Published in final edited form as:

Addict Behav. 2016 November ; 62: 108–113. doi:10.1016/j.addbeh.2016.06.015.

Preference for gain- or loss-framed electronic cigarette prevention messages

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Abstract

Background—Effective electronic cigarette (e-cigarette) prevention messages are needed to combat the rising popularity/uptake of e-cigarettes among youth. We examined preferences for e-cigarette prevention messages that either emphasized gains (e.g., You save money by not using e-cigarettes) or losses (e.g., You spend money by using e-cigarettes) among adolescents and young adults.

Methods—Using surveys in two middle schools, four high schools, and one college in CT ($N=5405$), we assessed students' preferences for gain- or loss-framed e-cigarette prevention messages related to four themes: financial cost, health risks, addiction potential, and social labeling as a smoker. We also assessed whether preferences for each message framing theme differed by sex, school level, cigarette-use status, and e-cigarette use-status. We also examined whether preference for message framing differed by cigarette and e-cigarette susceptibility status among never e-cigarette users.

Results—Overall, loss-framing was preferred for message themes related to health risks, addiction potential, and social labeling as a smoker, whereas gain-framing was preferred for message themes related to financial cost. Logistic regression analyses showed that 1) females preferred loss-framed messages for all themes relative to males, 2) lifetime e-cigarette users preferred loss-framed health risks and social labeling messages relative to never users, and 3) high school students preferred gain-framed social labeling messages relative to college students. The preference for message framing did not differ by cigarette or e-cigarette susceptibility.

Conclusions: Preference for message framing differed by themes and individual characteristics.

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Contributors: Dr. Krishnan-Sarin conceptualized and designed the study. Dr. Kong conducted literature search, data analysis, and wrote the first draft of the study. Drs. Krishnan-Sarin, Cavallo, Camenga and Morean assisted in the interpretation of the results and substantially assisted in the writing of the manuscript. All authors approved the final version.

Conflict of interest: The authors have no conflicts of interest.

This formative research could inform the construction of persuasive e-cigarette prevention messages.

Keywords

Message framing; Electronic cigarettes; Gender; Prevention; Adolescents; Young adults

1. Introduction

Electronic cigarette (e-cigarette) use rates are high among adolescents (Arrazola, Neff, Kennedy, et al., 2014; Arrazola, Singh, Corey, et al., 2015; Johnston, O'Malley, Miech, et al., 2015; Krishnan-Sarin, Morean, Camenga, et al., 2015) and young adults (Pokhrel, Little, Fagan, et al., 2014; Sutfin, McCoy, Morrell, et al., 2013). National data show that past-30-day e-cigarette use among high school (HS) students increased from 1.5% in 2011 to 13.4% in 2014, surpassing cigarette smoking rates (Arrazola et al., 2015).

E-cigarette use among youth is concerning because of potential harm of nicotine toxicity and the impact of nicotine on the adolescent brain (Dwyer, McQuown, & Leslie, 2009). The unknown health consequences of long-term e-cigarette use, with some laboratory findings showing concerns that e-cigarette vapor may trigger lung inflammatory responses (Wu, Jiang, Minor, et al., 2014), warrant e-cigarette prevention efforts directed at youth. Despite the potential adverse health effects, e-cigarettes continue to be popular among youth. The increasing popularity of e-cigarettes among youth may not be surprising given that e-cigarettes are marketed aggressively through a variety of mass media outlets, including popular youth-oriented social media sites (e.g., YouTube, Twitter) (Andrade, Hastings, & Angus, 2013; Huang, Kornfield, Szczypka, et al., 2014; Paek, Kim, Hove, et al., 2014; Richardson, Ganz, & Vallone, 2014).

E-cigarette marketing emphasizes themes that appeal to youth such as enticing flavors, promotion of e-cigarettes as a healthier and safer alternative to cigarettes, and the use of celebrity endorsements (Grana & Ling, 2014; Rooke & Amos, 2013). E-cigarette marketing is reaching youth; 70% middle school (MS) and 61% high school (HS) students in Connecticut reported seeing e-cigarette advertisements in multiple locations including billboards, social media, and TV (Krishnan-Sarin et al., 2015). However, there are few prevention campaigns aimed at reducing youth e-cigarette use. Given the widespread pro-e-cigarette messages available to youth (Duke, Lee, Kim, et al., 2014) and the exponential rise in the use of these products (Arrazola et al., 2015), developing and disseminating effective e-cigarette prevention messages to adolescents and young adults are needed.

