Research paper

Consumer preferences for electronic cigarettes: results from a discrete choice experiment

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ABSTRACT

Introduction E-cigarettes present a formidable challenge to regulators given their variety and the rapidly evolving nicotine market. The current study sought to examine the influence of e-cigarette product characteristics on consumer perceptions and trial intentions among Canadians.

Methods An online discrete choice experiment was conducted with 915 Canadians aged 16 years and older in November 2013. An online commercial panel was used to sample 3 distinct subpopulations: (1) non-smoking youth and young adults (n=279); (2) smoking youth and young adults (n=264) and (3) smoking adults (n=372). Participants completed a series of stated-preference tasks, in which they viewed choice sets with e-cigarette product images that featured different combinations of attributes: flavour, nicotine content, health warnings and price. For each choice set, participants were asked to select one of the products or indicate 'none of the above' with respect to the following outcomes: interest in trying, less harm and usefulness in quitting smoking. The attributes' impact on consumer choice for each outcome was analysed using multinomial logit regression.

Results Health warning was the most important attribute influencing participants' intentions to try e-cigarettes (42%) and perceived efficacy as a quit aid (39%). Both flavour (36%) and health warnings (35%) significantly predicted perceptions of product harm.

Conclusions The findings indicate that consumers make trade-offs with respect to e-cigarette product characteristics, and that these trade-offs vary across different subpopulations. Given that health warnings and flavour were weighted most important by consumers in this study, these may represent good targets for e-cigarette regulatory frameworks.

INTRODUCTION

Although research to date indicates that electronic cigarettes (e-cigarettes) contain much lower levels of harmful toxins as compared to cigarettes and tobacco smoke,[1] their long-term health effects remain unknown.[1] However, the lack of information on e-cigarette safety seems to have had little effect on the soaring popularity of these products worldwide.[2] E-cigarettes blur the distinctions between traditional nicotine products, such as tobacco cigarettes, and medicinal nicotine replacement therapy and, as a result, present a formidable challenge to regulators.[3] Regulatory agencies must balance competing public health priorities: whereas some public health experts have advocated greater access to non-combustible nicotine products among smokers,[4] others have called for a more stringent evidence-based approach to minimise uptake among youth and non-smokers.[5] E-cigarettes have also prompted the development of new regulatory frameworks in several jurisdictions, such as in the European Union[6] and the USA.[7]

Common regulatory principles regarding e-cigarettes include minimising product appeal and uptake among youth, increasing product safety and minimising false health beliefs.[8] [9] However, there is currently little evidence available to guide regulators with respect to how product characteristics influence these domains. For example, flavour variability is an important characteristic of the e-cigarette market, and e-cigarette companies appear to be expanding their availability of flavours to meet consumer demand.[10] Although consumer research indicates a potential association between flavour availability and consumer appeal,[11] the extent to which non-smokers and smokers respond to e-cigarette flavours has yet to be empirically examined. Given the intended purpose of e-cigarettes as nicotine delivery devices, nicotine level is a product characteristic that warrants regulatory attention.[12] In particular, evidence is needed regarding the presence and concentration of nicotine in e-cigarettes, as well as e-cigarette nicotine delivery, dose and health effects. Perceptions and use of e-cigarettes may also be influenced by the presence of health warning statements, which represent a prominent method by which regulatory agencies communicate the health consequences of tobacco and other hazardous consumer products. The extension of health warning statements from tobacco products to e-cigarettes has been approved by several regulatory bodies, including the European Union.[6] Finally, product price is a key product attribute requiring consideration, given its role in influencing consumer behaviour in the domain of tobacco.[13]

This study sought to examine the influence of four e-cigarette product characteristics that are under regulatory control: flavour, nicotine content, health warning statements and price, on perceptions and interest in trying e-cigarettes among non-smoking youth and young adults (aged 16–24 years), smoking youth and young adults (aged 16–24 years) and smoking adults (aged 25 years and older). The study was conducted in Canada, where e-cigarettes containing nicotine are prohibited, but widely available, with an estimated 9% of Canadians aged 15 years and older having ever tried an e-cigarette in 2013.[14] [15]

METHODS
Study design
An online discrete choice experiment (DCE) was conducted in Canada in November 2013. DCEs

are commonly used in marketing research to inform product development by assessing the trade-offs underlying consumer choices.[16] DCEs follow random utility theory, which states that individuals form preferences for products based on the utility (ie, perceived value) attributed to product features. Products with more desirable features or attributes are more desirable among consumers (ie, yield greater utility), which in turn influences consumers' choices.

