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Do Smokers Recall Source or Quitline on Cigarette Constituent Messages?

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Abstract

Objectives: The Food and Drug Administration (FDA) is required under the Family Smoking Prevention and Tobacco Control Act to communicate the risks of tobacco use to the public. Little research exists about methods to communicate the constituents of tobacco in a media campaign. This research examines specific strategies to increase effectiveness of a media campaign for cigarette smoking adults about tobacco constituents by including engagement text about smoking cessation and FDA as the source of the campaign.

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Human Subjects Statement

The study was approved by UNC's Institutional Review board on 6/15/2016 (IRB# 16-0590).

Conflict of Interest Statement

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

Methods: In an eye tracking study of 211 current cigarette smokers, participants randomly viewed 4 cigarette constituent messages that varied engagement text for quitting (benefits of quitting and quitline number, presence, absence) and by FDA source (presence, absence). After the eye tracking session, participants were asked about recall of the national quitline number and the source of message.

Results: Participants in conditions with engagement text were significantly more likely than those in the no engagement conditions to recall the national quitline number. Few participants saw or recalled the FDA source.

Conclusions: Engagement text for smoking cessation on constituent communication campaign messages significantly increases recall of the quitline, an important resource for smokers.

Keywords

tobacco communication; cigarette constituents; source credibility; quitline

The US Food and Drug Administration (FDA) is required under the 2009 Family Smoking Prevention and Tobacco Control Act (FSPTCA) to communicate the risks of tobacco use to the public.¹ Since 2013, FDA has launched several campaigns targeted towards youth (eg, *The Real Cost*, *This Free Life*, *Fresh Empire*), and recently launched the *Every Try Counts* campaign, which uses materials at the point of sale to target people who smoke cigarettes.^{2–5}

The FSPTCA requires FDA to release information on the chemicals in cigarette smoke (constituents) to the public.¹ FDA has also included messages about the toxic chemicals in tobacco smoke in campaign advertisements and materials to youth and adults.² Research has shown that messages about constituents are most effective when they pair information about constituents familiar to the public with the health effect of the constituent (eg, “Cigarette smoke contains arsenic. This causes heart damage.”), or other products containing the constituent (eg, “Cigarette smoke contains Ammonia. This is found in fertilizer.”).^{6–8}

FDA has tailored campaigns to several groups that are more likely to use tobacco or are more likely to experience negative health consequences of tobacco.^{9–12} *This Free Life* is directed at people who identify as Lesbian, Gay, Bisexual, Transgender (LGBT) and *Fresh Empire* includes youth who are racial and ethnic minorities, including African Americans^{3,4}. In order to decrease the negative effects of tobacco use in these communities, these campaigns must be effective among these vulnerable populations.

Given that developing tobacco constituent campaigns to inform the public about the risks of tobacco products is a relatively new role for the FDA, it is important to understand how to best design and implement such communications. Message components to consider as part of a constituent campaign include: a visual representation of the chemical, engagement text to encourage cessation, and the source of the campaign.

Engagement Text for Smoking Cessation

Research suggests that providing relevant information on quitting tobacco use can increase the effectiveness of tobacco control messages.¹³ Such “engagement text” on smoking cessation in a campaign may include several types of information. For instance, tobacco cessation information that emphasizes specific negative health effects of smoking can elicit negative emotions, such as fear, which may be associated with emotional arousal and message effectiveness.¹⁴ Such messages are more effective in eliciting smoking cessation than messages emphasizing general health effects of tobacco use.^{14–18} Messages that elicit negative emotions may be further enhanced if individuals understand how to avoid the specified threat and cope with associated risks (ie, “coping appraisal”).^{18–21} Enhancing coping appraisal can be accomplished in several ways, including telling people they can perform a specific action (eg, quitting smoking in this case, by saying “you can quit”) or providing resources for individuals to perform the action (eg, providing a quitline number for free nicotine replacement). Evidence suggests that using interrogative cues, asking with questions rather than presenting information in statements, can increase the impact of messages.^{22,23} Because questions may increase thinking about the topic and enhance intrinsic motivation, they may be more effective than declarative statements. For instance, in a study examining the effects of smoking-related warning messages, smokers who were presented with questions about the harms of smoking (eg, “Why can smoking have negative health effects?”) waited longer before lighting a cigarette than smokers who were presented with statements (eg, “Smoking can have negative health effects.”).²² Previous experimental research also suggests that including interrogative cues (eg, “Ready to be tobacco free?”) can increase perceived message effectiveness.¹³

