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## Testing messages to reduce smokers' openness to using novel smokeless tobacco products

**Lucy Popova, PhD,**

Center for Tobacco Control Research and Education, University of California, San Francisco

**Torsten B. Neilands, PhD, and**

Center for AIDS Prevention Studies, Department of Medicine, University of California San Francisco

**Pamela M. Ling, MD MPH**

Division of General Internal Medicine, Department of Medicine, Center for Tobacco Control Research and Education, University of California, San Francisco

### Abstract

**Introduction**—Tobacco manufacturers' aggressive promotion of new smokeless tobacco products such as snus warrants a timely and effective public health response. This study tested potential counter-marketing messages to discourage current and former smokers from becoming dual users of smokeless tobacco and cigarettes.

**Methods**—In a pretest – post-test experiment, 1,836 adult current and recently former smokers from a national sample were randomized to view one of six anti-smokeless tobacco ads followed by a snus ad, to view a control ad followed by a snus ad; or to view two control ads. Perceived effectiveness of ads and actual changes in attitudes and openness to snus were compared across groups using analyses of variance.

**Results**—Some ads that were perceived as most effective did not change attitudes or openness to trying snus, and conversely, some ads not perceived as effective changed attitudes and openness to snus. Ads portraying the negative health effects of smokeless tobacco were perceived as most effective, but ads with anti-tobacco industry themes significantly decreased favorable attitudes toward snus. Responses to ads were different for smokers who had ever used smokeless tobacco: for this group health effects and humorous/testimonial ads were effective.

**Conclusions**—Measures of perceived effectiveness of anti-tobacco ads need to be augmented with measures of actual effectiveness to assess counter-marketing messages. Some of the developed ads, such as ads with anti-industry themes, were effective for the overall population of smokers whereas humorous/testimonial and health effects ads were particularly effective in changing attitudes of past users of smokeless tobacco.

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Correspondence to: Pamela M. Ling, MD MPH, Associate Professor of Medicine, Box 1390, 530 Parnassus Avenue, Suite 366, University of California San Francisco, San Francisco, CA 94143-1390, 415-514-8627, fax 415-514-9345, pling@medicine.ucsf.edu.

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## INTRODUCTION

Marketing expenditures on smokeless tobacco in the US have increased by 277% since 1998.[1] Since 2006, the major US cigarette companies acquired smokeless tobacco companies and began targeting current smokers with cigarette-branded novel smokeless tobacco products.[2] Over the past 40 years, the US smokeless tobacco market has shown increasing rates of use of moist snuff (ground tobacco with high moisture content) and decreasing use of loose leaf chewing tobacco; recently, more novel tobacco products, such as snus have been introduced.[3] Snus is finely ground oral tobacco packaged in small porous pouches placed between the gum and lip. It originated in Sweden, and is currently banned in the rest of the European Union and in Australia.[4] It is unknown how similar products sold with the name “snus” in the USA are to the Swedish products.

The expansion of novel alternative tobacco products has been paralleled by increased advertising to people who are not traditional smokeless tobacco users, such as urban smokers[2] and women.[5] The increased advertising for smokeless tobacco products may result in harmful behavior patterns. First, current smokers might be discouraged from quitting and instead encouraged to become dual users of cigarettes and smokeless tobacco. Dual or situational use of smokeless tobacco normalizes tobacco use in smokefree environments, and dual use is associated with a number of negative health outcomes, such as increased rates of cardiovascular disease,[6–8] pancreatic and esophageal cancers,[9, 10] and greater risk of Crohn’s disease and ulcerative colitis.[11] Secondly, smokeless tobacco promotion may entice youth to begin experimenting with tobacco products, which may lead to cigarette initiation.

The aggressive promotion of novel smokeless tobacco products [2, 12–14] demands an effective and timely public health response. We took a first step toward developing and testing messages that might counteract the new promotion of novel smokeless tobacco products. Past research comparing different message concepts for anti-tobacco advertisements demonstrated that portraying negative health effects of tobacco use and conveying anti-industry themes in advertising is effective at generating anti-tobacco attitudes, attention to and positive appraisal of ads, and greater intentions to quit or not start using tobacco.[15–17] Building on this foundation, we assembled a research team with expertise and knowledge of the tobacco industry’s marketing strategies and practices gained from analyses of previously secret tobacco industry documents and from content analyses of current and past smokeless advertising. This multidisciplinary team worked with a social marketing agency to develop several countermarketing messages, which relied on principles of social marketing theory[18, 19] to directly or implicitly address tobacco companies’ marketing claims for new smokeless tobacco products. Rather than directly responding to industry advertising slogans or attempting to create aspirational images to compete with smokeless advertisements, an understanding of the tobacco industry marketing process was

used to help to determine the tobacco companies' target audiences, and to gain a basic sense of what arguments might increase resistance to adopting new tobacco products. This article reports how effective these messages were for current and former smokers, as well as past users and non-users of smokeless tobacco in decreasing positive perceptions of smokeless tobacco and in deterring smokers' interest in trying novel smokeless tobacco products for dual use.

