

The Effect of Comparatively-framed versus Similarity-framed E-Cigarette and Snus Print Ads on Young Adults' Ad and Product Perceptions

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Objectives: We examined the effects of comparative framing (C-F; ads highlighting differences between the advertised product and conventional cigarettes and/or smokeless tobacco products) versus similarity framing (S-F; ads highlighting congruence with conventional cigarettes and/or smokeless tobacco products) in e-cigarette and snus ads on young adult smokers' and non-smokers' ad- and product-related perceptions. **Methods:** Overall, 1051 young adults (18-24 years; 76% women; 50% smokers) from existing consumer panels were recruited in a within-subjects quasi-experiment. Each participant viewed 4 online advertisements, varied by tobacco product type (e-cigarette or snus) and ad framing (C-F or S-F). **Results:** Former and current smokers rated C-F ads as more persuasive than S-F ads, as evidenced by favorable ad perceptions and high product use intentions. Former and current smokers also rated e-cigarette ads with more favorable ad perceptions, low absolute and comparative risk perceptions, high product appeal, and high product use intentions as compared to snus ads. **Conclusions:** Unless FDA regulates e-cigarette and snus advertising, there is a potential of decreasing risk perceptions and increasing use of e-cigarettes among young adults. Further research on implicit/explicit comparative claims in e-cigarettes and snus advertisements that encourage risk misperceptions is recommended.

Key words: ad framing; comparative advertising; e-cigarettes; persuasion; risk perceptions; snus

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Electronic cigarettes (e-cigarettes) are devices that heat a solution (typically containing nicotine and other additives), producing a vapor that is inhaled without combustion.^{1,2} Given that no combustion occurs during use, e-cigarettes are considered by some to be safer alternatives to cigarette smoking, and may be potentially beneficial to the public (particularly smokers) by reducing mortality and morbidity from smoking conventional cigarettes.³⁻⁵ However, there are also numerous concerns

about e-cigarettes, particularly around issues of safety and long-term health effects,⁶⁻⁸ e-cigarette use encouraging cigarettes and/or other tobacco product use (the gateway hypothesis),⁹ and the renormalization of smoking.¹⁰

Similar concerns have been raised about snus, a smokeless tobacco product that originated in Sweden, characterized by lower levels of tobacco-specific nitrosamines (a major carcinogen in tobacco), packaged in small teabag-like pouches that are placed under the upper lip and can be relatively unobtrusive when in use, and do not require spit-

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ting.¹¹ The Swedish experience with use of snus, a less harmful alternative to smoking,¹² appears to have had a reduction on the smoking rate in Sweden.¹³⁻¹⁵ However, it is not clear if the Swedish experience with snus can be generalized to other countries.¹⁶ Several papers estimating snus trial and adoption in United States (US) test markets have been published. Reports from the national datasets estimate that in 2010, 5.1% of the population had tried snus (11.4% of all smokers),¹⁷ and 1.4% of the population (2.5% men, 0.4% women) were current users (past month users) of snus.¹⁸ More recently, Biener et al¹⁹ reported that among male smokers, 29.9% had ever tried snus, and 4.2% were current users. Among female smokers, 8.5% ever tried snus and current use was unknown. Current use also was found to be virtually absent among former and never smokers. Therefore, the American experience of snus has been different so far, and studies have not shown high adoption rates for snus among adults or significant reductions in smoking cessation attributable to snus use.¹⁹ However, the concerns in the tobacco control community have not been dismissed completely because of the heightened use among young adults,²⁰ and controversy over the use of snus as a gateway tobacco product that may undermine smoking prevention and cessation efforts.^{21,22}

Despite the controversy surrounding e-cigarettes and snus in the tobacco control community, reports indicate strong awareness of snus and significant associations with progression to cigarette smoking, particularly among young adults,^{23,24} as well as growing popularity of and experimentation with e-cigarettes among youth and young adults.²⁵⁻²⁹ However, in this rapidly changing consumer and product climate, e-cigarette use has surpassed snus use.^{30,31} Data from the US Centers for Disease Control and Prevention and the US Food and Drug Administration's Center for Tobacco Products indicated that current e-cigarette use among adolescents tripled from 2013 to 2014.³² In another study assessing e-cigarette use by college students,²⁵ ever use of e-cigarettes was reported by 4.9% of students, with 1.5% reporting past month use. Although e-cigarette use was more common among conventional cigarette smokers, 12% of ever e-cigarette users had never smoked a conventional cigarette.²⁵ As such, use of e-cigarettes and snus also heightens concerns that these products

may serve as gateway tobacco products, and undermine cessation efforts.^{23,24} Data from the Minnesota Adolescent Community Cohort Study collected in 2010 to 2011 and 2011 to 2012 indicated that young adult nonsmokers who had tried snus were subsequently more likely than those who had not tried snus to become current smokers.²⁹ The study also reported that snus use was not associated with subsequent smoking cessation or reduction among young adult current smokers. Taken together, these population surveys provide consistent evidence demonstrating growing popularity and use of e-cigarettes and snus among young adults, as well as raise concerns about snus use encouraging cigarette use and maintaining tobacco dependence.

Parallel to the increased use of e-cigarettes and snus, there has been a marked increase in advertising and promotional spending for these tobacco products.³³⁻³⁵ Given that findings from a meta-analysis demonstrate a strong link between tobacco marketing and youth smoking experimentation and use,³⁶ concern is mounting about e-cigarette and snus ads influencing youth experimentation with these products. Of concern to the tobacco control community, both e-cigarette and snus are being marketed as alternatives to smoking, particularly in places where clean indoor air laws have imposed restrictions on smoking (eg, work-sites, airports, restaurants, and bars).^{34,37,38} Ads for both products also imply use for harm reduction (eg, such as "no tobacco smoke, only vapor" for e-cigarette ads and "smoke-free resolution" for snus ads).^{34,38} It is evident that advertisers are framing messages with comparisons to conventional combustible cigarettes to enhance sales of e-cigarettes and snus.

