubs and bars	25.7
Inside stores that sell cigarettes	37.1
Outside stores that sell e-cigarette devices and e-liquids	46.8
Festivals, sports events, and concerts	23.5
Temporary outlets	30.7

Source: table prepared by authors based on results.

FIGURE 1. Prevalence of exposure to e-cigarette and e-liquid advertising from different sources (*n* = 5 977) by a) type of smoking, b) age group, and c) sex, Mexico, 2018–2021



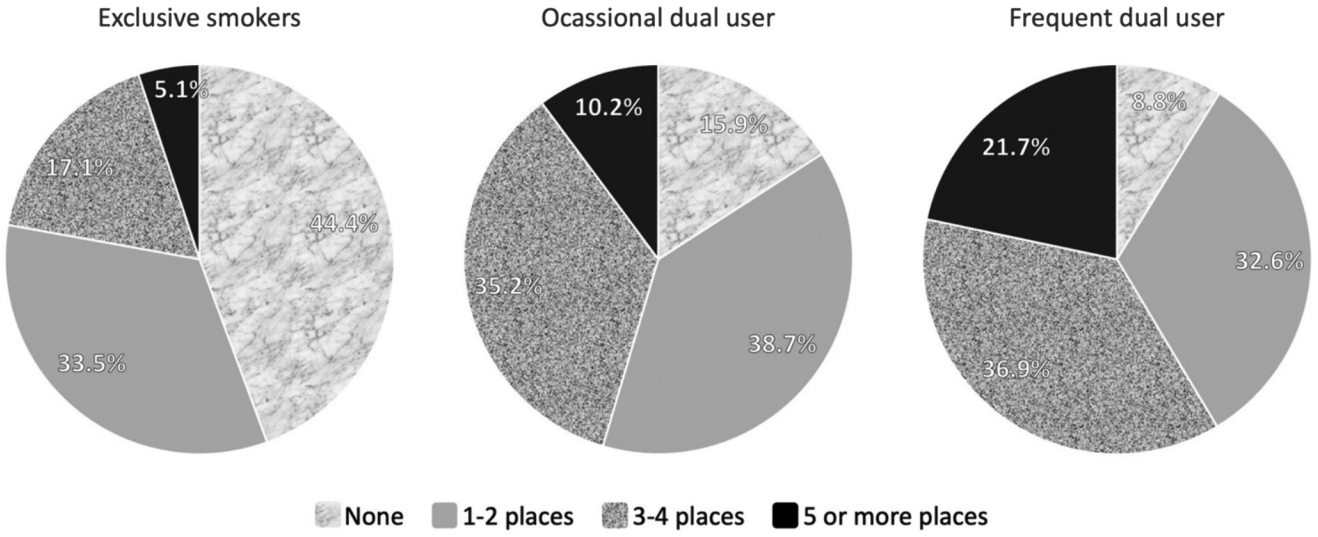
Source: figure prepared by authors based on results.

among frequent dual users for exposure to advertisements on the Internet (72.7%) and outside the stores that sell e-cigarettes and e-liquids (73.1%) (Figure 1, panel a). Except for mail and e-mail, participants aged 18–29 years reported a higher prevalence of exposure (Figure 1, panel b). Across all advertising channels, exposure to advertisements was higher among males than females (Figure 1, panel c). When assessing the number of channels through which participants reported exposure to advertising by frequency of e-cigarette use, 44.4% of exclusive smokers reported that they had not noticed any advertisements,

while only 8.8% of frequent dual users had not noticed any advertisements (Figure 2). In addition, 21.7% of frequent dual users, 10.2% of occasional dual user, and 5.1 % of exclusive smokers had noticed advertisements for these products in five or more places in the previous 30 days.

Table 2 shows the results of the regression analysis of the association between perception of the social acceptability of e-cigarette use and exposure to advertisements through different channels. Overall, 32.4% of respondents perceived that the public approved of e-cigarette use.

FIGURE 2. Proportion of exclusive smokers, occasional dual users, and frequent dual users who noticed e-cigarette advertising, by number of places advertising was noticed (*n* = 5 977), Mexico, 2018–2021



Source: figure prepared by authors based on results.