Development of e-cigarette prevention messages could be informed by the successful aspects of anti-smoking campaigns. For instance, the use of age appropriate themes is important components of effective anti-smoking campaigns (Farrelly, Niederdeppe, & Yarsevich, 2003). Themes that appeal specifically to youth include emphasis on the short-term adverse health effects of smoking (e.g., shortness of breath, inability to play sports) and cosmetic consequences (e.g., bad breath, stained teeth) relative to long-term effects (e.g., lung cancer) (Farrelly et al., 2003). Research also indicates that prevention messages can be made more effective through appropriate framing (see review by Gallagher & Updegraff,

2012). Message framing, guided by the Prospect Theory (Tversky&Kahneman, 1981), posits that gain-framed messages, which emphasize the benefits of engaging or not engaging in a behavior, should be more effective for preventing behaviors that have clear, certain outcomes like engaging in physical exercise (Latimer, Rench, Rivers, et al., 2008) and using sunscreen (Detweiler, Bedell, Salovey, et al., 1999). Conversely, loss-framed messages, which emphasize the costs of engaging or not engaging in a behavior, should be more effective for preventing behaviors with riskier, less certain outcomes such as disease detection.

Preference for message framing has been used to construct persuasive prevention messages to target populations to promote health behaviors (Schneider, 2006). Previous research assessed preference for loss- vs. gain-framed messages to develop cigarette smoking cessation messages, which was then used to tailor effective smoking cessation interventions for youth smokers (Latimer, Krishnan-Sarin, Cavallo, et al., 2012). Furthermore, there is compelling literature showing that message framing affects beliefs, intentions and behaviors (e.g., 27). Message framing also has been used successfully in smoking cessation messages (Fucito, Latimer, Salovey, et al., 2010; Toll, Salovey, O'Malley, et al., 2008; Wong & McMurray, 2002; Moorman & van den Putte, 2008; Latimer et al., 2012). For instance, smokers in a smoking cessation trial were randomly assigned to receive gain-framed messages or loss-framed messages. The findings of this randomized control trial (RCT) showed that smokers in the condition that received gain-framed messages were more likely to be abstinent than those who received loss-framed messages (Toll, O'Malley, Katulak, et al., 2007). However, before assessing the predictive validity of these messages, formative work is needed to accurately formulate the message content and choose appropriate framing.

Current evidence suggests that the persuasiveness of message framing may differ based on individual characteristics. For instance, prior research has highlighted sex differences in preference for loss- versus gain-framed messages (Toll et al., 2008). Specifically, adult females who perceived relatively low risk associated with engaging in unhealthy behaviors, like smoking, preferred gain-framed smoking cessation messages compared to females who perceived high risk associated with engaging in unhealthy behaviors; males preferred gain-framed smoking cessation messages irrespective of risk perception. The effectiveness of loss- versus gain-framed messages also seems to be different for adults and adolescents. Among adult smokers, gain-framed smoking prevention messages are more effective in reducing cigarette smoking (Fucito et al., 2010; Wong & McMurray, 2002) and influencing smoking-related beliefs (Schneider, Salovey, Pallonen, et al., 2001). However, among adolescent smokers, loss-framed smoking prevention messages are more effective in influencing smoking-related attitudes and behavioral intentions (Latimer et al., 2012; Goodall & Appiah, 2008).

Given the importance of developing appropriately framed prevention messages to maximize persuasiveness, the primary goal of this formative research is to gain insight into adolescents' and young adults' preferences for loss- or gain-framed e-cigarette prevention themes. The current study used themes identified using prior qualitative work, in which we conducted focus groups with adolescents and young adults to derive themes that may be important to emphasize in e-cigarette prevention messages targeting youth (e.g., health risks, cost, addiction potential, social labeling as a smoker) (Cavallo, Kong, Ells, et al., 2015).