## METHODS

### Message development

We used an empirical, inductive approach to develop counter-marketing messages. We reviewed the literature regarding effective anti-tobacco messaging for various audiences, although most of this prior work focuses on cigarettes, not smokeless tobacco or dual use. Our main focus was on identifying and counteracting tobacco companies' promotion of new smokeless tobacco products using the principles of countermarketing. Over the past three years, our research team has conducted analyses of previously secret tobacco industry documents to develop a deep understanding of the historical and evolving strategies used to promote smokeless tobacco products.[2] In addition, the team collected, reviewed and compared past and current smokeless tobacco advertisements in print, direct mail, and on websites to examine the strategies used by tobacco companies to promote smokeless tobacco to current and former smokers. In addition, in 2010, 8 focus groups were conducted to assess smokers' reactions to smokeless advertising and their perceptions of novel smokeless tobacco products, and these results have been published previously.[20] Participants were 65 adult smokers residing in San Francisco and Los Angeles who had received direct mailing advertisements for tobacco products in the past year, recruited by a commercial market research firm using market research databases, telephone, internet, and street recruitment. [20] The results of this research were reviewed by a multidisciplinary research team with subject area expertise in medicine, social marketing, public health, and anthropology, to inform the development of 12 initial message concepts in collaboration with a social marketing agency. These message concepts were tested with 8 online focus groups to determine smokers' responses to the different concepts (including but not limited to liking and perceived effectiveness) with particular attention to which message concepts generated the most or the richest discussion among participants. Online focus group participants were 75 adult current and recently former (quit in the past 2 years) smokers, recruited from a Knowledge Networks panel (additional information on the panel recruitment is provided in the next section). Each group viewed at least four of the 12 message concepts, executed as black-and-white drawings and text. Rather than solely taking into account perceived effectiveness, we examined which advertisements generated the most discussion amongst participants, whether the discussion was relevant to smokeless tobacco and dual tobacco use, and how engaged participants appeared to be with the topic of discussion. Based on the focus group discussions, six message concepts were further developed into print ads with color photographs (Appendix 1).

Because the ads were developed from this iterative inductive approach rather than to test a single message strategy, a variety of messages, themes, and delivery styles appeared in the

final ads. Almost all of the ads included some negative health effects of smokeless tobacco, but with different emphasis. For example, the “Target” ad (Appendix 1), featured an illustration of a practice shooting target and named ten diseases that have been linked to smokeless tobacco use. The “Poison control” ad pictured a little girl reaching for pellets of dissolvable tobacco (another novel smokeless tobacco product), illustrating the risk of nicotine poisoning with these products. The “Industry cartoon” ad portrayed the more well known link between oral cancer and smokeless tobacco use by showing a person losing their jaw, but executed in a less threatening, more metaphorical way using a cartoon. Calling attention to the role of the tobacco industry in the tobacco epidemic is one of the most effective strategies in tobacco control.[21, 22] Tobacco industry activities were included in several ads with different styles: the “Keep Smoking” ad emphasized similarities between all tobacco products in a straightforward, informational manner, and pointed out tobacco industry attempts to “push smokeless gimmicks at smokers” in order to keep them hooked on nicotine. The “Experiment” ad was a metaphor, comparing smokers who used novel smokeless tobacco products to lab rats used by the tobacco industry to test their new products. The “Industry Cartoon” ad framed oral cancer as a new problem “from the industry that brought you lung cancer.” In contrast, the “Spit swallow” ad utilized a completely different approach using a personal “tongue-in-cheek” testimony that revealed that novel smokeless tobacco products are just a variation on the old smokeless tobacco products.

## Participants

A national sample of current and former smokers was recruited through a Knowledge Networks online panel (N=1,836). Knowledge Networks is a research company that recruits participants through probability-based sampling using address-based methods. Participants are rewarded for participation in research with incentive points redeemable for cash or with hardware and free access to the Internet. The sample was initially screened to include only adults age 18+, who had smoked 100 cigarettes in their entire life and reported that they were a current or former smoker (having quit within the past two years). Within this population, we defined current smokers as those who had either never tried to quit or had resumed smoking after their quit attempts, and former smokers as those who had tried and quit successfully (were not currently smoking). Because relapse rates for former smokers with abstinence of a duration longer than two years are low,[23] we excluded former smokers who had quit more than 2 years prior to the study.

## Procedure

We conducted a pilot test with 134 current and former smokers recruited from the Knowledge Networks panel to examine feasibility, refine the questionnaire, and to determine whether order of stimulus presentation affected results. No order effects were found, so the study employed a single order of stimulus presentation.

After completing a pre-test survey measuring their current attitudes towards snus, openness to using snus, and behavior regarding smokeless tobacco, participants were randomized to view one of six anti-smokeless tobacco ads followed by a snus ad (groups 1–6), to view a control ad followed by a snus ad (group 7); or to view two control ads (group 8) (Figure 1).

The counter-advertisement was placed before the pro-snus ad, modeling after the counter-advertising research by Pechmann et al.[24] Participants viewed the message without time constraint but were unable to return to the message once they had moved on. Immediately following the viewing of the first ad, all participants answered questions evaluating their reactions to the ad. Then they saw the second ad, followed by the ad evaluations. Immediately afterwards respondents completed a post-test assessing their attitudes towards snus and openness to use snus. They also completed a behavioral task selecting which, if any, free sample of snus they would like to receive. Median time to complete the study was 20 minutes. After completing the study, all participants were given a quitline telephone number and referred to smoking cessation websites.