TABLE 2. Perception of smokers and e-cigarette users about the public's attitude towards e-cigarettes according to exposure to advertising about e-cigarettes in different media, Mexico, 2018–2021

In the previous 30 days, have you noticed print advertising of e-cigarettes and e-liquids in the following places?	Some or high disapproval/neither approval nor disapproval/don't know (n = 4 041, 67.6%)		Some or high approval (n = 1936, 32.4%)		
	n	%	%	OR (95% CI)	Adjusted OR[a] (95% CI)
Mail					
Yes (*n* = 811)	449	55.4	44.6	1.83 (1.58, 2.13)**	1.01 (0.83, 1.21)
Internet (social media, Facebook, Twitter, YouTube, Instagram or Snapchat)					
Yes (*n* = 2 831)	1 673	59.1	40.9	2.10 (1.88, 2.35)**	1.43 (1.25, 1.63)**
E-mail					
Yes (*n* = 838)	467	55.7	44.3	1.81 (1.56, 2.10)**	1.03 (0.85, 1.24)
Pubs and bars					
Yes (*n* = 1 536)	885	57.6	42.4	1.80 (1.60, 2.03)**	1.13 (0.98, 1.31)
Inside stores that sell cigarettes					
Yes (*n* = 2 219)	1 329	59.9	40.1	1.73 (1.55, 1.93)**	1.05 (0.92, 1.21)
Outside stores that sell e-cigarette devices and e-liquids					
Yes (*n* = 2 798)	1 654	59.1	40.9	2.08 (1.86,2.32)**	1.31 (1.14, 1.50)**
Festival, sports events, and concerts					
Yes (*n* = 1 407)	816	58.0	42.0	1.73 (1.53, 1.96)**	1.10 (0.95, 1.28)
Temporary outlets					
Yes (*n* = 1 834)	1 080	58.9	41.1	1.74 (1.55, 1.96)**	1.16 (1.01, 1.34)*

OR, odds ratio; CI, confidence interval.
[a]Adjusted for all variables in the table and sex, age, education, smoking and vaping frequency, use of e-cigarettes by partner, family and friends, and wave.
*$p < 0.05$, **$p < 0.001$.
Source: table prepared by authors based on results.

Perception of the social acceptability of e-cigarettes was significantly higher among participants who noticed advertisements about e-cigarettes and e-liquids on the Internet (adjusted OR $_{\text{yes vs no}}$ 1.43, 95% CI 1.25, 1.63), outside stores that sell e-cigarettes and e-liquids (adjusted OR $_{\text{yes vs no}}$ 1.31, 95% CI 1.14, 1.50), and in temporary outlets (adjusted OR $_{\text{yes vs no}}$ 1.16, 95% CI 1.01, 1.34), after adjustment for covariates, including all other channels of exposure to e-cigarette advertisements (Table 2).

In a separate model that included the number of channels through which participants were exposed to e-cigarette advertisements (Table 3), participants who noticed advertisements in more places were more likely to perceive e-cigarettes

TABLE 3. Perception of smokers and e-cigarette users about the public's attitude towards e-cigarette use according to sociodemographic characteristics, smoking frequency, and marketing exposure, Mexico, 2018–2021