These themes were then framed in gain- and loss-contexts and preferences for these loss- and gain-framed messages were then examined using surveys among adolescents and young adults.

Based on previous studies showing that the effect of message framing differs by individual characteristics (described above), our secondary objective was to examine if message-framing preference differed by sex, race, e-cigarette use status, cigarette use status, and school level (i.e., middle school, high school, and college students). Finally, we examined whether preference for message framing differed by e-cigarette susceptibility status among never e-cigarette users. Identifying relevant prevention messages for youth who are susceptible to future use is important, as prevention efforts would be targeting this group.

We hypothesized that gain-framed messages would be preferred over loss-framed message in all themes based on the aforementioned literature suggesting that gain-framed messages are more effective for prevention messages targeted toward behaviors that are deemed less risky. Although youth preferred loss-framed cigarette prevention messages (Latimer et al., 2012), youth may prefer gain-framed messages for e-cigarettes because they perceive e-cigarettes to be less harmful than cigarettes (Ambrose, Rostron, Johnson, et al., 2014). We also explored demographic (e.g., sex, school level) and cigarette—/e-cigarette-use status differences based on previous literature showing that individual characteristics are important in determining message framing. However, given the relative novelty of e-cigarettes, we did not make any hypotheses related to demographics or cigarette-/e-cigarette-use status.

2. Methods

2.1. Procedures

Detailed study procedures have been described previously (Krishnan-Sarin et al., 2015; Kong, Morean, Cavallo, et al., 2015). However, in brief, we surveyed four Connecticut HSs ($N = 3614$) and two MSs ($N = 1166$) in Fall 2013 that represented a wide range of District Reference Groups (i.e., DRGs; groupings based on student enrollments and socioeconomic factors like median family income, and family structure). We subsequently conducted a survey in one Connecticut public university ($N = 625$) in Spring 2014.

The Institutional Review Board of Yale University and the participating schools approved all study procedures. Passive parental permission procedures were used in MSs and HSs. In the MSs/HSs, paper and pencil surveys were administered by the teachers to the entire student body during homerooms/advisories. In the college, we recruited participants from randomly selected classes and during recruitment sessions held in the student union. College students were provided with a post card with the survey information, a link, and a Quick Response (QR) code that directed students to the online survey. All participants were informed of the voluntary nature of the study and limits to confidentiality. Participation in the survey was regarded as assent/consent.

2.2. Measures

We obtained demographic information including age, sex, and race/ethnicity.

Participants who responded “yes” to “Have you tried e-cigarettes?” were coded as Lifetime E-cigarette Users and “no” were coded as Never E-cigarette Users. Participants who provided a valid age of smoking onset to “How old were you when you first tried a cigarette, even one or two puffs?” were coded as *Lifetime Cigarette Smokers*, while those who reported that they had never tried a cigarette were coded as *Never Cigarette Smokers*. Susceptibility to future use of cigarettes were assessed among never smokers (Pierce, Farkas, Evans, et al., 1995). We asked, “If one of your best friends offered you a cigarette, would you smoke it?” and “Do you think that in the future you might experiment with cigarettes?” We modified these items to assess susceptibility to use e-cigarettes by replacing “cigarettes” with “e-cigarettes” to the questions listed above. Responses of “definitely not” to both questions for each substance were coded as “*not susceptible to future cigarette smoking*” or “*not susceptible to future e-cigarette use*” and responses of “definitely yes” “probably yes,” or “probably not” to either question was coded as “*susceptible to future cigarette smoking*” and “*susceptible to future e-cigarette use*.”