## Measures

**Demographics and tobacco use**—Demographic variables included sex, age, race, annual household income, educational level, and geographical region. Smoking status was either current smoker (smoked 100 cigarettes in lifetime and currently smoke) or recent former smoker (quit within the past two years). Ever and current (past month) use of smokeless tobacco products was measured for each of three smokeless tobacco products: loose leaf, moist snuff, and snus. Participants were classified as past smokeless users if they reported ever trying at least one of these products (Table 1).

**Ad evaluations**—Participants evaluated ads on several dimensions. *Perceived effectiveness* measures were based on past research on perceived effectiveness, [25, 26] and consisted of five items reported on a 7-point semantic differential scale: convincing-unconvincing, effective-ineffective, believable-unbelievable, realistic-unrealistic, and memorable-not memorable (Cronbach's  $\alpha=.95$ ). General *attitudes toward the ad* comprised three items measured on a 7-point semantic differential scale: interesting-not interesting, good-bad, likeable-not likeable (Cronbach's  $\alpha=.87$ ).[27, 28] One item "How much did you see in the ad that you didn't already know?" measured *information value* of the ad on 5-point Likert scale ranging from "Nothing at all" to "A great deal." The rest of the ad evaluation items were measured on 9-point Likert scales ranging from "Not at all" to "Extremely." The *ad's potential to stimulate discussion* was measured by one item: "How likely are you to talk about this ad with your family or friends?" *Emotional response to the ad* was assessed using a scale comprising six items: "When looking at this ad I felt: afraid, guilty, sad, angry, disgusted, anxious" (Cronbach's  $\alpha=.93$ ). *Ad consistency*[29] was measured by two items: "How much do you think the visual message (i.e., what you saw) and the text (i.e., what you read): (a) Say the same thing as each other; (b) Are consistent with each other?" (Cronbach's  $\alpha=.94$ ). *Transportation into the ad* [30] was measured with four items: "I could picture myself in the scene of events in the ad," "The ad really made me think," "The ad affected me emotionally," and "The events in the ad are relevant to my everyday life" (Cronbach's  $\alpha=.87$ ).

**Outcome variables**—Outcome variables measured changes in attitudes toward snus and openness to snus from pretest to post-test. The *attitudes toward snus* scale comprised four items measured on a 7-point semantic differential scale: good-bad, intelligent-unintelligent, appropriate-not appropriate, and pleasant-unpleasant (pretest  $\alpha=.96$ , post-test  $\alpha=.97$ ). One

item “How open are you to trying snus in the future?” measured *general openness to trying snus* on a 9-point Likert scale, anchored by “Not at all open” - “Extremely open.” *Openness to using snus for health reasons* was measured with three items: “Would you ever use or switch to a smokeless tobacco product for any of these reasons? a) to reduce your health risk; b) to cut down on number of cigarettes you smoke; c) to quit smoking” (pretest  $\alpha=.97$ , post-test  $\alpha=.96$ ), likewise measured on 9-point Likert scale, anchored by “Definitely wouldn’t” – “Definitely would.” Participants were also asked “How willing would you be to try smokeless tobacco in a situation when you couldn’t smoke?” (9-point Likert scale, ranging from “Not at all” to “Extremely”).

**Behavioral task - selection of free sample of snus**—After the exposure to both ads, participants were offered a free sample of snus and asked to select the brand and flavor, choosing among three Camel snus packs (robust, frost, mint), two Marlboro snus packs (mint, original), and a pack of Skoal snus (mint). They could also select "Not interested in a free sample of snus" option. After making the selection, the participants were informed that no packs would actually be mailed to them and that this study did not endorse or promote tobacco use in any way. This behavioral selection task has been used in prior studies.[31]

### Rationale for Group Comparisons

Our goal was to determine which messages were the most effective countermarketing tactics by comparing groups exposed to countermarketing ads to each other and to the control groups. We wanted to see which messages, if any, were perceived as more effective and which resulted in actual changes in attitudes and openness to snus. Consistent with our inductive message development strategy we were open to discovering what message ideas were the most effective.

### Statistical Analyses

All analyses were conducted in IBM SPSS version 19. To analyze evaluations of the ad (such as perceived effectiveness), univariate analyses of variance (ANOVAs) were used with ad type as independent variable and various ad evaluations as dependent variables. To examine the effects of individual ads on changes in attitudes and openness to snus, repeated measures ANOVAs were performed. To assess the relationship between two types of measures of ads’ efficacy, bivariate correlations were ran between measures of perceived effectiveness and changes in outcomes. Finally, to study the interaction effects of ad and demographic or tobacco use variables, we used general linear models (GLM) with time as within-subject factor and demographics and past tobacco use variables as between-subject factors. Multiple paired comparisons of cell means featured *p*-value adjustment via Tukey's honestly significant difference (HSD) procedure to maintain a nominal alpha of .05.

## RESULTS

### Description of the sample

The national sample of 1,836 current and former smokers was 46.8% male, mean age was 47 years, ethnically the sample was predominantly White (73.1%), but the distribution by income, education, and region of the US was diverse (Table 1). The majority of participants

were daily smokers (57.0%), 22.0% tried smokeless tobacco (loose leaf, moist snuff, or snus) in the past, and 5.2% were current users (used one or more of smokeless tobacco products in the past month). In addition, 76 participants (4.1%) were dual users, i.e., current smokers and current (past 30 days) users of smokeless tobacco. Due to the small number, we did not run separate analyses focused on dual use.