Product attributes and their corresponding levels were selected on the basis of a review of the literature[17–21] and through consultation with experts in e-cigarette and cigarette product science and policy to ensure that they accurately reflected the market at the time of the study. Given that the European Union was in the process of developing e-cigarette health warning statements at that time, two statements from the European Commission (EC) were used as templates for content. In total, four e-cigarette product attributes were tested (table 1).

The approach of Louviere et al[22] was used to construct the experiment. Attribute levels were varied in the experiment to produce e-cigarette product packages or profiles, which were then grouped together to form choice sets. A balanced incomplete block design (BIBD) was used to assign profiles to choice sets of a fixed size. Given the attributes and attribute levels presented in table 1, the design produced a total of $4^3 \times 2$ (=128) possible profiles. From this number of possible profiles, 16 were needed to achieve orthogonality. The BIBD was used to assign 16 profiles to 20 choice sets, each consisting of four profiles presented in a random order as well as an opt-out option (figure 1). DCE participants were presented with the 20 choice sets in random order and asked to complete three stated preference tasks. Participants' responses were then analysed to determine the effect of distinct attributes and attribute levels on consumer choice. The study received approval from the Office of Research Ethics at the University of Waterloo.

Table 1 Product attributes and levels

Product attribute	Product attribute levels
Flavour	Tobacco
	Menthol
	Coffee
	Cherry
Nicotine content (mg)	None (0)
	Low (6–8)
	Medium (10–12)
	High (16)
Health warning	None
	"Health Canada has not approved this product for quitting smoking" (HC)
	"This product is intended for use by existing smokers. It contains nicotine which is a highly addictive substance" (EC1)
	"This product is intended for use by existing smokers aged 18 or over as an alternative to tobacco cigarettes. It contains nicotine which is a highly addictive substance. Consult your doctor if you are pregnant, breast feeding, allergic to nicotine or propylene glycol, or have high blood pressure" (EC2)
Price	Low ($7.99)
	High ($9.99)

EC, European Commission; HC, Health Canada.

Participants

Three distinct subpopulations were sampled for this experiment: (1) non-smoking youth and young adults aged 16–24 years; (2) smoking youth and young adults aged 16–24 years and (3) smoking adults aged 25 years and older. Participants were recruited through Global Market Insite, Inc (GMI), a commercial market research company with an online panel of Canadians. GMI panel members were sent an email invitation with a link directly to the experiment. Additional information on GMI's Canadian panel is available online (http://www.lightspeedgmi.com/global-panels/). A total of 915 respondents were included in the analyses.

Measures

Demographic variables included gender, age, ethnicity and education level. Ethnicity was classified as white or Non-white (including South Asian, Chinese, Black, Filipino, Latin American, Arab, Southeast Asian, West Asian, Korean, Japanese, Aboriginal or multiracial). The highest level of education completed was categorised as: low (high school or less), moderate (technical/trade school, community college, or some university but no degree), and high (university degree or more). Cigarette smoking status was determined by asking participants whether they had smoked at least 100 cigarettes in their lifetime and had smoked a cigarette in the past 30 days. Trial or ever use of e-cigarettes was measured by asking participants whether they had ever used an e-cigarette, even one or two times; current use of e-cigarettes was determined by asking e-cigarette ever users if they had used e-cigarettes within the past 30 days.