The preference for loss- or gain-framed e-cigarette prevention messages was assessed by asking participants to select either a loss-framed message (e.g., “You spend more money if you use e-cigarettes.”) or a gain-framed message (e.g., “You save money by not using e-cigarettes.”) in response to the question: “Which message would you use to convince someone your age not to use e-cigarettes?” Participants were presented with four pairs of loss- and gain-framed messages covering the following themes: financial cost, health risks, addiction potential, and social labeling as a smoker (see Table 1 for messages). These four themes were derived through 10 focus groups in one MS, one HS, and one college students (Ells, Kong, Camenga, et al., 2013). Each focus group was used to assess perceptions about e-cigarettes and identify themes that could be used to encourage/discourage e-cigarette use among their peers. Through this exercise, 11 appealing themes about e-cigarettes were identified: financial cost, smell, health risks, flavor, comparative perceptions to cigarettes, convenience, technology, quitting smoking, social labeling as a smoker, addiction potential, and constituents. Of these themes, we selected four (i.e., financial cost, health risks, addiction potential, and social labeling as a smoker) that represented the clearest examples of domains that could be framed into loss- and gain-framed messages. The loss- and gain-framed messages were evaluated for clarity, appropriateness and acceptability in two subsequent focus groups. Based on the feedback, the research team derived the final messages that were included in the survey.

2.3. Data analysis

We used SPSS software version 21 (IBM, SPSS) to conduct descriptive statistics on all study variables. Using the whole sample, we also used SPSS to conduct separate adjusted logistic regression analyses evaluating preference for each of the message themes as a dependent variable (i.e., financial cost, health risks, addiction potential, social labeling as a smoker), with the following categorical variables entered as independent variables: school level (MS, HS, college), sex, race (white vs. non-white), e-cigarette use (never users vs. lifetime users), and cigarette smoking (never smokers vs. lifetime smokers). We then conducted a separate set of adjusted logistic regression analyses within the sub-sample of never e-cigarette users. For these analyses, preference for loss- or gain-framed messages again served as separate

dependent variables, with the following categorical variables entered as independent variables: school level (MS, HS, college), sex, race (white vs. non-white), e-cigarette use susceptibility (not susceptible vs. susceptible), and cigarette smoking susceptibility (not susceptible vs. susceptible). To correct for multiple comparisons, Bonferroni-determined p -values < 0.01 were considered statistically significant.

Finally, we used Mplus (Version 6) to conduct sensitivity analysis to assess potential clustering by adding school and homeroom as random effects using multi-level models. In these analyses, we examined only MS and HS because the college did not have homerooms. The results from the multi-level models mirrored the adjusted logistic regression models; neither school nor homeroom had an effect on message-framing preference. Therefore, we only reported the findings from the adjusted logistic regression models in this paper.

3. Results

The sample was 53% female, 69.7% White, 21.4% lifetime e-cigarette users, and 19.9% lifetime cigarette smokers. Among lifetime e-cigarette users ($n = 1180$), 62.7% also were lifetime cigarette smokers. Among never e-cigarette users ($n = 4206$), 29.5% were susceptible to future e-cigarette use.

Among the total sample, loss-framed messages were preferred over gain-framed messages for themes related to health risks, addiction potential, and social labeling as a smoker; however, the gain-framed message was preferred for the financial-cost themed message (Table 2).

The adjusted logistic regression analyses showed that 1) across all four message themes, females were more likely than males to prefer loss-framed messages; 2) HS students were more likely than college students to prefer gain-framed messages for social labeling as a smoker theme; and 3) never e-cigarette users were more likely than lifetime e-cigarette users to prefer loss-framed messages for health risks and social label themes (Table 3).

The adjusted logistic regression analyses among never e-cigarette users showed that females were more likely than males to prefer loss-framed messages across all four message themes; however, preference for gain- vs. loss-framed messages did not differ by cigarette susceptibility or e-cigarette susceptibility status (Table 4).

4. Discussion

In the total sample, loss-framed messages were preferred over gain-framed messages for themes related to health risks (i.e., you may be exposed to unknown health risks if you use e-cigarettes), addiction potential (i.e., you may increase your chances of being addicted to other tobacco products if you use e-cigarettes), and social labeling as a smoker (i.e., people will label you as a smoker if you use e-cigarettes), and gain-framed message was preferred over loss-framed message for the theme related to financial cost (i.e., you save money by not using e-cigarettes).