Research demonstrates that one of the most prolific themes employed for e-cigarette and snus marketing is based on framing associations relative to cigarettes.^{34,38,39} This association can be framed as a distinct comparison (eg, "smoke-free," "spit-free") or a similarity (eg, "great taste and experience of a real cigarette," "with full on tobacco satisfaction") between traditional cigarettes and the advertised alternative tobacco product. Pepper et al⁴⁰ demonstrated that smokers report greater interest in trying e-cigarettes after viewing ads that highlighted distinct differences between conventional cigarettes and e-cigarettes and ads showing product use. Although not yet well-studied, it is plausible

that young adults' responses to differently framed ads may not only depend on how the message is framed, but also on their cigarette smoking history.

Our study sought to improve understanding of the differential effects of comparative framing (C-F) versus similarity framing (S-F) in e-cigarette and snus ads on 2 important outcomes (ad-related and product-related perceptions) among young adult smokers and non-smokers. Traditional theories of persuasion used in marketing research, such as the elaboration likelihood model⁴¹ and the heuristic systematic model,⁴² highlight the importance of contextual ad-related outcomes such as positive ad perceptions, ad credibility, and ad liking in understanding attitude and behavior change. Current smokers typically exhibit a high personal relevance and involvement with tobacco-related issues, and will be more likely to process the C-F ads systematically and expend more cognitive effort in processing the comparative harm-reduction messages.^{31,41,42}

In addition, major theories of health behavior such as the social cognitive theory,⁴³ the health belief model,⁴⁴ the theory of reasoned action,⁴⁵ the theory of planned behavior,⁴⁶ and the self-regulation theory⁴⁷ argue that individuals' judgment about risk (or risk perceptions) along with perceptions about the positive consequences of behaviors play a key role in behavioral choices. Accordingly, we focused on ad-related (ad perception and ad credibility) and product-related perceptions (absolute and comparative risk perceptions, product appeal, and product use intention) as outcomes in this study.

We hypothesized that comparisons highlighted in C-F would be more persuasive (for both ad-related and product-related perceptions) than similarity-based reasoning used in S-F, because of the general perception among smokers and non-smokers that cigarette smoking is unhealthy,⁴⁸ and an overall large effect of decades of effective tobacco control policies and anti-smoking media campaigns.⁴⁹ Given the increasing popularity of e-cigarettes as compared to snus,^{30,31} we also predicted that exposure to C-F e-cigarette ads as compared to S-F e-cigarette ads, C-F snus ads, and S-F snus ads would result in favorable ad perceptions, high ad credibility, low perceived risk, high product appeal,

and high product use intention. Additionally, we hypothesized that these outcomes would be most pronounced for current smokers because of prior research demonstrating heightened interest from smokers in trying e-cigarettes after viewing ads that highlight differences between conventional cigarettes and e-cigarettes and ads showing product use.³¹ In sum, the study hypotheses were:

H1: Exposure to C-F ads will result in more favorable ad perceptions, higher ad credibility, lower perceived absolute and comparative risk, higher product appeal and higher product use intentions as compared to S-F ads.

H1a. These results will be stronger for current smokers as compared to former or never smokers.

H2: Exposure to e-cigarette ads will result in more favorable ad perceptions, higher ad credibility, lower perceived absolute and comparative risk, higher product appeal and higher product use intentions as compared to snus ads.

H2a. These results will be stronger for current smokers as compared to former or never smokers.

H3: Exposure to C-F e-cigarette ads will result in more favorable ad perceptions, higher ad credibility, lower perceived absolute and comparative risk, higher product appeal and higher product use intentions as compared to S-F e-cigarette, C-F snus, and S-F snus ads.

H3a. These results will be stronger for current smokers as compared to former or never smokers.

This study is of importance because it has several implications for tobacco product advertising and marketing regulation. The 2009 US Family Smoking Prevention and Tobacco Control Act granted the US Food and Drug Administration (FDA) authority to regulate tobacco products, but these regulations did not apply to e-cigarettes. Not until recently did the FDA propose governance of other tobacco products, including regulatory requirements for age restrictions, inclusion of health warnings, and rigorous scientific review of new tobacco products and claims to reduce tobacco-related disease and death.^{50,51} In particular, the Tobacco Control Act prohibits false or misleading labels, labeling, and advertising for tobacco products, such as modified risk or therapeutic claims. Although explicit claims on modified risk claims are not made in snus and e-cigarette advertising, implicit claims about health benefits are evident when ad-

vertisements include comparisons with cigarettes and traditional smokeless tobacco products to highlight advertised products.³⁹ By examining ad-related and product-related perceptions of young adults exposed to snus and e-cigarette advertising, we report reactions to harm-reduction claims made by tobacco companies. As such, these forms of advertising colors public perception of new and emerging tobacco products and are important to examine from a public health perspective.

METHODS

This study was a 2 (tobacco product type: e-cigarette vs snus) \times 2 (associative ad. framing: C-F vs S-F) factorial within-participants quasi-experimental study. All participants were exposed to 4 print magazine ads, with each ad representing a particular combination of the 2 independent variables (ie, e-cigarette with C-F, e-cigarette with S-F, snus with C-F, and snus with S-F). After viewing each ad for a minimum of 30 seconds, participants completed a battery of assessments regarding attitudes toward the ad and the product portrayed in it.

Participants and Procedure

Survey participants were sampled from the Qualtrics' partnered online panel providers, and their IP addresses were thoroughly checked to exclude duplication and ensure validity. In addition, Qualtrics used a sophisticated digital fingerprinting technology, and deduplication technology to provide the most reliable results and retain the integrity of the survey data. Potential respondents were sent an email invitation informing them that the survey was for research purposes only, the approximate time the survey was expected to take, and available incentives. To avoid self-selection bias, the survey invitation did not include specific details about the contents of the survey.

Based on screening criteria (US residents, young adults; half smokers, half non-smokers), 2112 participants were selected to complete the survey, during a 2-week period (June 12, 2014 to June 22, 2014). The overall response rate was 49.5%, and only 1051 participants (18-24 years; 76% women; 69.3% Whites, 14.9% Blacks, 7.7% Asians, and others less than 5% each) completed the survey. We stratified the data by cigarette smoking, so that we sampled half ever smokers (N = 524) and half

non-smokers (N = 527). Among ever smokers, 137 were former smokers, and 387 were current smokers. Additionally, of the 1051 participants, 384 (36.5%) had ever smoked an e-cigarette and 83 (7.9%) had ever used snus.