Variable	Some or high disapproval/neither approval nor disapproval/don't know (*n* = 4 041, 67.6%)	Some or high approval (*n* = 1936, 32.4%)	OR (95% CI)	Adjusted OR (95% CI)
	%	%		
Sex				
Female (*n* = 2 785)	69.0	31.0*	Reference	Reference
Male (*n* = 3 005)	66.4	33.6	1.09 (0.94, 1.26)	1.07 (0.95. 0.82)
Age group, in years				
18–29 (*n* = 2 073)	63.5	36.5**	Reference	Reference
30–39 (*n* = 1 771)	65.3	34.7	0.92 (0.77, 1.10)	0.95 (0.82, 1.10)
40–49 (*n* = 973)	71.5	28.5	0.60 (0.49, 0.75)**	0.83 (0.66, 1.00)*
≥ 50 (*n* = 973)	77.0	23.0	0.48 (0.39, 0.60)**	0.74 (0.61, 0.90)*
Education				
University of higher (*n* = 1 829)	63.0	37.0**	Reference	Reference
Middle school or less (*n* = 550)	71.6	28.4	0.98 (0.74, 1.30)	1.07 (0.85, 1.34)
High school/technical school/some college (*n* = 3 411)	69.5	30.5	0.89 (0.77, 1.04)	0.96 (0.84, 1.10)
Frequency and intensity of smoking				
Non-daily (*n* = 3247)	69.1	30.9*	Reference	Reference
Daily ≤ 5 cigarettes (*n* = 1 200)	66.0	34.0	1.39 (1.15, 1.68)*	1.20 (1.03, 1.40)*
Daily > 5 cigarettes (*n* = 1 343)	65.8	34.3	1.27 (1.06, 1.52)*	1.20 (1.03, 1.39)*
Frequency and intensity smoking/e-cigarette use				
Smoker only (*n* = 3318)	74.6	25.4**	Reference	Reference
Occasional dual user/e-cigarette use 1–2 days a week (*n* = 1 552)	62.4	37.6	1.87 (1.63, 2.15)**	1.14 (0.97, 1.34)
Frequent dual user/e-cigarette use 3 days a week to every day (*n* = 842)	50.5	49.5	2.96 (2.52, 3.47)**	1.47 (1.20, 1.79)**
Use of e-cigarettes by partner/family				
No (*n* = 4 417)	71.6	28.4**	Reference	Reference
Yes (*n* = 1 373)	54.8	45.2	1.22 (1.05, 1.43)*	1.24 (1.07, 1.44)*
Use of e-cigarettes by friends				
No (*n* = 3 641)	73.7	26.3**	Reference	Reference
Yes (*n* = 2 149)	57.5	42.5	1.59 (1.35, 1.88)**	1.14 (0.99, 1.31)
In the previous 30 days, in how many places have you noticed e-cigarette and e-liquid print advertising (e.g., stores, events, concerts and temporary outlets)?				
None (*n* = 1 939)	79.8	20.2**	Reference	Reference
1–2 (*n* = 1 998)	65.7	34.3	1.50 (1.25, 1.81)**	1.46 (1.24, 1.72)**
3–4 (*n* = 1 366)	58.8	41.2	1.88 (1.54, 2.29)**	1.58 (1.31, 1.91)**
≥ 5 (*n* = 487)	52.2	47.8	2.05 (1.58, 2.66)**	1.72 (1.33, 2.21)**
In the previous 30 days, have you noticed e-cigarette and e-liquid online advertising through e-mail or social media (e.g., Facebook, Twitter)?				
No (*n* = 2 896)	76.1	23.9**	Reference	Reference
Yes (*n* = 2 894)	59.2	40.8	1.75 (1.51, 2.02)**	1.28 (1.11, 1.48)*
In the previous 30 days, have you searched for information on and visited websites about e-cigarettes?				
No, I have not searched or visited/don't know (*n* = 2613)	77.9	22.1**	Reference	Reference
Yes, I have searched for information (*n* = 1455)	64.3	35.7	1.63 (1.36, 1.95)**	1.50 (1.28, 1.75)**
Yes, I have visited websites (*n* = 1 722)	54.9	45.1	2.41 (2.03, 2.86)**	1.48 (1.25, 1.76)**

OR, odds ratio; CI, confidence interval.
Note: Adjusted for wave and all variables in the table. *$p < 0.05$, **$p < 0.001$.
Source: table prepared by authors based on results.