For each experimental choice set, participants were asked to perform three stated preference tasks, each of which corresponded to an outcome. The first task tested interest in trying e-cigarettes by asking the question: 'Which one of these products would you rather try?' The next task tested perceptions of product harm using the question: 'Which one of these products do you think would be less harmful?' The final task tested perceptions of product efficacy in quitting smoking with the question: 'Which one of these products do you think would help someone quit smoking?' For each outcome, participants were asked to select one of the profiles or indicate 'none of the above' as their answer. The inclusion of a 'none of the above' option was deemed appropriate for the evaluation of potential demand of a novel product.[23] The measures were pilot-tested prior to inclusion in a similar DCE conducted by the research team in order to ensure that the questions were worded well and understood by respondents appropriately.[24]

Analyses

Multinomial logit regression was used to analyse the effect of attributes on consumer choice for each outcome. Parameter estimates for attribute levels were effects coded, meaning the referenced level was set to the grand mean in the design and in the marketplace. To assess the influence of each attribute as a whole on consumer choice, a utility range for each attribute was calculated, representing the difference between each attribute's highest and lowest estimated part-worth utility. The relative importance of each attribute was then calculated as the range of estimated parameter values for each attribute, normalised by the sum of all the attribute ranges for a given outcome; this measure was expressed as a percentage, indicating the relative importance of a given attribute's influence on consumer choice. To account for the sampled subpopulations (combining aspects of age and cigarette smoking status) and the moderating effects

Figure 1 Sample choice set. Which one of these products would you rather try?

of gender and past trial of e-cigarettes, an adjusted multinomial logit model was created by interacting these categorical variables with each attribute. The magnitude of effect of significant findings for each attribute level was calculated using correlation coefficients and interpreted as: small ($r \leq 0.2$), medium ($0.3 \leq r \leq 0.4$) and large ($r \geq 0.5$). All analyses were conducted using SAS V. 9.4.

RESULTS

Table 2 describes the three subpopulations of participants.

Overall, 68%, 72% and 70% of participants chose a particular e-cigarette package (as opposed to opting out of making a choice) when asked about their intentions to try the product, as well as perceptions of reduced product harm and of greater product quit efficacy, respectively. Results of the multinomial logit models without and with interaction terms are presented in table 3 and online supplementary table S4, respectively. Parameter estimates indicate the degree to which respondents

did or did not prefer particular attribute levels for each attribute with respect to key outcomes.

Intentions to try e-cigarettes

Participants were significantly more interested in trying e-cigarettes with cherry (p<0.0001, r=0.2) and menthol (p=0.01, r=0.1) flavours, low nicotine levels (p<0.0001, r=0.0), no health warning (p<0.0001, r=0.3) and the second EC2 health warning (p<0.0001, r=0.4), and low price (p<0.0001, r=0.4). Results of the multinomial logit models with interaction terms indicated differences in consumer preferences across subpopulations. Younger non-smokers showed interest in trying various e-cigarette flavours, including coffee (p<0.01, r=0.3), cherry (p<0.0001, r=0.3) and menthol (p<0.001, r=0.2). This subpopulation was also interested in products with no nicotine (p<0.0001, r=0.2) and low nicotine content (p<0.0001, r=0.1), with no health warning (p<0.0001, r=0.3) and with the EC2 health warning (p<0.0001, r=0.2), and with low price (p<0.0001, r=0.2). Younger smokers expressed a preference for products with cherry flavour (p<0.001, r=0.2), medium nicotine content (p=0.03, r=0.1), the Health Canada (HC) health warning (p<0.001, r=0.2) and higher price (p<0.0001, r=0.2). Older smokers indicated greater interest in trying tobacco-flavoured (p<0.0001, r=0.6) e-cigarettes, with high nicotine content (p=0.01, r=0.1) and the HC health warning (p<0.0001, r=0.3). With respect to gender, males were more interested in trying tobacco-flavoured e-cigarettes (p<0.0001, r=0.2) and more expensive e-cigarettes (p<0.01, r=0.1). Participants who had tried an e-cigarette in the past were more interested in trying cherry-flavoured products (p<0.0001, r=0.3).