The assessments and experiment was administered online. First, participants completed a battery of questions about their tobacco use behaviors and demographics. Next, they were told that they were about to see 4 different magazine advertisements, one at a time, to read the ad carefully, and then to complete some questions about the ad before going onto the next ad. They also were told that they would not be able to move to the set of questions before 30 seconds had elapsed, and would need to hit the "next" button (which appeared after 30 seconds) to move ahead.

Stimulus Materials

Given the 2 X 2 design, there were 4 different types of print magazine ads assembled for the study. Ads were obtained from Kantar Media, using a proprietary Web-based database, Stradegy. The ads were among a set of print magazine ads obtained for a content analysis study of persuasive and rhetorical themes in non-cigarette tobacco product advertisements, from August 2012 to August 2013.³⁰ To increase the external validity of the study, we used original ads and did not manipulate them from the way they appeared in magazines.

Whereas we did not manipulate the ads, we varied the ads based on: tobacco product type (e-cigarette, snus) and ad framing (C-F, S-F). We selected ads that did not have any humans/models so as to minimize any confounds due to model preferences. We defined C-F and S-F for purposes of the current research study following Federal Trade Commission (FTC)⁵² definition of comparative advertising as one that "compares alternative brands on objectively measurable attributes or price, and identifies the alternative brand by name, illustration, or other distinctive information." We also examined trends in marketing of e-cigarettes and snus,^{30,38,53} and defined C-F as one that highlights explicit statements of differences that make the advertised product superior to conventional cigarettes and/or smokeless tobacco and S-F as one that highlights congruence with conventional cigarettes and/or smokeless tobacco and notes the advertised product as a supe-

Table 1
Ad Categorization and Orders of Presentation

Ad Framing	Type A	Type B
C-F e-cig ad	A	B
S-F snus ad	C	D
S-F e-cig ad	E	F
C-F snus ad	G	H

S. No.	Orders of presentation
1	ACEG
2	ACEH
3	ACFG
4	ACFH
5	ADEG
6	ADEH
7	ADFG
8	ADFH
9	BCEG
10	BCEH
11	BCFG
12	BCFH
13	BDEG
14	BDEH
15	BDFG
16	BDFH

rior alternative.

The specific stimuli ads we used for the study included the following e-cigarette ads that made comparisons with cigarettes, and were classified as C-F:

(1a) Njoy e-cigarette ad with the following tagline, “Start a new relationship: Finally smokers have a real alternative. Introducing the Njoy king electronic cigarette.”

(1b) blu e-cigarette ad with the following tagline, “Rise from the ashes.”

The next 2 e-cigarette ads highlighted congruence with cigarettes, with same words “...delivers the great taste and experience of a real cigarette...” and were classified as S-F:

(2a) Mystic e-cigarette ad with the following tagline, “Some choices are hard. This is easy.” This ad contained images of cowboy boots.

(2b) Mystic e-cigarette ad with the following tag-

line, “Some choices are hard. This is easy.” This ad contained images of high heel shoes for women.

The stimuli ads also included the following snus ads that made comparisons with cigarettes, with phrases such as “smoke-free” and “smoke-free tobacco pleasure” and were classified as C-F:

(3a) Camel snus ad, with the following tagline, “Cavemen created fire. We made it unnecessary.”

(3b) Camel snus ad, with the following tagline, “2013 smoke-free resolution.”

Finally, the next 2 snus ads highlighted the image of camel as an icon for Camel cigarettes, or highlighted congruence with cigarettes with words such as “...with the quality, flavor, and full-on tobacco satisfaction” and were classified as S-F:

(4a) Camel snus ad, with the following tagline, “Are you snus’n?”

(4b) General snus ad, with the following tagline, “Not all snus is created equal.”

To minimize incidental confounds,⁵⁴ we used stimulus sampling such that we had 2 ads (Type A/Type B) for each of the 4 conditions, with 8 ads total assembled for the experiment. The Type A/Type B ads were different ads highlighting the same stimulus condition. In the study, participants were exposed to 4 ads corresponding to the 4 conditions (e-cigarette with C-F, e-cigarette with S-F, snus with C-F, and snus with S-F) that were presented in predetermined 2 sets of 8 orders of presentation (see Table 1 for different orders of presentation). A one-way analysis of variance (ANOVA) with order of ads as the independent variable and all the outcome variables as dependent variables showed no difference by order of presentation (details are available from the first author). Therefore, order of presentation was not included in subsequent analyses.

Dependent Measures

The dependent measures for this study were ad perceptions, ad credibility, absolute and comparative risk perceptions, product appeal, and product use intentions.

Ad perceptions. This measure, adapted from Wakefield et al,⁵⁵ assessed overall interest and curiosity in the ad and the product. It consists of 6 items measured on a 5-point Likert scale, with responses ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Each item is prefaced with the phrase, “The ad that I just saw...” Example items include, “...has made me interested in the product,” “...made me curious to know if what the ad says is true,” and “...is one that I would talk to other people about.” Reliability for the measure was high (Cronbach’s alpha ranging from .91 to .94) for each of the 8 types of stimuli ads (Table 2). The items were averaged with a higher value indicating more favorable ad perceptions.

Ad credibility. This measure was adapted from Beltramini and Evans⁵⁶ and assessed the extent to which an ad is capable of evoking sufficient confidence in its truthfulness. It consists of 4 items measured on a 7-point semantic differential scale with bipolar adjectives such as unbelievable/believable, not convincing/convincing, and not authentic/authentic. Reliability for the measure was high (Cronbach’s alpha ranging from .89 to .94) for each of the 8 types of stimuli ads (Table 2). The items were averaged with a higher value indicating more favorable ad credibility.