### Evaluation of perceived effectiveness of the ads

Different messages received different evaluations from the participants (Table 2), but two ads – “Poison Control” and “Target” – scored highest in perceived effectiveness. The “Poison control” ad was perceived as the most effective, judged to have the greatest potential to stimulate discussion, and elicited the highest emotional response. The “Target” ad was deemed the most consistent, involving (ad transportation), and likeable (attitudes toward the ad).

### Effects of the ads on attitudinal outcomes

Table 3 summarizes the results of the repeated-measures ANOVAs on various outcomes. Exposure to “Keep smoking” and “Industry cartoon” ads significantly decreased favorable attitudes toward snus. Exposure to four anti-smokeless ads significantly increased openness to try snus (Table 3), but openness to snus went up in all groups, which is likely to be the effect of repeated testing. In all groups, openness to use snus for health reasons and in situations when one cannot smoke decreased from pretest to post-test. Because this situational openness to snus decreased even in the control/control group, we cannot conclude that anti-smokeless ads had an effect; rather, this appears to be the effect of repeated testing.

The time by group interaction test was only significant for changes in attitudes towards snus; “Keep smoking” and “Industry cartoon” ads significantly decreased positive attitudes towards snus compared to other groups.

### Correlation between perceived effectiveness and changes in outcomes

Bivariate correlations between ad evaluations (perceived effectiveness of the ad, informational value, etc.) and actual changes in outcomes (change in attitudes towards snus, change in openness to snus, etc.) in participants who saw treatment ads ranged in absolute values between  $r=.001$  (between ad’s potential to stimulate discussion and change in general openness to snus) and  $r=.136$  (between perceived effectiveness and change in openness to snus when cannot smoke) (Table 4). Although many correlations were statistically significant due to the large sample size, the average absolute correlation was .06, a very small effect.[32]

### Interactions between ad exposure and past smokeless use

There was a significant ad by past smokeless tobacco use interaction on change in positive attitudes towards snus ( $F(7, 1647)=2.60, p<.05$ ; Figure 2, top). When looking by ad, the statistically significant differences between never users and past users were for “Target” and “Industry Cartoon” ads. The “Target” ad ( $F(1, 1647)=6.81, p<.01$ ) significantly lowered positive attitudes of past users ( $M= -.52$ ) relative to never users ( $M=.06$ ). The “Industry

cartoon” ad ( $F(1, 1647)=9.57, p<.01$ ) significantly lowered attitudes of never users ( $M= -.45$ ) relative to past users ( $M=.22$ ).

There was also a significant ad by past smokeless tobacco use interaction on change in general openness to snus ( $F(7, 1773)=2.50, p<.05$ ; Figure 2, bottom). When looking by ad, the significant differences were in the control/control “Spit swallow,” and “Target” conditions. In the control/control condition, past users ( $M=.38$ ) became significantly more open to using snus as compared with never users ( $M=.01, p<.05$ ). Seeing the “Spit swallow” ad made past users significantly less open to snus ( $M= -.24$ ) relative to never users ( $M=.13, p<.05$ ). The “Target” ad significantly increased the openness to snus for never users ( $M=.4$ ) relative to past users ( $M=.02, p<.05$ ).

### Behavioral task - selection of free sample of snus

Overall, 20% (365) of participants were interested in receiving a free sample of snus. There was no significant difference across ads in the proportion of people interested in free snus ( $\chi^2(7) = 9.16, p=.241$ ) (Table 3), although the proportion was highest (24.6%) in the group that saw the snus ad without an anti-smokeless ad.

## DISCUSSION

We found that some anti-smokeless tobacco ads were able to reduce favorable attitudes toward and intentions to use novel smokeless tobacco products, such as snus. These anti-smokeless counter-advertisements are, to our knowledge, the first attempt to provide evidence for various anti-smokeless tobacco messages to counteract the newest snus advertising strategies. Compared to past research, our study employed a more advanced pretest-post-test experimental design and measured both perceived effectiveness and actual effectiveness of the ads on attitudes and openness to trying snus. The results from this study add to the existing body of research on the comparative effectiveness of various message themes and have the potential to assist in decision making about specific ads or message strategies that may be used in public health interventions.

One of the strengths of this study was assessing ads’ efficacy in two ways: by measuring perceived effectiveness (asking participants to rate how effective, realistic, believable they thought the ad was) and actual effects of the ad (changes in attitudes and openness to snus). Responses to these measures were different: while “Poison control” and “Target” ads were rated as the most effective, involving, and liked “Industry Cartoon” and “Keep smoking” ads were the most effective based on the actual changes in attitudes and the behavioral measure of interest in free sample of snus. The average absolute correlation between the two types of measures of ads’ efficacy was  $r=.06$ , a small effect.[32] These findings demonstrate the necessity to measure ad efficacy by looking at actual outcomes, rather than relying solely on how viewers rate them. The “Poison control” ad, which received the highest perceived effectiveness evaluations from viewers (and was uniformly liked by the focus group in preliminary studies), did not change attitudes or behavioral intentions.

Furthermore, the attitudinal and behavioral outcomes suggested that “cartoon style” ads might be more effective for some audiences than past research indicated.[33] In Hammond’s



study of cigarette warning labels, cartoon warnings were rated as less effective than “real” graphics; but only perceived effectiveness was measured. Similarly, in our study the “Industry cartoon” ad was rated lower on effectiveness than ads with “real” pictures, but this cartoon ad significantly decreased positive attitudes toward snus, while those ads that were rated as more effective (e.g. “Poison Control”) did not affect attitudes. However, because the “Industry cartoon” ad included many elements, including a metaphorical presentation of health effects and a novel/creative depiction in cartoon style, the result cannot be generalized to cartoon ads in general. These results would also be enhanced by additional research to determine if attitudinal measures predict actual behavior, or by conducting measurements of attitudes or recall over time, as our study measured immediate responses following a single exposure to ads.