Perceptions of reduced harm

E-cigarettes with the following characteristics were perceived as less harmful: menthol (p<0.0001, r=0.6) and coffee flavours (p<0.0001, r=0.3), low nicotine (p<0.0001, r=0.3), no health warning (p<0.0001, r=0.5) and the EC2 health warning (p<0.0001, r=0.5), and low price (p<0.0001, r=0.5). Younger non-smokers were more likely to perceive coffee-flavoured (p=0.02, r=0.1) e-cigarettes and e-cigarettes carrying no health warning (p<0.001, r=0.2) as less harmful. Younger smokers held these beliefs about products with cherry flavour (p=0.03, r=0.1), medium nicotine content (p=0.01, r=0.1) and carrying the HC health warning (p=0.01, r=0.2). Finally, older smokers perceived products with tobacco flavour (p<0.001, r=0.2), high

Table 2 Sample characteristics (n=915)			
Characteristic	**Younger non-smokers (n=279), % (n)**	**Younger smokers (n=264), % (n)**	**Older smokers (n=372), % (n)**
Age			
Mean (SD)	20.6 (2.8)	21.4 (2.1)	49.0 (12.2)
Gender			
Male	33.3 (93)	37.5 (99)	50.3 (187)
Female	66.7 (186)	62.5 (165)	49.7 (185)
Ethnicity			
White	71.3 (199)	78.4 (207)	85.8 (319)
Non-white	26.5 (74)	21.2 (56)	14.0 (52)
No response	2.2 (6)	0.4 (1)	0.2 (1)
Education			
Low	40.1 (112)	40.5 (107)	29.6 (110)
Moderate	35.5 (99)	42.1 (111)	42.4 (158)
High	23.3 (65)	17.0 (45)	27.7 (103)
No response	1.1 (3)	0.4 (1)	0.3 (1)
E-cigarette ever use			
Yes	15.8 (44)	51.9 (137)	33.3 (124)
E-cigarette current use			
Yes	1.4 (4)	22.3 (59)	12.4 (46)

Education: low=high school or less; moderate=technical/trade school, community college, or some university but no degree and high=university degree or more.

Table 3 Predictors of key outcomes: multinomial logit models

	Intentions to try the product			Perceptions of lower product harm			Perceptions of greater product quit efficacy		
	Parameter estimate	SE	Significance, p value	Parameter estimate	SE	Significance, p value	Parameter estimate	SE	Significance, p value
Flavour									
Tobacco	−0.19	0.02	**<0.0001**	−0.58	0.02	**<0.0001**	−0.12	0.02	**<0.0001**
Menthol	0.04	0.02	**<0.01**	0.42	0.02	**<0.0001**	0.15	0.02	**<0.0001**
Coffee	0.02	0.02	0.37	0.19	0.02	**<0.0001**	0.08	0.02	**<0.0001**
Cherry	0.13	0.02	**<0.0001**	−0.03	0.02	0.07	−0.11	0.02	**<0.0001**
Nicotine content									
None	−0.02	0.02	0.33	0.02	0.02	0.19	−0.04	0.02	**0.04**
Low	0.11	0.02	**<0.0001**	0.19	0.02	**<0.0001**	0.07	0.02	**<0.0001**
Medium	−0.09	0.02	**<0.0001**	−0.24	0.02	**<0.0001**	−0.04	0.02	**0.02**
High	0.00	0.02	0.80	0.03	0.02	0.08	0.01	0.02	0.63
Health warning									
None	0.15	0.02	**<0.0001**	0.34	0.02	**<0.0001**	0.13	0.02	**<0.0001**
HC	−0.33	0.02	**<0.0001**	−0.63	0.02	**<0.0001**	−0.26	0.02	**<0.0001**
EC1	−0.04	0.02	**0.04**	−0.01	0.02	0.60	−0.01	0.02	0.39
EC2	0.21	0.02	**<0.0001**	0.31	0.02	**<0.0001**	0.15	0.02	**<0.0001**
Price									
Low	0.12	0.01	**<0.0001**	0.20	0.01	**<0.0001**	0.14	0.01	**<0.0001**
High	−0.12	0.01	**<0.0001**	−0.20	0.01	**<0.0001**	−0.14	0.01	**<0.0001**