Risk perceptions. The measure of risk perceptions was based on the National Cancer Institute’s 2012 Health Information National Trends Survey (HINTS),⁵⁷ and consisted of 5 items measuring absolute and comparative risk perceptions, modified for use in this study. *Absolute risk perceptions* consisted of 2 items, measured on a 5-point Likert scale: (1) “In your opinion, how harmful to health is this tobacco product (ie, the tobacco product shown in the ad),” with responses ranging from 1 (*not at all harmful*) to 5 (*extremely harmful*); and (2) “In your opinion, how likely is it that this tobacco product will cause tobacco addiction,” with responses ranging from 1 (*very unlikely*) to 5 (*very likely*). The 2 items had a strong correlation (ranging from $r = .53$ to $r = .74$ for each of the 8 stimuli; Table 2), and were averaged to form a composite measure, with a higher score indicating more harmful absolute risk perceptions. *Comparative risk perceptions* consisted of 3 items, measured on a 5-point Likert scale, and assessed risk perceptions in comparison with cigarettes. The 3 items asked: (1) “How harmful to health is this product compared to regular cigarettes,” with responses ranging from 1 (*not at all harmful*) to 5 (*extremely harmful*); (2) “How likely is it that this product will cause a tobacco-related disease for the user compared to regular cigarettes,” with responses ranging from 1 (*extremely unlikely*) to 5 (*extremely likely*); and (3) “How likely is it

that this product will cause tobacco addiction for the user as compared to regular cigarettes,” with responses ranging from 1 (*extremely unlikely*) to 5 (*extremely likely*). The 3 items were averaged to form a composite measure, with a higher score indicating more harmful comparative risk perceptions.

Product appeal. Product appeal was measured by one 5-point Likert-type item from Callery et al⁵⁸ and asked: “Would this product appeal to people your age?” Responses ranged from 1 (*not at all*) to 5 (*yes, a lot*), with a higher score indicating greater product appeal.

Product use intention. Intention was measured by one 7-point Likert-type item developed by the authors: “Overall, how likely is it that over the next 6-months, you will try the product in the ad for the first time?” Responses ranged from 1 (*very unlikely*) to 7 (*very likely*), with a higher score indicating greater product use intentions. Those who had already tried the specific product (snus or e-cigarette) chose response option 8, and they were merged with 7 (*very likely*).

Data Analyses

Preliminary data analysis assessed differences in outcome variables due to stimulus type (Type A/Type B). Table 2 presents Cronbach’s alpha values, means, and standard deviations for each of the 8 types of stimuli ads. Given 2 variants (Type A/Type B) for each stimulus type, we conducted independent sample t tests to assess differences in outcome variables due to stimulus type. The results indicated that the difference between Type A and Type B ads was significant for C-F snus ads, for absolute and comparative risk perceptions and product use intentions (Table 2). For brevity of analyses, we combined values for Type A and Type B ads for each stimulus type: C-F e-cigarette ad, S-F e-cigarette ad, C-F snus ad, and S-F snus ad. However, to account for the differences that emerged for C-F e-cigarettes, we included the stimulus type for C-F e-cigarette ads as a covariate for the substantial analyses.

Six 2 (tobacco product: e-cigarette/snus) \times 2 (framing: C-F/S-F) repeated-measures GLM analyses with smoking status (never, former, or current smoker) as a between-subject measure were conducted for each of the outcome variables (ad perceptions, ad credibility, absolute and comparative risk perceptions, product appeal, and product use inten-

Table 2
Descriptive Statistics for All Measures

Ad Description	Cronbach's Alpha α / Correlation Co-efficient r	M	SD	Cronbach's Alpha α / Correlation Co-efficient r	M	SD	t (df = 1049)
	Type A			Type B			
Ad Perceptions							
C-F e-cig ad	$\alpha = .91$	2.78	1.09	$\alpha = .91$	2.82	1.05	-.54
S-F e-cig ad	$\alpha = .94$	2.53	1.14	$\alpha = .94$	2.50	1.11	.38
C-F snus ad	$\alpha = .94$	2.37	1.08	$\alpha = .93$	2.41	1.08	-.50
S-F snus ad	$\alpha = .91$	2.36	1.07	$\alpha = .91$	2.29	1.01	1.01
Ad Credibility							
C-F e-cig ad	$\alpha = .89$	4.16	1.49	$\alpha = .90$	4.37	1.50	-.57
S-F e-cig ad	$\alpha = .91$	3.83	1.55	$\alpha = .91$	3.86	1.60	.04
C-F snus ad	$\alpha = .91$	3.89	1.60	$\alpha = .89$	3.90	1.57	.11
S-F snus ad	$\alpha = .91$	3.88	1.51	$\alpha = .93$	3.70	1.48	.49
Absolute Risk Perceptions							
C-F e-cig ad	$r = .59^{**}$	3.47	1.08	$r = .66^{**}$	3.24	1.15	3.29*
S-F e-cig ad	$r = .72^{**}$	3.17	1.16	$r = .74^{**}$	3.18	1.12	-.12
C-F snus ad	$r = .53^{**}$	4.03	.91	$r = .64^{**}$	3.90	1.00	2.15
S-F snus ad	$r = .55^{**}$	4.20	.87	$r = .63^{**}$	4.06	.90	2.50
Comparative Risk Perceptions							
C-F e-cig ad	$\alpha = .89$	3.03	1.09	$\alpha = .89$	2.82	1.09	3.17*
S-F e-cig ad	$\alpha = .92$	3.11	1.15	$\alpha = .90$	3.11	1.09	-.06
C-F snus ad	$\alpha = .87$	3.94	.90	$\alpha = .89$	3.85	.95	1.61
S-F snus ad	$\alpha = .84$	4.07	.87	$\alpha = .88$	3.95	.88	2.25
Product Appeal							
C-F e-cig ad	N/A	3.78	1.13	N/A	4.03	1.01	-3.87**
S-F e-cig ad	N/A	3.76	1.10	N/A	3.67	1.10	1.34
C-F snus ad	N/A	3.33	1.20	N/A	3.29	1.20	.64
S-F snus ad	N/A	3.10	1.24	N/A	3.06	1.22	.52
Product Use Intentions							
C-F e-cig ad	N/A	2.58	1.98	N/A	2.81	2.20	-1.82
S-F e-cig ad	N/A	2.44	1.89	N/A	2.31	1.81	1.18
C-F snus ad	N/A	2.03	1.81	N/A	1.95	1.64	.75
S-F snus ad	N/A	1.80	1.60	N/A	1.77	1.48	.30