use as socially acceptable. The magnitude of the association increased as the respondents noticed more traditional advertising (adjusted $OR_{\text{1–2 places vs none}}$ 1.46, 95% CI 1.24, 1.72; adjusted $OR_{\text{3–4 places vs none}}$ 1.58, 95% CI 1.31, 1.91; and adjusted $OR_{\text{≥ 5 places vs none}}$ 1.72, 95% CI 1.33, 2.21). This positive association was also observed among participants who reported having noticed online marketing about e-cigarettes and e-liquids (adjusted $OR_{\text{yes vs no}}$ 1.28, 95% CI 1.11, 1.48). In addition, respondents who searched online for information about e-cigarettes (adjusted $OR_{\text{yes, I have searched vs no, I have not searched or visited}}$ 1.50, 95% CI 1.28, 1.75) and visited websites about e-cigarette use (adjusted $OR_{\text{yes, I have visited websites vs no, I have not searched or visited}}$ 1.48, 95% CI 1.25, 1.76) were more likely to perceive public approval of e-cigarette use.

Respondents who smoked daily, whether fewer (adjusted $OR_{\text{daily ≤ 5 CPD vs non-daily}}$ 1.20, 95% CI 1.03, 1.40) or more than 5 CPD (adjusted $OR_{\text{daily > 5 CPD vs non-daily}}$ 1.20, 95% CI 1.03, 1.39), were more likely to perceive public approval of e-cigarette use compared to non-daily smokers. In addition, perceived social acceptability of e-cigarette use was higher among dual users who used e-cigarettes most often compared to exclusive smokers (adjusted $OR_{\text{frequent dual user vs exclusive smoker}}$ 1.47, 95% CI 1.20, 1.79) and among respondents who had a family member or partner who used e-cigarettes (adjusted $OR_{\text{family/partner e-cigarette use vs non-use of e-cigarettes}}$ 1.24, 95% CI 1.07, 1.44). Only age group was independently associated with perceived social acceptability of e-cigarette use, with older respondents less likely to perceive their use as socially acceptable (adjusted $OR_{\text{30–39 years vs 18–29 years}}$ 0.83, 95% CI 0.66, 1.00) and (adjusted $OR_{\text{40–49 years vs 18–29 years}}$ 0.74, 95% CI 0.61, 0.90).

DISCUSSION

This study of smokers and dual users of combustible cigarettes and e-cigarettes in Mexico, a low- and middle-income country where e-cigarettes are banned, found that self-reported exposure to e-cigarette advertising was highest for online channels (social media such as Facebook, Twitter, YouTube, or Instagram) and outside e-cigarette stores, followed by tobacco stores and temporary outlets. Three of these outlets (online channels, outside e-cigarette stores, and temporary outlets) were also the only channels of exposure to advertising that were significantly associated with a higher likelihood of perceiving e-cigarettes as socially acceptable. Compared with dual users, a higher percentage of exclusive smokers did not notice any e-cigarette advertising (44.4%). Among dual users who occasionally used e-cigarettes, the number of channels through which they were exposed to advertisements was one or two (38.7%) and among frequent dual users, 36.9% noticed advertisements in three or four channels. When exposure to traditional advertisements was treated as a summary index, a significant dose–response association was found with a greater likelihood of perceiving e-cigarettes as socially acceptable, the greater the exposure.

How a technology is perceived within a social context, i.e., its social acceptability, has an important role in its acceptance and use (12). Those who perceive a positive attitude to a behavior are more likely to engage in and maintain the behavior, including consumption of a product. Exposure to e-cigarette advertisements plays a major role in the awareness, popularity, and perception of these products (13). Our results show that the greater the number of physical channels where e-cigarette advertisements were noticed, the more positive the perception of the acceptability of their use. This finding is consistent with a study in a cohort of university students (20–24 years) in the United Kingdom of Great Britain and Northern Ireland which found that exposure to e-cigarette advertisements increased the social acceptability of both e-cigarette use and smoking (14). Previous research has shown that e-cigarette advertisements as lifestyle marketing tend to be more effective when the advertisements feature characters who are similar to a person's peers (15), and such advertising could increase how socially acceptable or desirable these devices are, thus increasing their use or even functioning as a gateway to smoking initiation (16, 17).