EC, European Commission; HC, Health Canada.
Bold typeface indicate statistically significant findings.

nicotine content (p=0.01, r=0.1) and the HC health warning (p=0.01, r=0.1) as less harmful. Males were more likely to perceive tobacco-flavoured e-cigarettes (p<0.0001, r=0.2) as less harmful, while females perceived menthol-flavoured e-cigarettes (p<0.001, r=0.2) as such. Participants who had tried an e-cigarette in the past were more likely to perceive cherry-flavoured products (p=0.01, r=0.1) as less harmful.
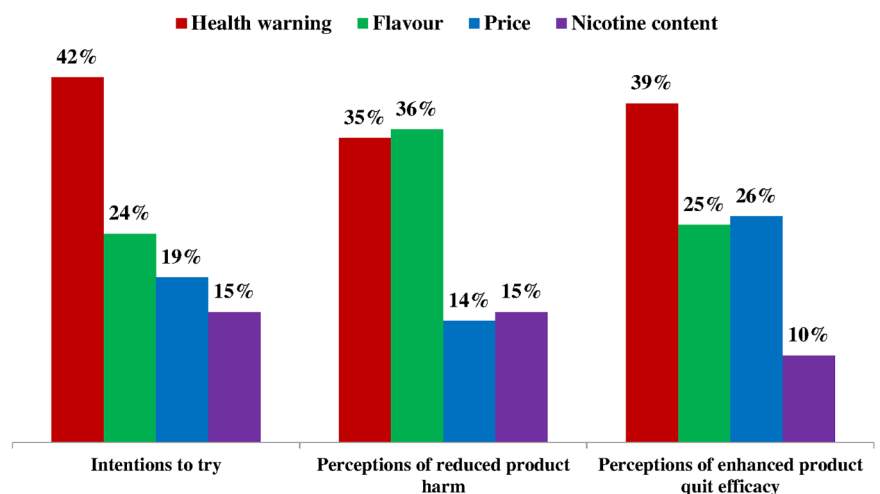
Perceptions of greater quit efficacy
E-cigarettes with the following characteristics were perceived as having greater quit efficacy: menthol (p<0.0001, r=0.2) and coffee (p<0.0001, r=0.1) flavours, low nicotine (p<0.0001, r=0.0), no health warning (p<0.0001, r=0.2) and the EC2 health warning (p<0.0001, r=0.3), and low price (p<0.0001, r=0.3). Flavours differentiated perceptions of quit efficacy among subpopulations, with younger non-smokers, younger

smokers and older smokers being more likely to choose coffee (p=0.01, r=0.1), cherry (p=0.02, r=0.1) and tobacco (p<0.0001, r=0.2) flavours, respectively. Males also exhibited a preference for tobacco-flavoured e-cigarettes (p<0.01, r=0.1) in this regard. Participants who had tried an e-cigarette in the past perceived products with tobacco flavour (p<0.001, r=0.2), medium nicotine content (p=0.01, r=0.1) and high price (p=0.01, r=0.1) as having greater quit efficacy.

Relative importance of attributes
Figure 2 depicts the relative importance of product attributes in predicting key outcomes. The relative importance of each attribute reflects the relative weight that consumers placed on the tested product attributes when forming their choices. For instance, health warnings accounted for 42% of consumers' intentions to try e-cigarettes, while flavour, price and nicotine

Figure 2 Relative importance of product attributes on key outcomes.