* $p < .01$, ** $p < .001$

Note.
C-F: Comparative-framing, S-F: Similarity-framing

Table 3
GLM Results for All Outcome Variables

Variables	Ad Perceptions		Ad Credibility		Absolute Risk Perceptions [^]		Comparative Risk Perceptions [^]		Product Appeal [^]		Product Use Intentions	
	df	F	df	F	df	F	df	F	df	F	df	F
Between-Participants												
Smoking status (SS)	2	108.35**	2	40.58**	2	46.82**	2	32.57**	2	22.79**	2	259.65**
Error	1048		1048		1047		1047		1047		1048	
Within-Participants												
Product (P)	1	148.96**	1	30.21**	1	37.71**	1	67.79**	1	8.64*	1	174.34**
Framing (F)	1	84.33**	1	93.39**	1	6.55*	1	.97	1	.64	1	64.18**
P x F	1	23.94**	1	22.36**	1	22.38**	1	2.92	1	3.85	1	.71
P x SS	2	26.23**	2	2.02	2	9.81**	2	9.07**	2	6.72*	2	94.15**
F x SS	2	4.84*	2	2.88	2	1.43	2	1.07	2	2.26	2	27.36**
P x F x SS	2	.40	2	3.20	2	.09	2	.85	2	1.18	2	2.07
Error	1048		1048		1047		1047		1047		1048	

p < .01, ** p < .001

Note.

For absolute risk perceptions, comparative risk perceptions, and product appeal, we added a covariate C-F e-cigarette ad type in the GLM model. The main effect or any of the interaction effects of the covariate were not significant, and not added to the table. Details are available from the first author.

Table 4
Means and Standard Error for All Outcome Measures by Framing and Tobacco Product Type

Outcome measures	Comparison-focused (C-F)	Similarity-focused (S-F)
	M (SE)	M (SE)
Ad perceptions	2.61 (.03) ^a	2.43 (.03) ^b
Ad credibility	4.14 (.05) ^a	3.85 (.05) ^b
Absolute risk perceptions	3.65 (.03) ^a	3.63 (.03) ^b
Comparative risk perceptions	3.39 (.03) ^a	3.55 (.03) ^a
Product Appeal	3.62 (.03) ^a	3.40 (.04) ^a
Product Use Intentions	2.38 (.05) ^a	2.08 (.05) ^b
	E-cigarette	Snus
Outcome measures	M (SE)	M (SE)
Ad perceptions	2.67 (.03) ^a	2.36 (.03) ^b
Ad credibility	4.10 (.05) ^a	3.89 (.05) ^b
Absolute risk perceptions	3.23 (.04) ^a	4.06 (.03) ^b
Comparative risk perceptions	2.98 (.04) ^a	3.97 (.03) ^b
Product Appeal	3.84 (.03) ^a	3.18 (.04) ^b
Product Use Intentions	2.58 (.05) ^a	1.87 (.05) ^b

Note.

Means in the same row that do not share the same subscript are significantly different at $p < .01$.

tions). GLM models for absolute risk perceptions, comparative risk perceptions, and product use intentions also included C-F e-cigarette stimulus type (Type A versus Type B) as a covariate. *Post hoc* tests were performed using a Bonferroni correction.

RESULTS

Main Effects

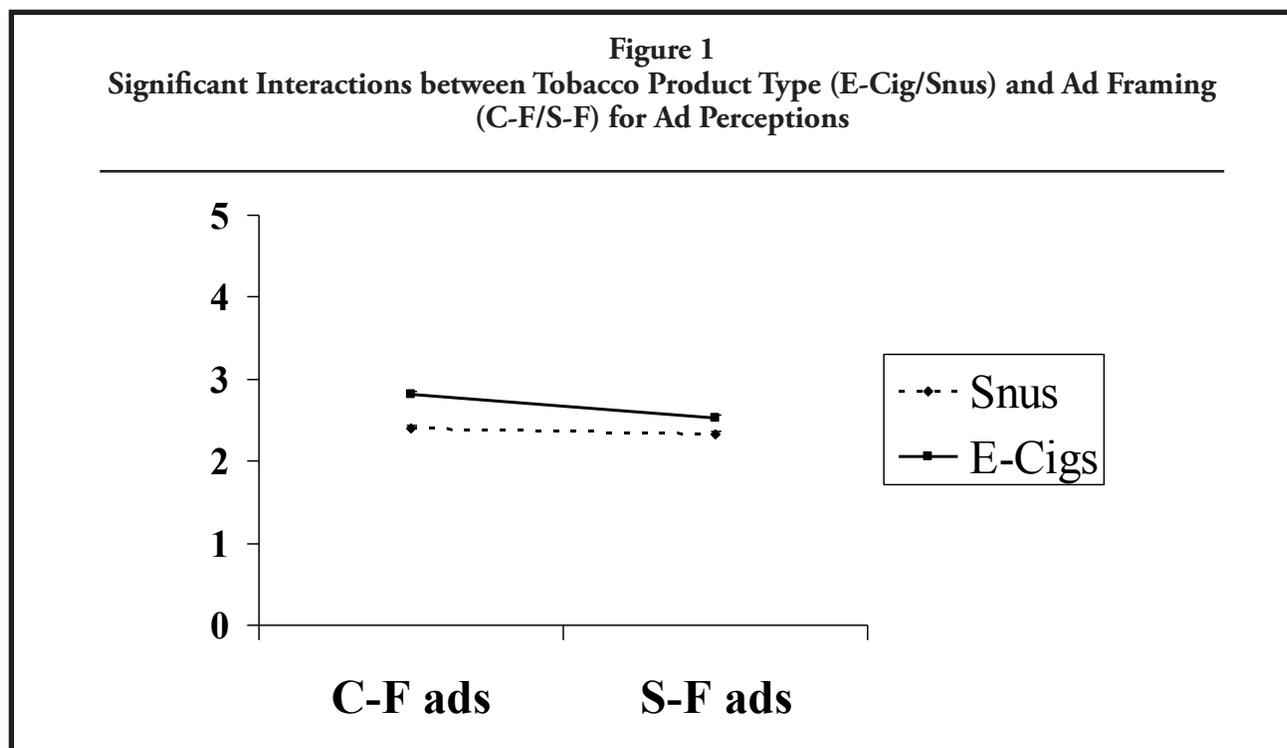
Framing. The main effect of framing was significant for ad perceptions, ad credibility, absolute risk perceptions, and product use intentions. There were

Table 5
Means and Standard Error for All Outcome Measures by Smoking Status

Outcome measures	Current smoker	Former smoker	Never smoker
	M (SE)	M (SE)	M (SE)
Ad perceptions	3.01 (.04) ^a	2.37 (.07) ^b	2.18 (.04) ^b
Ad credibility	4.37 (.06) ^a	4.01 (.11) ^b	3.61 (.06) ^c
Absolute risk perceptions	3.36 (.04) ^a	3.71 (.07) ^b	3.86 (.03) ^b
Comparative risk perceptions	3.23 (.04) ^a	3.52 (.07) ^b	3.66 (.03) ^b
Product Appeal	3.73 (.04) ^a	3.45 (.07) ^b	3.34 (.04) ^b
Product Use Intentions	3.28 (.06) ^a	1.90 (.10) ^b	1.51 (.05) ^c

Note.