E-cigarettes and their use have been widely promoted on the Internet, and e-cigarette users employ social media as an important information-sharing platform (18). We found that having noticed e-cigarette advertising on social media or receiving this type of advertising via email was positively associated with perceived social acceptability of e-cigarette use. These results concur with those of an Australian study, which found that people who searched for information on social media or who were exposed to e-cigarette advertising were more likely to report past or current e-cigarette use (19). Similar results have been found in the depiction of other psychoactive substances in social media, especially where celebrities' activities endorse the consumption of these substances (20).

Our results also show that searching for information online about e-cigarettes and visiting provaping websites are positively associated with perceived social acceptability of e-cigarette use. Similar associations were found in a study of young adults, which showed that the existence of provaping information in the public communication environment combined with information-seeking shapes the opinion of the seeker, creates curiosity, and leads to use (2). A meta-analysis in 2019 showed that online e-cigarette marketing affects the perception and trial of these devices; however, few studies have examined the effects of exposure to misleading or inaccurate information (21). We found that visiting provaping websites was the second strongest correlate of perceiving e-cigarette use as socially acceptable. This finding may be related to the composition of our sample; nicotine users as tobacco users appear more prone to exposure to e-cigarette information (13). Another possible reason for the association between visiting provaping sites and perceiving e-cigarette use as socially acceptable is the engagement generated by the provaping information and spokespersons, both for parasocial (feeling an actual interaction with media characters such as influencers, close enough to consider them as peers or close friends) and cultural or entertainment reasons (22). Finally, it is possible that these searches were based on positive expectancy about e-cigarette use that would be reinforced by the information found at provaping sites (23).

This study has several limitations. As a cross-sectional study, it is not possible to determine the direction of the associations we assessed. In particular, we were not able to determine if e-cigarette users were exposed to more advertising because they are more likely to seek out and listen to such advertising, or whether they started using e-cigarettes because of the advertising. However, our correlation study serves as a starting point for future studies on the impact of advertising on nicotine consumption behavior over time. Furthermore, our convenience sample comes from a non-probabilistic sample recruited from

an online marketing research panel that over-represents people from higher social economic strata; our sample also included quotas to oversample e-cigarette users. This sampling strategy was necessary to study e-cigarette users as they represent a relatively small population segment (1.2% of the general population, and 4.5% of smokers) (24). Therefore, our results probably cannot be generalized to the broader Mexican population. However, our approach gave us the statistical power required to study in greater detail the perception of e-cigarette users, a group that is difficult to study given its low prevalence, and who may be most influenced by advertising.

Conclusion

Being exposed to e-cigarette marketing, through online or regular channels, may positively affect and reinforce perceptions of the social acceptability of these products. However, searching for information on e-cigarettes and visiting provaping sites have a stronger association. More research is therefore needed on the impact of the information available to those seeking to learn about e-cigarettes and these activities in starting or increasing the use of these devices. Given that the social acceptability of these products may be related to less support for restrictions on their sale and consumption, especially in measures such as smoke-free spaces, the possible impact of this advertising on public health should be studied.

Similarly, it is necessary to consider regulatory options to avoid the proliferation of promotional websites disguised as opinion or user sites, as well as the use of influencers and celebrities in the promotion of e-cigarettes.

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Exposición a la publicidad de cigarrillos electrónicos y sitios web que promueven el vapeo y la aceptabilidad social de su uso entre los consumidores de nicotina

RESUMEN

Objetivos. Evaluar la prevalencia de la exposición a las comunicaciones por Internet y la publicidad de los cigarros electrónicos (*e-cigarettes*), así como su asociación con las percepciones sobre la aceptabilidad social de los cigarrillos electrónicos en México.

Métodos. Se analizaron los datos de ocho encuestas (2018-2021) de una muestra en línea de adultos mexicanos (mayores de 18 años) fumadores y consumidores dobles (cigarrillos combustibles y cigarrillos electrónicos). Se evaluaron la exposición —referida por los propios encuestados— a la publicidad de cigarrillos electrónicos en varios canales de comercialización y las visitas a sitios web de cigarrillos electrónicos. Se realizó un análisis de regresión logística para evaluar la relación entre la percepción de aceptabilidad social del consumo de cigarrillos electrónicos, por una parte, y el nivel de exposición publicitaria y las visitas a sitios web de cigarrillos electrónicos, por la otra.