Legend: ■ Health warning ■ Flavour ■ Price ■ Nicotine content

Intentions to try: 42%, 24%, 19%, 15%
Perceptions of reduced product harm: 35%, 36%, 14%, 15%
Perceptions of enhanced product quit efficacy: 39%, 25%, 26%, 10%

content accounted for 24%, 19% and 15%, respectively. Health warnings (35%) and flavour (36%) were equally influential in determining perceptions of reduced harm, while nicotine content (15%) and price (14%) were less influential. Health warnings were the most influential predictor of whether consumers believed e-cigarettes would help someone quit smoking, accounting for 39% of their overall judgement. In addition, flavour (25%) and price (26%) had a moderate influence, while nicotine content (10%) had a lower influence on judgements of product quit efficacy.

DISCUSSION

To the best of our knowledge, this is the first study to assess influences on consumer choice of e-cigarettes using discrete choice methodology, thereby offering preliminary evidence regarding consumer perceptions and choices regarding these novel products. The study findings reflect the heterogeneity in consumers' trade-offs with respect to e-cigarette product characteristics. Such heterogeneity is not particularly surprising, given the lack of a clear evidence base surrounding the purpose and function of these rapidly evolving products.

Health warnings

In this DCE, participants consistently chose e-cigarettes featuring no health warning and the most comprehensive health warning (EC2). Although these findings seem contradictory, both choices may reflect a sense of reassurance for consumers. On the one hand, the absence of a health warning might have suggested that the product is suitable for use, requiring no specific instructions or precautions. Thus, the absence of a health warning may have emphasised the difference between e-cigarettes and tobacco cigarettes, which are accompanied by health warning labels in many countries, including Canada.[25] On the other hand, the similarity between tobacco and e-cigarettes may have been emphasised by the comprehensive warning (EC2), reassuring participants that a governing body responsible for consumer protection had adequately assessed the product and deemed it suitable for use, while stipulating special considerations and precautions.

Interestingly, a different pattern of results emerged among smokers. Although both health warnings under consideration by the European Parliament (ie, EC1 and EC2) stipulated use of e-cigarettes for smokers, smoking participants chose products featuring the HC warning when forming trial intentions and perceptions of reduced product harm. This may be due to Canadian smokers' familiarity with Canadian health warnings on tobacco cigarette packages, which have featured an attribution to the appropriate health authority, 'Health Canada', since 2001.[25 26] Given the high levels of exposure of such warnings among smokers,[27] smoking participants may have been persuaded by the credibility of the source of health information.[25 28] The contrast between the medium and small effect sizes for older and younger smokers, respectively, indicates a difference of practical significance and may lend further support to this interpretation. In contrast, e-cigarette ever users did not express a preference for the presence or absence of health warnings, nor for a particular type of health warning; given that these participants had already tried e-cigarettes, this attribute may not have influenced their trial intentions or product perceptions. Additional research is needed to examine whether this pattern of findings is reproducible in different samples and settings.

Flavours

The attribute of flavour exhibited the most variability in our study. For instance, non-smokers expressed interest in trying all flavoured e-cigarette products (with greater preference for coffee and cherry flavours compared to menthol), but showed a markedly lower preference for tobacco flavour. In addition, while younger smokers showed a weak preference for cherry flavour, older smokers strongly preferred solely tobacco-flavoured products and appeared quite averse to trying products with other flavours. These preferences for flavours were mirrored by perceptions of reduced harm for each of these groups, although the magnitude of preferences was small. This statistically and practically significant divergence in preferences between younger participants (including both non-smokers and smokers) and older participants with respect to flavour and harm may be indicative of the success of tobacco denormalisation, which aims to reduce the acceptability of tobacco use.[29]

Dedicated e-cigarette users have claimed that flavours play an important role in their vaping experience, as well as in their efforts to reduce cigarette consumption and cravings. Farsalinos et al[30] reported that, among e-cigarette users, although tobacco flavour was largely preferred at the time of e-cigarette initiation, fruit flavours were most popular at the time of the survey. Interestingly, the mean duration of e-cigarette use in the sample was 12 months, and current smokers reported substantial reductions in cigarette consumption from the time of e-cigarette initiation.[30] Our findings that e-cigarette ever users were most interested in trying cherry-flavoured e-cigarettes and perceived tobacco-flavoured products as being more likely to help someone quit smoking may support these results regarding e-cigarettes and smoking reduction and/or cessation. Further research is needed to examine the role of e-cigarette flavours, as this product attribute is garnering considerable consumer attention and also doing so differently across subpopulations.