Our study findings indicated that preference of message framing is theme specific. However, in general, loss-framed messages were preferred for the majority of the message themes. This finding is contrary to a previous meta-analysis study which showed that gain-framed messages have more utility for prevention-related behaviors like tobacco initiation, whereas loss-framed messages are more useful in promoting detection behaviors, like disease detection (Gallagher & Updegraff, 2012). Youth may prefer the loss-framed e-cigarette messages based on their familiarity with the types of loss-framed prevention messages typically used in anti-smoking campaigns. This is consistent with the previous literature showing that adolescent smokers preferred loss-framed anti-smoking messages (Latimer et al., 2012; Goodall & Appiah, 2008). Given that e-cigarettes are relatively new and harm and risk perceptions may evolve over time, specific reasons for message framing preference and risk perceptions related to e-cigarette use among youth need further examination.

It is important to note that we only assessed preference for either loss- vs. gain-framed e-cigarette prevention messages and we did not assess whether message framing influenced e-cigarette use behaviors. Previous research on youth preference for cigarette warning labels showed that although adolescent smokers and non-smokers found loss-framed cigarette warning labels persuasive, gain-framed warning labels were more effective in influencing intention to quit among smokers (Goodall & Appiah, 2008). Thus, youth may prefer loss-framed e-cigarette prevention messages but the question of which type of framing is more effective in decreasing e-cigarette use behaviors remain untested and needs examination.

Although loss-framed e-cigarette prevention messages were generally preferred by youth, we detected differences by the theme of the messages. For instance, we found that in the total sample, gain-framed messages were preferred over loss-framed messages when examining themes related to financial cost. This finding suggests that gain-framed messages regarding financial cost, which emphasized saving money by not using e-cigarettes, may be important to consider in communicating prevention messages toward youth. This theme may be particularly important given that increasing cigarette prices is one of the most effective methods to reduce youth cigarette smoking (Nikaj & Chaloupka, 2014).

We observed that preference for loss- vs. gain-framed messages across themes significantly differed by individual characteristics. For instance, relative to college students, HS students preferred loss-framed message only on themes related to social labeling as a smoker, which may reflect different social norms surrounding cigarette and e-cigarette use among adolescents and young adults. Given that peer influence is one of the top reasons for e-cigarette initiation among youth (Kong et al., 2015), it is possible that not engaging in e-cigarette use may be perceived as socially risky, and therefore, HS students may prefer loss-framing in this theme.

We also observed that females were more likely than males to endorse loss-framed messages for all message themes, regardless of their e-cigarette and cigarette use status, school level, and race. Prior research has shown that message framing influenced smoking cessation outcomes differently for female smokers with different levels of risk perception, but this effect was not found among male smokers (Toll et al., 2008). Females were less likely to use e-cigarettes in our sample than were males (females 48.2% vs. males 51.8%) (Krishnan-

Sarin et al., 2015). Future studies should examine sex-specific risk perceptions related to e-cigarettes that may moderate the association between message framing preference and sex.

Finally, we found that message framing preference differed by e-cigarette use status. We found that, adolescents who had never used e-cigarettes were more likely to prefer gain-framed messages for themes related to health risks and social labeling as a smoker relative to lifetime e-cigarette users who preferred loss-framed messages for these themes. These findings suggest that prevention messages targeted toward those who have never tried e-cigarettes should focus on gain-framed themes related to health risks and social labeling as a smoker. Interestingly, we did not observe an association between preference for any of the message themes and susceptibility to future e-cigarette use or cigarette smoking.

The findings should be interpreted in light of study limitations. We surveyed youth in Connecticut and the findings identified in this study may not generalize to other geographic regions. Although the four themes used in the messages were derived using focus groups (Cavallo et al., 2015), there could be other relevant themes that could be used for e-cigarette prevention that were not assessed in this study. To choose appropriate themes to be used in prevention messages and to appropriately counteract pro-e-cigarette messages that are widely and easily available to youth, a better understanding of how these pro-e-cigarette messages are influencing e-cigarette perceptions and use behaviors is needed.

The goal of this study was to conduct a formative evaluation to assess preference for message framing as a first step to constructing persuasive e-cigarette prevention messages. Although communicating prevention messages that are loss-framed may have utility in preventing e-cigarette use among youth, we acknowledge that a comprehensive tobacco control policies and programs would be ideal for preventing e-cigarette and other tobacco use (Farrelly et al., 2003; Lantz, Jacobson, Warner, et al., 2000). Such examples are policy changes, such as price increases and youth access restrictions, media campaigns, as well as school- and community-based interventions that involve parents and individual skill building such as psychosocial skills (e.g., self-esteem, conflict resolution). While it is outside the scope of this study to examine all of these components, we filled the gap in the literature by conducting formative research to understand youth's preference for message framing using the relevant themes identified in focus groups. This study could inform the development of e-cigarette prevention messages that could be used in future media campaigns and educational curriculums.