Means in the same row that do not share the same subscript are significantly different at $p < .01$.



no significant differences found for comparative risk perceptions and product appeal (Table 3). For each of the significant outcomes, exposure to C-F ads was more persuasive than exposure to S-F ads (Table 4), thereby partially supporting Hypothesis 1.

Product type. Main effects for product type were significant for both ad and product-related perceptions (ie, ad perceptions, ad credibility, absolute and comparative risk perceptions, product appeal, and product use intentions; Table 3). For each of the dependent variables, exposure to e-cigarette ads was more persuasive than exposure to snus ads (Table 4), thereby supporting Hypothesis 2.

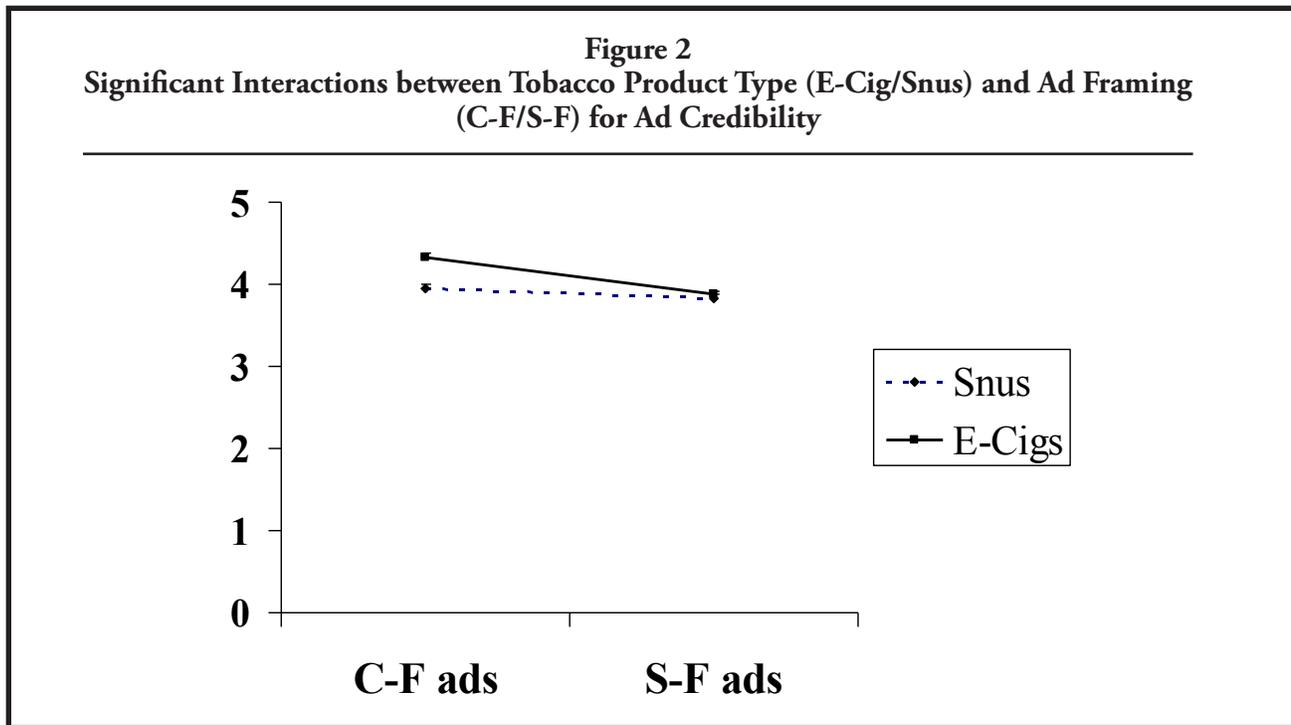
Smoking status. The main effect of smoking status was significant for ad perceptions, ad credibility, absolute and comparative risk perceptions, product appeal, and product use intentions (Table 3). Current smokers had more positive ad perceptions, ad credibility, product appeal, and product use intentions and lower absolute and comparative risk perceptions as compared to former or never smokers (Table 5).

Interaction Effects

Between framing and product type. Interaction effects between framing and product type were sta-

tistically significant for ad perceptions, ad credibility, and absolute risk perceptions (not significant for comparative risk perceptions, product appeal, and product use intentions; Table 3). The pattern of results was the same, and demonstrated that for C-F ads, e-cigarette ads were rated with more favorable perceptions, higher ad credibility, and lower absolute risk perceptions as compared to snus ads. For S-F ads, there was no difference between e-cigarette and snus ads for ad perceptions and ad credibility. However, for S-F ads, e-cigarette ads were rated with lower absolute risk perceptions than snus ads (Figures 1-3). Thus, Hypothesis 3 was partially supported, and C-F e-cigarette ads were rated with stronger favorable ad perceptions and higher credibility than S-F e-cigarette ads, C-F snus ads, and S-F snus ads (but not for other outcome measures).

Between framing and smoking status. The interaction between framing and smoking status were not statistically significant for any of the outcome variables, with 2 exceptions: ad perceptions and product use intentions, therefore Hypothesis 1a was partially supported (Table 3). For never smokers, there was no difference in ad perceptions by C-F ($M = 2.24$, $SE = .04$) versus S-F ads ($M = 2.11$, $SE = .04$). For former smokers, more favor-



able ad perceptions were reported for C-F ads ($M = 2.45$, $SE = .08$) than S-F ads ($M = 2.28$, $SE = .08$). Similarly, for current smokers, more favorable ad perceptions were reported for C-F ads ($M = 3.13$, $SE = .05$) than S-F ads ($M = 2.89$, $SE = .05$).