Nicotine content

Although the overall influence of nicotine content on consumer choice was much less relative to the other examined product characteristics, it is nevertheless worth noting several findings, given the central role of nicotine in smoking behaviour. Overall, the subsamples showed divergent preferences for nicotine content with respect to interest in trying e-cigarettes and lower perceived product harm: while younger non-smokers preferred products with no nicotine and with low nicotine content, younger and older smokers preferred products with medium and high nicotine, respectively. Stated preferences for nicotine by smokers may reflect their familiarity with the addictive drug and their desire to acquire it from these products. However, unlike smokers and non-smokers, who saw no particular level of nicotine as likely to be more useful in quitting smoking, participants who had ever tried e-cigarettes showed a preference for medium nicotine content, which may be due to their experience using these products.

Price

Across all key outcomes tested, consumers were more likely to choose less expensive e-cigarettes. This is consistent with the behaviour of consumers of tobacco products, whose choices typically exhibit economically sound preferences.[13] Nevertheless, it is prudent to include price in DCEs in order to ensure that the presented choice sets are as reflective as possible of a real market, thereby creating the conditions necessary to invoke real trade-offs by participants.

Strengths and limitations

A key strength of this study was its use of discrete choice methodology, which is an established marketing methodology that allows one to simultaneously test the effects of various e-

cigarette product characteristics on consumer choice, thereby providing potentially useful premarket testing evidence for product regulation. In addition, the DCE employed a statistically efficient design with orthogonal and balanced choice sets. Limitations were that the design did not include all possible attribute-level combinations. Next, only a subset of attributes that were hypothesised to influence consumer choice of e-cigarette products were tested. Of course, there may be other characteristics that play a role in consumer perceptions and choice, such as branding and marketing claims; further studies should evaluate the effect of such characteristics. Furthermore, although the product profiles were reflective of the e-cigarette market at the time of the study, rapid product evolution since that time may limit the applicability of the study findings. Third, the study used a convenience sample, which is not necessarily representative of the general population. Fourth, DCEs measure the stated preferences of consumers as opposed to their revealed preferences, and are thus not a substitute for measures of actual behaviour. Finally, it is unclear to what extent the findings are generalisable to different regulatory contexts. At the time of the study, no nicotine-containing e-cigarettes were approved for sale in Canada; however, these products were widely available, with similar rates of use as in other Western countries in which these products were legally sold. Therefore, we would not expect findings in Canada to be materially different from other Western countries.

CONCLUSIONS

The study findings provide evidence that health warnings significantly influence consumers' intentions to try e-cigarettes and their perceptions of product quit efficacy, while both health warnings and flavour drive perceptions of e-cigarette harm. Given that consumers gave most weight to the tested attributes of health warnings and flavour, these may represent good targets for e-cigarette regulatory frameworks. The development of such frameworks should be guided by evidence regarding the potential benefits and harms to various subpopulations, with the overall aim of improving public health.

What this paper adds

- ▶ E-cigarette regulatory frameworks are currently being developed in response to the growing popularity of these novel products.
- ▶ Common regulatory principles regarding e-cigarettes include minimising product appeal and uptake among youth, increasing product safety and minimising false health beliefs. However, there is currently little evidence available to guide regulators with respect to how e-cigarette product characteristics influence these domains, making the development of regulatory frameworks difficult.
- ▶ The study findings reflect divergent consumer preferences for e-cigarettes with respect to key product characteristics and covariates related to the use of cigarettes and e-cigarettes. The complexity of these preferences across various subpopulations should be considered in the development of regulatory frameworks for these products to ensure that they benefit public health.

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