Resultados. La mayor exposición a la publicidad se dio en las tiendas virtuales y físicas donde se venden cigarrillos electrónicos, según lo notificado por 47,4% y 46,8% de los encuestados, respectivamente. Los encuestados que observaron anuncios de cigarrillos electrónicos en Internet (razón de probabilidades ajustada [*OR* ajustada] 1,43; intervalos de confianza [IC] del 95 %: 1,25; 1,63), en tiendas físicas de cigarrillos electrónicos (*OR* ajustada 1,31; IC del 95 %: 1,14; 1,50) y en puntos de venta temporales (*OR* ajustada 1,16; IC del 95 %: 1,01; 1,34), y los que visitaron sitios web de cigarrillos electrónicos (*OR* ajustada 1,48; IC del 95 %: 1,25; 1,76) fueron más propensos a percibir los cigarrillos electrónicos como socialmente aceptables. Asimismo, se asoció el hecho de observar anuncios en más canales con la percepción de una mayor aceptabilidad social del consumo de cigarrillos electrónicos.

Conclusiones. La exposición a la publicidad de los cigarrillos electrónicos, ya sea en línea o por los canales tradicionales, así como el contacto con sitios web que promueven el vapeo, se relaciona con la percepción acerca de la aceptabilidad social del consumo de cigarrillos electrónicos. Deberían considerarse alternativas regulatorias para evitar la proliferación de sitios web promocionales disfrazados de sitios de opinión o de usuarios.

Palabras clave Sistemas electrónicos de liberación de nicotina; publicidad; mercadotecnía; vapeo; México.

Exposição a propaganda de cigarros eletrônicos e sites pró-*vaping* e aceitação social de seu uso entre usuários de nicotina

RESUMO

Objetivos. Avaliar a prevalência da exposição a comunicações e propagandas sobre cigarros eletrônicos na internet e sua associação com percepções de aceitação social dos cigarros eletrônicos no México.

Métodos. Foram analisados dados de oito pesquisas (2018 a 2021) de uma amostra on-line de adultos mexicanos (maiores de 18 anos) fumantes e usuários duais (de cigarros combustíveis e eletrônicos). Avaliou-se a exposição autorrelatada à propaganda de cigarros eletrônicos em diversos canais de marketing, além de visitas a sites de cigarros eletrônicos. Foi utilizada uma análise de regressão logística para avaliar a associação entre percepções de aceitação social do uso de cigarros eletrônicos e o nível de exposição a propagandas e visitas a sites de cigarros eletrônicos.

Resultados. A maior exposição a propaganda ocorreu na internet e no exterior de tabacarias que vendem cigarros eletrônicos, conforme relatado por 47,4% e 46,8% dos respondentes, respectivamente. Os respondentes que haviam notado propagandas de cigarros eletrônicos na internet (razão de chances [RC] ajustada: 1,43; intervalo de confiança [IC] de 95%: 1,25-1,63), no exterior de tabacarias que vendem cigarros eletrônicos (RC ajustada: 1,31; IC de 95%: 1,14-1,50) e em pontos temporários de venda (RC ajustada: 1,16; IC de 95%: 1,01-1,34), e os respondentes que visitavam sites de cigarros eletrônicos (RC ajustada: 1,48; IC de 95%: 1,25-1,76) eram mais propensos a achar que os cigarros eletrônicos eram socialmente aceitáveis. A observação de propaganda em um maior número de canais também estava associada à percepção de maior aceitação social do uso de cigarros eletrônicos.

Conclusões. A exposição ao marketing de cigarros eletrônicos, seja on-line ou por meio de canais tradicionais de marketing, está associada à percepção de aceitação social do uso de cigarros eletrônicos, assim como o contato com sites pró-*vaping*. Devem-se cogitar opções regulatórias para evitar a proliferação de sites promocionais disfarçados de sites de opinião ou de usuários.

Palavras-chave Sistemas eletrônicos de liberação de nicotina; publicidade; marketing; vaping; México.