A similar pattern of results was observed for product use intentions. For never smokers, there was no difference in product use intentions by C-F ($M = 1.53$, $SE = .06$) versus S-F ads ($M = 1.49$, $SE = .06$). For former smokers, higher product use intentions were reported for C-F ads ($M = 2.06$, $SE = .11$) than S-F ads ($M = 1.73$, $SE = .11$). Similarly, for current smokers, higher product use intentions were reported for C-F ads ($M = 3.55$, $SE = .07$) than S-F ads ($M = 3.00$, $SE = .06$).

Between product type and smoking status. Significant interactions were observed for all dependent variables (except ad credibility) between product type and smoking status, thereby supporting Hypothesis 2a (Table 3). The pattern of the interactions was similar for ad perceptions, product appeal, and product use intentions. For instance, for never smokers, there was no difference in product use intentions by e-cigarette ($M = 1.55$, $SE = .06$) versus snus ads ($M = 1.47$, $SE = .06$). For former smokers, those exposed to e-cigarette ads ($M = 2.20$, $SE = .12$) reported higher product use inten-

tions than those exposed to snus ads ($M = 1.59$, $SE = .12$). Similarly, for current smokers, those exposed to e-cigarette ads ($M = 4.00$, $SE = .07$) reported higher product use intentions than those exposed to snus ads ($M = 2.56$, $SE = .07$).

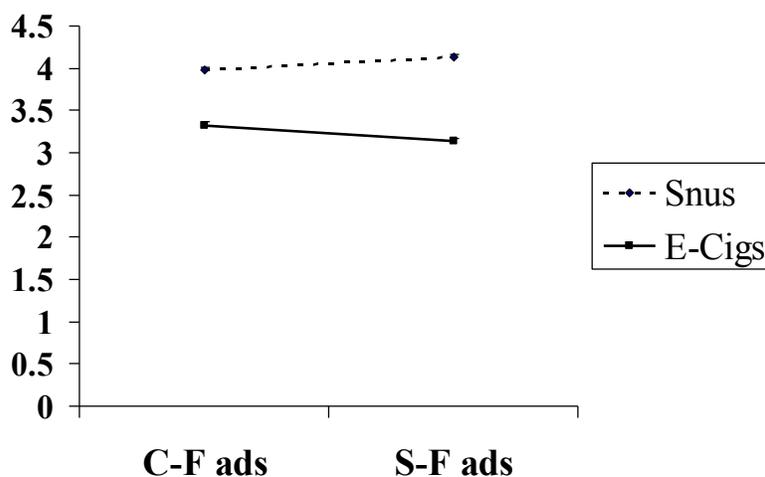
For absolute risk perceptions, results indicated that for snus, there was no difference in perceived risk between never cigarette smokers ($M = 4.18$, $SE = .04$) and former cigarette smokers ($M = 4.17$, $SE = .07$), but for e-cigarettes, never smokers ($M = 3.53$, $SE = .04$) perceived higher absolute risk compared to former smokers ($M = 3.25$, $SE = .08$). Current cigarette smokers, on the other hand, reported the lowest absolute risk perceptions for both snus ($M = 3.81$, $SE = .04$) and e-cigarettes ($M = 2.90$, $SE = .05$), albeit they perceived snus to be more risky than e-cigarettes. The same pattern of interactions was evident for comparative risk perceptions.

Between framing, product type, and smoking status. The interaction among framing, product type, and smoking status was not statistically significant for any of the dependent variables, thus Hypothesis 3a was not supported (Table 3).

DISCUSSION

This study examined the differential effects of C-F versus S-F in e-cigarette and snus ads on ad

Figure 3
Significant Interactions between Tobacco Product Type (E-Cig/Snus) and Ad Framing (C-F/S-F) for Absolute Risk Perceptions



and product-related perceptions among young adult smokers and non-smokers. The results showed overall high persuasive outcomes for C-F ads and e-cigarette ads, with statistically significant results for current and former smokers, but not for never smokers. The type of ad framing made a difference as to whether an ad generated product use intentions among young adult never, former, and current smokers. As well, e-cigarette ads generated more product use intentions than snus ads among current and former smokers, but not for never smokers. The findings are discussed in greater detail below, with a heightened focus on the magnitude of change.

Marked concerns have been raised about the effect of current unregulated practices of marketing of e-cigarettes to youth and young adults. Our results show that print ads for e-cigarettes and snus not only promote the idea of reduced harm but also generate interest in the product and an increased likelihood of product use among former smokers and current smokers, albeit the magnitude of difference was not too large. In particular, the results demonstrate that participants rated e-cigarette ads with low risk perceptions (3.23 for absolute and 2.98 for comparative risk perceptions, on a scale from 1-5, with a higher score indicating more

harmful risk perceptions) as compared to snus ads (with scores of 4.06 and 3.97 respectively). The significant changes observed for ad perceptions, ad credibility, and product appeal became more favorable for e-cigarette ads than neutral ratings for snus ads. Finally, results indicated a significant change in the degree of likelihood of product use intentions, with e-cigarette ads rated as somewhat unlikely use intentions as compared to snus ads that were rated as unlikely use intentions. Similarly, current smokers reported a more neutral stance to both e-cigarette and snus product use intentions compared to somewhat unlikely intentions from former smokers and highly unlikely intentions from never smokers. Correlating the findings with current research that demonstrates heavy expenditures for promoting e-cigarettes and snus,³⁹ it is not surprising that manufacturers of e-cigarettes and snus see a clear potential in re-introducing newer forms of non-combustible tobacco products to former and current smokers. Our study only examined effects of a single time-point exposure to e-cigarette and snus ads; however, the effect of cumulative ad exposure on long-term tobacco use behavior is yet to be determined.