While this study identified preference for message framing, future studies should assess whether preference for and exposure to loss- vs. gain-framed e-cigarette prevention messages reduces positive attitudes toward e-cigarettes, reduces intentions to use e-cigarettes, enhances motivation to quit, or prompts e-cigarette cessation. Future studies should also examine other stylistic features of public health messages that could enhance the persuasiveness and impact of health messages, such as images vs. texts. For instance, previous research showed that persuasiveness of message framing of cigarette warning labels was more effective for changing smoking intentions among college students when graphic images were used but not when texts were used (Zhao, Nan, Yang, et al., 2014).

Despite the limitations, the findings of this formative research assessing preference for framing e-cigarette prevention message in terms of losses and gains is an important first step in constructing e-cigarette prevention messages. Our study findings suggest that overall, youth prefer loss-framed messages for themes related to health risks, addiction potential and social labeling as a smoker and gain-framed messages are preferred for themes related to financial costs. We also observed differences in message framing preference by individual characteristics such as sex, school level and e-cigarette use status, suggesting that theme content and framing of the messages in terms of losses or gains can be further tailored to subgroups of youth to increase the appeal of the messages.

Acknowledgments

The authors wish to thank Dr. Ralitz Gueorguieva and Ms. Ran Wu for their assistance in statistical analyses.

Role of funding source: This study was supported by a supplement grant to Dr. Krishnan-Sarin through National Institute on Drug Abuse (NIDA) grants P50DA009241 and P50DA036151. GK's and DRC's efforts were also partially supported by 1K12DA033012, CTSA grants UL1 TR000142, and KL2 TR000140 from the National Center for Advancing Translational Science (NCATS), components of the National Institutes of Health (NIH), and NIH roadmap for Medical Research. The study funders did not have any role in the design; the collection, analysis, and interpretation of data; the writing of the report; and the decision to submit the manuscript for publication.

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Highlights

- Loss-framing was preferred for themes on health risks, addiction, and social label.
- Gain-framing was preferred for themes related to financial cost.
- Females, relative to males, preferred loss-framed messages for all themes.
- Ever e-cigarette users, relative to non-users, preferred loss-framed health risks and social label themes.
- High-school students, relative to college students, preferred gain-framed social label theme.

Table 1

Loss- and gain-framed e-cigarette prevention messages.

Themes	Loss-framed message	Gain-framed message
Financial cost	You spend more money if you use e-cigarettes	You save money by not using e-cigarettes
Health risks	You may be exposed to unknown health risks if you use e-cigarettes	You may avoid unknown health risks if you don't use e-cigarettes
Addiction potential	You may increase your chances of being addicted to other tobacco products if you use e-cigarettes	You may lower your chances of being addicted to other tobacco products if you don't use e-cigarettes
Social labeling as a smoker	People will label you as a smoker if you use e-cigarettes	People won't label you as a smoker if you don't use e-cigarettes

Table 2

Preference for loss- and gain-framed e-cigarette prevention messages.

	Financial cost		Health risks		Addiction potential		Social label	
	Loss %	Gain	Loss	Gain	Loss	Gain	Loss	Gain
Total sample	38.4	56.4	68.3	25.9	66.3	27.8	71.5	22.0
Sex								
Male	38.5	61.5	67.6	32.4	64.8	35.2	70.9	29.1
Female	42.3	57.7	76.6	23.4	75.5	24.5	81.2	18.8
School level								
Middle school	38.7	61.3	74.7	25.3	72.3	27.7	79.0	21.0
High school	41.2	58.8	71.4	28.6	69.5	30.5	75.1	24.9
College	38.8	61.2	76.3	23.7	76.3	23.7	83.5	16.5
Race								
Non-White	39.4	60.6	71.2	28.8	68.2	31.8	75.4	24.6
White	41.0	59.0	73.0	27.0	71.4	28.6	77.0	23.0
Cigarette smoking								
Never smokers	40.1	59.9	72.6	27.4	71.2	28.8	77.5	22.5
Lifetime smokers	42.3	57.7	72.0	28.0	67.0	33.0	72.1	27.9
E-cig use								
Never users	40.5	59.5	73.7	26.3	71.8	28.2	78.6	21.4
Lifetime users	40.6	59.4	67.7	32.3	65.3	34.7	68.3	31.7
E-cig susceptibility (non-e-cig users only)								
Not susceptible	39.8	60.2	73.1	26.9	72.2	27.8	79.0	21.0
Susceptible	42.1	57.9	75.1	24.9	70.8	29.2	77.8	22.2