Our study also suggests that some important groups have different responses to counter-advertising. For example, we found that responses to counter-advertisements were different for smokers with prior experience using smokeless tobacco compared to smokers who had never used smokeless tobacco. For past smokeless tobacco users, as compared to never-users, the “Target” ad effectively reduced favorable attitudes toward snus. In addition, the “Spit swallow” ad reduced openness to trying snus among past smokeless users. It is possible that a non-threatening humorous presentation in the “Spit swallow” ad given in a testimonial format allowed smokers to relate to the message to the greater extent without alienating them with health threats. The testimonial, humorous, or other non-threatening approaches should be explored further among those considering interventions specifically targeting past smokeless users. Furthermore, future research should examine how people with different levels of experience with smokeless tobacco react to anti-smokeless messages in combination with snus advertising.

In our study, 20% of participants opted to receive a free sample of snus. This is lower than in a study where participants chose among free samples of cigarette packs with 38.5% accepting the offer. [31] There were no significant differences in proportion of participants choosing to receive a free sample of snus across the experimental groups, although a slightly higher proportion of those who saw a smokeless ad, but did not see a counter-marketing ad were interested.

The strength of this study is that it combined bottom up, inductive message development with the strong experimental design of the message testing. However, both of these approaches have inherent limitations. Our approach to developing messages from the bottom up is similar to how many public health interventions are developed. Currently, there is almost no research on effective messages that would discourage smokers from taking up smokeless tobacco. Our study begins to fill this gap by developing a wide variety of counter-marketing messages and broadly testing the various message ideas. As such, although it is based on relevant and timely empirical findings, the messages include a variety of approaches. As a result, it is hard to apply theoretical mechanisms to explain message effects (or lack thereof). However, in this initial study of this approach for tobacco prevention, our primary goal was to identify messages that work; explaining the mechanisms of effects under a theoretical framework and developing new messages under that framework is a logical next step. For example, future investigations might apply theory on

message framing (e.g., gain vs. loss)[34] to determine whether highlighting risk of using smokeless tobacco or the benefits of not using smokeless tobacco is more effective in preventing smokeless tobacco use. Past research on health message framing predominantly focused on positive behaviors (such as using sunscreen or getting mammograms) rather than on negative behaviors (such as not starting to use smokeless tobacco). [35] Applying gain- or loss-oriented messages to prevent novel smokeless tobacco use will enrich both theory and practice.

In this study participants viewed only the ads (rather than the ads embedded in a magazine, for example) in a single exposure. This is different from how ads are usually viewed in real life, where they have to compete for people's attention with other commercial and informational content but are usually seen repeatedly. In this study, the ads had undivided attention from participants, which might have increased the effects of the ads. However, this design maximizes internal validity and participants' full attention to the target ad counterbalances the effect of a single exposure, which might be insufficient for some effects to emerge. In addition, we tried to increase ecological validity by pairing each anti-smokeless ad with the same snus ad to more closely imitate the interactions of various pro- and anti-tobacco messages in the real world. Our dependent measures were conservative – we looked at the change from pretest to post-test in attitudes and openness to snus instead of simply comparing post-test measures across groups, as has been done in past studies.[36], [37] Although the changes are small, effects found on the basis of a single exposure give evidence to potential efficacy of some of these counter-marketing ads.

This study is limited by its exclusive focus on smokers. However, current and former smokers have been the target of much of the smokeless tobacco marketing, particularly as the cigarette companies have used mailing lists of smokers for smokeless tobacco direct mail promotions. This advertising includes messages promoting new smokeless tobacco products to smokers for temporary use in situations when one would not normally smoke (such as in smokefree environments). Dual use of smokeless tobacco and cigarettes is a critical behavior to address, so this study focused on smokers, who are much more likely to become dual users than non-tobacco users. While non-users of tobacco may also be affected by smokeless tobacco promotion (and are also an audience of interest, particularly youth) this audience would be more appropriate to address in a separate study. In addition, future research among smokeless tobacco users could address responses to the counter ads prior to and after exposure to snus ads.

On the basis of this study, we conclude that counter-advertisements may counteract the effects of snus advertising. Messages rated highly on perceived effectiveness do not necessarily predict actual changes in attitudes or openness to product use, and both of these types of outcomes should be measured. Furthermore, past smokeless tobacco users likely require different tailored message strategies than smokers in general; in particular less threatening message strategies may be more effective for this group.