This study also demonstrates that the framing of ads make a difference in the way the products are

perceived. The messages promoted in C-F ads for snus (eg, “spit-free,” “smoke-free”) and e-cigarette (such as, “no tobacco smoke, only vapor,” “no odor, no ash”) did not explicitly state modified risk, but implied messages about modified risk to our sample of young adults. Our study demonstrated that exposure to C-F ads was associated with slightly lower risk perceptions than S-F ads that promoted the message that the advertised product was similar, but better than cigarettes (eg, “great taste and experience of a real cigarette,” “with full on tobacco satisfaction”). Given the widespread perception among general public in the US that cigarettes are unhealthy,⁴⁸ it is likely that C-F messages act as important cues promoting harm reduction messages, motivating systematic processing among smokers,⁴² and therefore, influencing lower risk perceptions and higher product use intentions in smokers. The results also indicated that former smokers rated the C-F ads with more neutral ad perceptions and product use intentions as compared to S-F ads that were rated with more unfavorable perceptions and unlikely intentions, thereby, highlighting the concern that cumulative exposure to such ads may lower former smokers’ intent to stay away from tobacco and increase chances of eventual relapse to tobacco product use.

Our findings indicate that never smokers did not report heightened product appeal or product use intentions for C-F or S-F ads as compared to former or current smokers. Examining the exact pathways of influence will help clarify the differential effects of C-F and S-F ads on risk perceptions and product use intentions among never, former, and current smokers. As well, the medium of ad exposure may influence youth and young adults differently. In one study, after televised e-cigarette ad exposure, youth who had never used e-cigarettes previously perceived e-cigarettes as cooler, more fun, healthier, and more enjoyable. Youth who thought the ads were more effective were also more likely to have a positive attitude toward e-cigarettes and greater intention to try e-cigarettes in the future.⁶⁰ Although the aforementioned study did not utilize differential ad framing, it may be possible that the medium of advertisement influences favorable perceptions, with televised ads motivating youth more than printed ads to experiment with product use. Therefore, additional research is needed to examine the effects of differential ad framing (in various media)

for snus and e-cigarette advertising for youth and young adult populations.

Limitations of the Study

Limitations to this study include the use of on-line convenience sampling, which limits the generalizability of the findings to all young adults. We only stratified the sample by smoking status, and not by e-cigarette, snus, and cigarette use status (because of low frequencies), primarily because we were interested in assessing the reactions of never, former, and current smokers on exposure of e-cigarette and snus ads. The self-selected population of online young adults may react differently to print ads than the general population of young adults viewing print ads in other forms of publications. We utilized a quasi-experimental study design that limited the control over stimuli. Instead of manipulating the stimuli, we varied the stimuli based on specific characteristics of the ads. Therefore, our study was not controlled but more externally valid, as we used original ads, the way they appear in magazines. We did not include a manipulation check to assess if the stimuli variability was indeed perceived as such by participants. However, given clear differences in outcome variables owing to framing variability, it can be assumed that the participants were able to find nuanced differences among the different stimuli to which they were exposed. We also did not control for brand and current e-cigarette and snus use status of participants, which may have modified the findings. Additionally, we relied on immediate post-exposure outcomes and did not follow the participants longitudinally to help explore the longer-term influence of ads on single product use and poly-tobacco use behaviors. Finally, we relied only on self-reported data and did not measure actual behavior, similar to most message perception research.

Despite these limitations, our study indicates that e-cigarette and snus print ads, particularly the ones that exhibit comparisons with conventional cigarettes or smokeless tobacco provide compelling risk reduction beliefs and reduce the strong likelihood of product use among young adult current and former smokers. The cumulative and long-term effects of exposure to these ads on tobacco use are not yet known. However, in the absence of strong message regarding the harms associated with

these products, there is a marked concern about the influence of advertising on e-cigarette and snus use among young adults. Unless FDA regulates e-cigarette and snus advertising, there is a potential of decreasing risk perceptions and increasing use of e-cigarettes among young adults. Given that we only measured responses to one-time exposure and not cumulative ad exposure, it is likely that framing of ads may promote reduced harm perceptions, make a difference in how products are perceived, and increase intentions, but the study cannot draw clear conclusions on the impact of snus and e-cigarette ad exposure.

IMPLICATIONS FOR TOBACCO REGULATION

Our study has several implications for tobacco product advertising and marketing regulation. The Tobacco Control Act prohibits false or misleading labels, labeling, and advertising for tobacco products, such as modified risk or therapeutic claims.⁶¹ Our study demonstrates that C-F ads for e-cigarettes are perceived favorably, found to be more credible, and that the product is assumed to be of lower risk. These findings are relevant for former smokers, raising the concern that cumulative and long-term exposure to such ads may lower former smokers' intent to stay away from tobacco and increase chances of eventual relapse to tobacco product use. Therefore, more research to assess the impact of C-F ads on former smokers is advisable. Unless harm reduction claims are substantiated by meta-analysis, marketing restrictions banning any form of implicit or explicit claims about harm reduction in e-cigarettes and snus advertisements should be enforced.

The Tobacco Control Act limits tobacco advertising in publications with a large youth readership,^{62,63} but review of past research indicates that teens (12-17 year-olds) and young adults (18-24 year-olds) have access and exposure to print and television ads for e-cigarettes and print ads for snus.^{39,64} Our study demonstrates how exposure to e-cigarette and snus ads can influence risk perceptions, product appeal, and product use intentions among young adults. Future research examining the effects of exposure to e-cigarette and snus print ads on teenagers' ad-related and product-related perceptions will provide much needed

data to demonstrate the dangers associated with exposure to persuasive e-cigarette and snus ads on youth. A clear regulatory guideline and strict enforcement that prohibits any form of e-cigarette and snus advertising in publications that have a 10% or more youth readership and on national network, cable, and syndicated television media will reduce youth exposure to e-cigarette and snus ads, thereby reducing product use and experimentation. This is an area of possible extension of the current work.

Our study also has implications for future tobacco control research. A longitudinal study of e-cigarette and snus advertising influence on product use initiation, single tobacco product use, dual tobacco product use, or poly-tobacco product use behaviors is needed to demonstrate the long-term effects of advertising on product use for both youth and young adults. If longitudinal research finds that e-cigarettes and/or snus deter current smokers from quitting, encourage dual- and poly-tobacco use, or initiate smoking among youth and young adults, then public health campaigns will need to be developed to discourage e-cigarette and snus use. Finally, our study underscores the need for close monitoring of advertising influences on youth and young adults by including other media outlets such as billboards, radio, television, and direct mail.

Human Subjects Statement

We received a de-identified anonymous dataset from Qualtrics, so human subjects approval was not required.

Conflict of Interest Statement

All authors of this article declare they have no conflicts of interest.

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