Note. E-cig = e-cigarette.

Table 3

Adjusted logistic regression models comparing preference for loss- and gain-framed e-cigarette prevention messages.

	Financial cost (<i>n</i> = 4754)	Health risks (<i>n</i> = 4720)	Addiction potential (<i>n</i> = 4689)	Social label (<i>n</i> = 4534)
	OR (95% CI)			
School level				
College (ref)				
Middle school	0.92 (0.73, 1.16)	1.00 (0.77, 1.31)	1.23 (0.94, 1.60)	1.40 (1.04, 1.89)
High school	0.83 (0.68, 1.02)	1.16 (0.92, 1.46)	1.33 (1.06, 1.67)	1.57 (1.21, 2.04)
Sex (male [ref] vs. female)	0.84 (0.75, 0.95)	0.65 (0.57, 0.74)	0.62 (0.54, 0.70)	0.57 (0.50, 0.66)
Race (white [ref] vs. non-white)	1.09 (0.95, 1.24)	1.12 (0.97, 1.29)	1.18 (1.03, 1.36)	1.11 (0.95, 1.29)
Cigarette use (lifetime users [ref] vs. never users)	1.16 (0.96, 1.40)	1.13 (0.92, 1.40)	0.88 (0.72, 1.07)	0.96 (0.77, 1.20)
E-cigarette use (lifetime users [ref] vs. never users)	0.94 (0.78, 1.12)	0.72 (0.59, 0.88)	0.81 (0.67, 0.99)	0.60 (0.49, 0.73)

Note: Gain-framed message is coded 1 and loss-framed message is coded 0. Bold font represents $p < 0.01$. ref= reference group, OR= odds ratio, and CI= confidence interval. ORs were adjusted for all listed variables.

Table 4

Adjusted logistic regression models comparing preference for loss- and gain-framed e-cigarette prevention messages among never e-cigarette users.

	Financial cost (<i>n</i> = 3793)	Health risks (<i>n</i> = 3780)	Addiction potential (<i>n</i> = 3775)	Social label (<i>n</i> = 3746)
	OR (95% CI)			
School level				
College (ref)				
Middle school	0.93 (0.72, 1.21)	0.91 (0.67, 1.22)	0.98 (0.73, 1.31)	1.27 (0.90, 1.80)
High school	0.83 (0.65, 1.05)	1.04 (0.79, 1.36)	1.03 (0.79, 1.35)	1.35 (0.98, 1.85)
Sex (male [ref] vs. female)	0.81 (0.71, 0.93)	0.64 (0.55, 0.74)	0.56 (0.48, 0.65)	0.55 (0.47, 0.65)
Race (white [ref] vs. non-white)	1.05 (0.91, 1.21)	1.11 (0.94, 1.30)	1.17 (1.00, 1.37)	1.11 (0.93, 1.32)
Cig susceptibility	0.98 (0.81, 1.19)	0.87 (0.70, 1.09)	0.80 (0.65, 0.99)	0.77 (0.61, 0.98)
E-cig susceptibility	1.10 (0.93, 1.29)	1.25 (1.04, 1.51)	1.06 (0.88, 1.27)	1.07 (0.87, 1.30)

Note: Gain-framed message is coded 1 and loss-framed message is coded 0. Bold font represents $p < 0.01$. ref = reference group, OR = odds ratio, and CI = confidence interval. ORs were adjusted for all listed variables.