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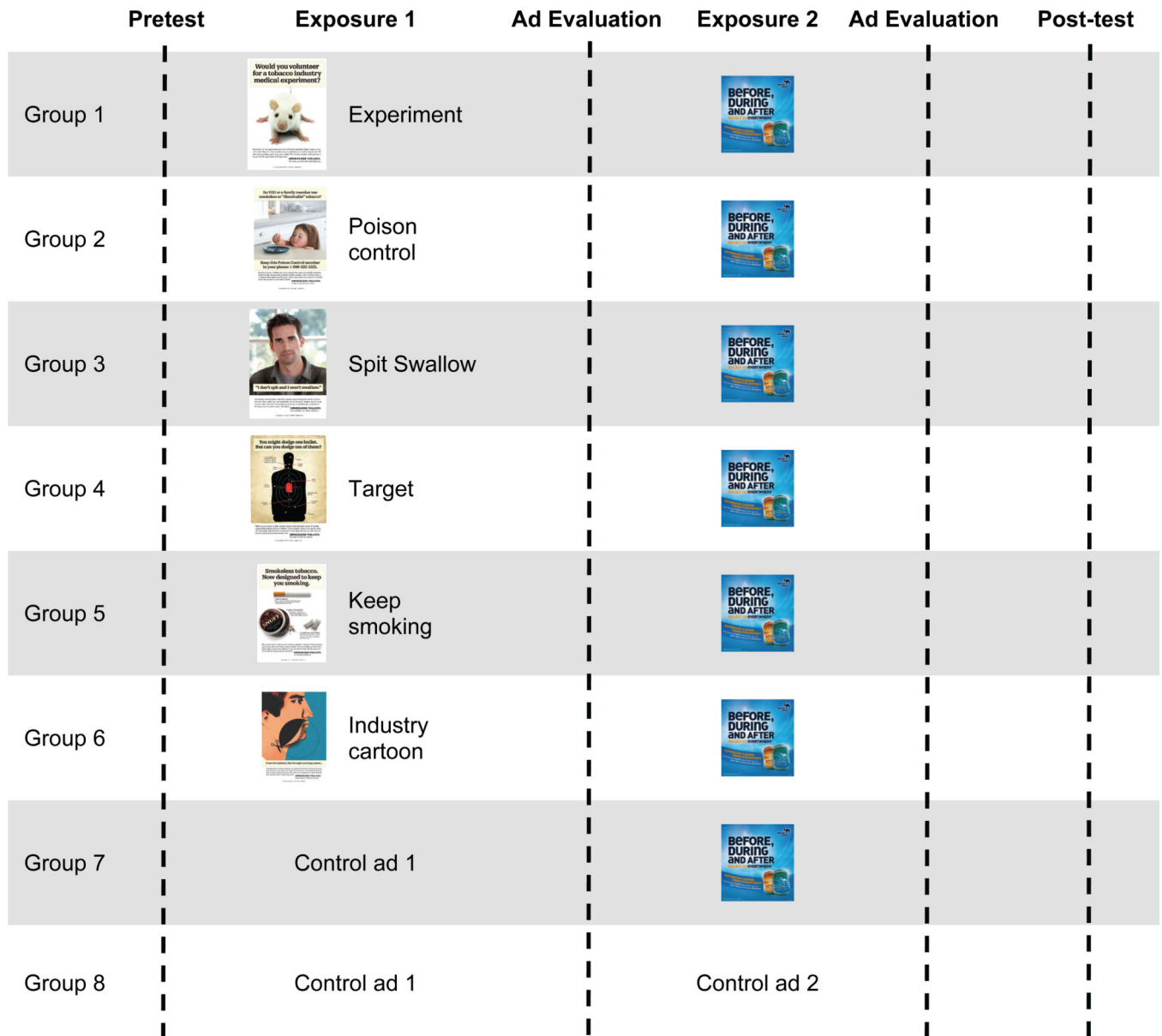
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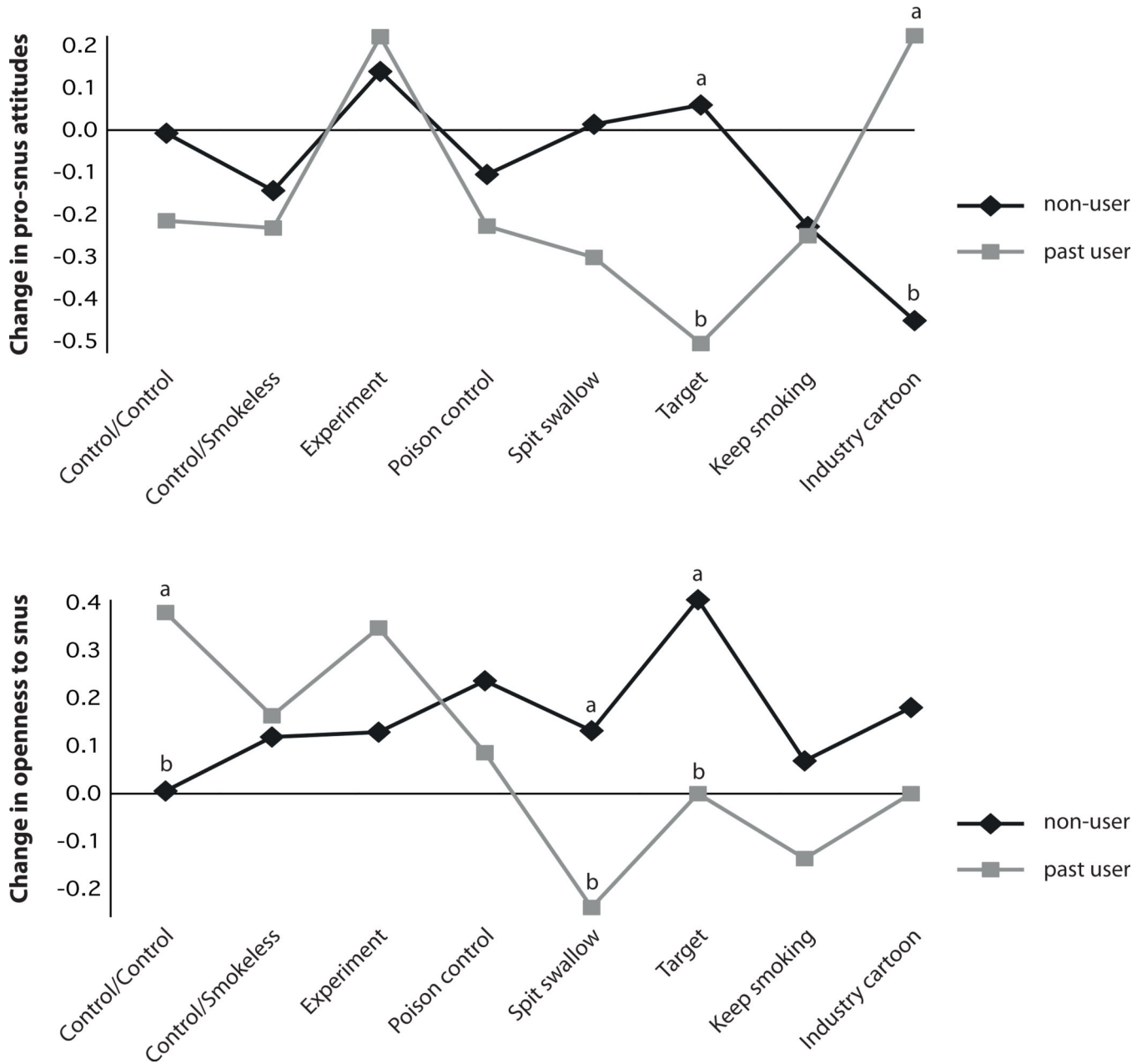
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**Figure 1.** Study Design and Experimental Procedure. Participants completed a pretest, then all were randomized to view one of six anti-smokeless advertisements, followed by a pro-snus ad, or one of 2 control conditions (snus ad only, 2 control ads). Following each ad exposure, participants completed a questionnaire. After both exposures, participants completed a post-test survey.



**Figure 2.** Change in pro-snus attitudes (upper) and openness to using snus (lower) by ad by past smokeless use. Lower numbers indicate greater drop in positive snus attitudes and openness, which is the desired outcome of the exposure to anti-smokeless ads. Past smokeless tobacco users who viewed the “Target” ad had a significant decrease in positive snus attitudes (upper). Past users who viewed the “Spit/swallow” ad had a significant decrease in openness to snus (lower).

**Table 1**  
Participant demographic characteristics for the total sample and for each (randomly assigned) counter-advertisement group.

Characteristic	N	%	Control/ Control (n=230), %	Control/ Smokeless (n=204), %	Expe- riment (n=218), %	Poison control (n=233), %	Spit swallow (n=241), %	Target (n=228), %	Keep smoking (n=239), %	Industry cartoon (n=243), %
<b>Gender</b>										
Male	859	46.8	46.1	47.5	47.7	44.2	43.2	48.2	49.8	47.7
Female	977	53.2	53.9	52.5	52.3	55.8	56.8	51.8	50.2	52.3
<b>Age, years</b>										
18–29	285	15.5	18.7	16.7	16.1	15.0	15.4	17.1	13.8	11.9
30–44	445	24.2	18.3	25.5	27.1	22.7	25.7	23.2	26.4	25.1
45–59	753	41.0	43.9	41.7	35.3	43.8	40.7	41.2	39.3	42.0
60+	353	19.2	19.1	16.2	21.6	18.5	18.3	18.4	20.5	21.0
<b>Race</b>										
White, Non-Hispanic	1,343	73.1	72.2	71.1	73.4	68.7	78.4	71.5	76.6	72.8
Black, Non-Hispanic	185	10.1	9.6	10.3	8.7	12.0	8.7	9.2	8.8	13.2
Other, Non-Hispanic	49	2.7	4.3	2.5	3.7	2.6	0.8	2.6	2.9	2.1
Hispanic	189	10.3	8.7	10.8	9.2	12.9	10.4	12.7	9.6	8.2
2+ Races, Non-Hispanic	70	3.8	5.2	5.4	5.0	3.9	1.7	3.9	2.1	3.7
<b>Education</b>										
Less than high school	174	9.5	10.4	12.3	7.3	11.6	9.1	9.6	10.0	5.8
High school	725	39.5	36.5	36.3	48.2	42.1	36.1	32.9	38.1	45.7
Some college	589	32.1	30.4	32.8	27.1	31.3	38.2	36.4	33.5	26.7
Bachelor's degree or higher	348	19.0	22.6	18.6	17.4	15.0	16.6	21.1	18.4	21.8
<b>Annual Household Income (thousand USD)</b>										
<24.9	571	31.1	31.7	32.8	27.1	37.8	29.0	32.0	26.4	32.1
25–59.9	679	37.0	38.3	36.8	42.7	30.5	37.8	37.7	37.7	35.0
>60	586	31.9	30.0	30.4	30.3	31.8	33.2	30.3	36.0	32.9
<b>Region</b>										

Characteristic	N	%	Control/ Control (n=230), %	Control/ Smokeless (n=204), %	Expe- riment (n=218), %	Poison control (n=233), %	Spit swallow (n=241), %	Target (n=228), %	Keep smoking (n=239), %	Industry cartoon (n=243), %
Northeast	275	15.0	15.2	16.7	14.2	13.7	14.9	15.8	15.5	14.0
Midwest	489	26.6	24.3	27.9	30.3	25.3	28.2	21.5	27.6	28.0
South	695	37.9	43.5	32.4	31.7	43.3	35.7	39.0	37.2	39.1
West	377	20.5	17.0	23.0	23.9	17.6	21.2	23.7	19.7	18.9
<b>Smoking Status</b>										
Current smoker	1,412	76.9	72.2	76.0	76.1	80.3	77.2	77.2	74.5	81.5
Former smoker	424	23.1	27.8	24.0	23.9	19.7	22.8	22.8	25.5	18.5
<b>Smokeless Tobacco User</b>										
Never user	1,432	78.0	78.3	72.5	79.8	74.7	80.5	77.6	80.8	79.0
Past user	308	16.8	17.4	19.1	15.1	18.5	13.3	18.4	15.1	17.7
Current user	96	5.2	4.3	8.3	5.0	6.9	6.2	3.9	4.2	3.3

Note. No significant differences existed between conditions on participant characteristics except for education, where there were significant differences between experimental conditions ( $\chi^2(21) = 33.489, p < .05$ ). There were fewer participants with less than high school education in the Industry Cartoon condition as compared to other conditions.



**Table 2**

Mean scores for evaluations of the ads.

Ad evaluation	Scale Range	Control	Experiment	Poison control	Spit swallow	Target	Keep smoking	Industry cartoon
Perceived effectiveness	1-7	3.12a	4.09bc	<b>5.00e</b>	3.94b	4.90de	3.98b	4.48cd
Informational value	1-5	4.12d	3.78bc	3.45a	<b>4.06cd</b>	3.82bcd	3.90bcd	3.65ab
Potential to stimulate discussion	1-9	1.81a	2.97cde	<b>3.58e</b>	2.52bc	3.24de	2.74bcd	3.02cde
Emotional response	1-9	1.31a	3.59cd	<b>4.34e</b>	2.29b	4.00de	3.14c	3.69cd
Ad consistency	1-9	3.56a	5.00cd	5.60e	4.41bc	<b>6.00e</b>	5.47de	5.41de
Ad transportation	1-9	2.10a	3.09c	3.12c	2.38ab	<b>3.95d</b>	2.84bc	3.11c
Positive Attitudes toward the ad	1-7	3.21a	3.60ab	4.23cd	3.62ab	<b>4.52d</b>	3.34ab	3.79bc

Notes: Groups with different subscripts (a, b, c, d, e) are different at  $p < .05$ . (Univariate ANOVAs with Tukey HSD post-hoc multiple comparison). **Bold** font indicates the highest evaluation.

**Table 3**

Effect of ads on the attitudes toward snus and openness to try snus for various reasons

	Positive attitudes towards snus		General openness to snus		Openness to snus for health reasons		Openness to snus when cannot smoke		Interested in free snus	
	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test	Pretest	Post-test
Control/Control	2.39	2.34	1.30	1.38	3.82	3.23***	3.14	2.67***		17.9%
Control/Smokeless	2.65	2.28	1.64	1.77	4.26	3.52***	3.37	2.98***		24.6%
Experiment	2.39	2.54	1.44	1.61**	4.10	3.37***	3.48	2.95***		18.3%
Poison control	2.44	2.30	1.44	1.64*	4.11	3.47***	3.25	2.97***		22.5%
Spit swallow	2.30	2.24	1.40	1.46	3.70	3.03***	3.21	2.77***		22.5%
Target	2.32	2.25	1.40	1.71***	4.09	3.43*	3.31	2.72***		21.2%
Keep smoking	2.41	2.18*	1.30	1.33	3.92	3.22***	3.2	2.68***		16.3%
Industry cartoon	2.48	2.17**	1.32	1.46*	3.98	3.34***	3.40	2.85***		17.0%
Time*group interaction	$F(7, 1655)=2.307, p<.05$		$F(7, 1781)=1.578, p=.138$		$F(7, 1779)=1.130, p=.996$		$F(7, 1821)=.675, p=.694$			

\* -  $p<.05$ ,

\*\* -  $p<.01$ ,

\*\*\*

-  $p<.001$  (Significant differences from pretest to post-test, repeated-measures ANOVAs.)

**Table 4**

Correlations between ad evaluations and changes in outcomes

<b>Actual outcomes</b> <b>Ad evaluations</b>	<b>Change in</b> <b>positive attitudes</b> <b>towards</b> <b>attitudes</b>	<b>Change in</b> <b>general</b> <b>openness to</b> <b>snus</b>	<b>Change in</b> <b>openness to</b> <b>snus for</b> <b>health reasons</b>	<b>Change in</b> <b>openness to</b> <b>snus when</b> <b>cannot smoke</b>
Perceived effectiveness	-.066*	.015	-.085**	-.136**
Informational value	.081**	-.066*	.014	-.002
Potential to stimulate discussion	-.043	-.001	-.072**	-.048
Emotional response	-.050	.015	-.074**	-.068*
Ad consistency	-.021	-.024	-.047	-.099**
Ad transportation	-.086**	.075**	-.094**	-.063*
Positive attitudes toward the ad	-.065*	.042	-.067*	-.104**

\* -  $p < .05$ ,\*\* -  $p < .01$ ,\*\*\* -  $p < .001$