FDA Source and Credibility

Source credibility is a known factor that may influence trust in a message,^{24–26} and beliefs about the source credibility of a tobacco communicator are likely to influence reactions to messages, including the behavior the message is targeting.²⁴ FDA has been messaging about the risks of tobacco use since 2014.²⁷ However, FDA has reduced the visibility of the FDA logo and focused on branding their campaigns with *The Real Cost*, *This Free Life*, *Fresh Empire*, and more recently *Every Try Counts*. Yet, FDA is perceived as moderately credible as a tobacco regulator,²⁸ with 95% name recognition among adults in the US.²⁹ Given their credibility as an agency and high name recognition, more prominent FDA source attribution may improve campaigns by increasing the credibility of the campaign messages.

Eye Tracking

Eye tracking is a method to directly measure attention to visual communication messages and has been implemented in many studies in tobacco control, especially around warnings and tobacco advertisements.³⁰ Attention is an essential first step to information acquisition, recall, and ultimately behavior change.^{31,32} Eye tracking can also be used to assess which elements of a message are the most visually compelling, information that can have policy implications across health communication fields.³³ Eye tracking data can provide essential information about how health messages are performing, and whether audiences are attending

to all elements of a message. When eye tracking is paired with measures of recall and other message effectiveness metrics, the data can be even more informative, and studies have demonstrated that eye tracking measures are associated with downstream cognitive processing indicators, such as recall.³⁰

Study Purpose

Few studies have examined the impact of communication about cigarette smoke constituents, or strategies to increase campaign impact using text to engage smokers and encourage them to quit or impact of a credible campaign source. The current study experimentally examined a hypothetical communication campaign focused on cigarette smoke constituents by presenting participants with ads that either included or excluded engagement text about smoking cessation and FDA source in a population of current cigarette smokers in North Carolina. Primary outcomes for this study were attention to engagement text and FDA source, and recall of the national quitline number and FDA source.

METHODS

Participants

As part of the Center for Regulatory Research on Tobacco Communication (CRRTC) at the University of North Carolina at Chapel Hill (UNC), participants were recruited from the triangle area of North Carolina. Participants were recruited using a website and flyers, which directed potential participants to answer an online screening questionnaire. As a key emphasis of the CRRTC is to include vulnerable populations in tobacco regulatory research, a portion of the recruitment activities focused on recruiting participants that identified as Black or African American and participants that identified as LGBT.

To be eligible for the study, a potential participant had to be between 18 and 65 years old, be a current cigarette smoker, and be able to be eye tracked. Participants who had participated in a tobacco study in the last 3 months were excluded. Current cigarette smoking was defined as having smoked more than 100 cigarettes in their life, and smoking cigarettes some days or everyday in the last 30 days. To be eye tracked, participants had to have vision in both eyes; could not be blind or have cataracts, glaucoma, permanently dilated pupils, or eye implants (this does not include contact lenses); and could not use glasses with more than one prescription (eg, bifocals). Since eye tracking equipment is capable of successfully collecting data from people with contact lenses and single prescription eye glasses, we included these groups in our study.

The study was conducted from July to December of 2016. Participants were given \$10 if they were not able to be calibrated for eye tracking, and \$50 if they completed the full study protocol.

Stimuli

The stimuli for the study were developed by CRRTC investigators who first created and experimentally tested text to disclose the health risks of cigarette smoke constituents to the

public.^{6–8} This constituent disclosure text was then paired with images and other relevant anti-smoking information using a series of focus groups and online experiments.^{13,34} The final messages, formatted as a hypothetical print ad campaign, included constituent messages about health effects of arsenic, formaldehyde and uranium in cigarette smoke, as well as a message about the health harms of smoking in general. The message about the general health harms of smoking was included to compare more general communication about the health effects of smoking cigarettes to the efficacy of the messages about specific constituents. All messages included the constituent disclosure text and an image depicting the health effect. Depending on condition, messages did or did not include engagement text about quitting smoking, and did or did not include information about FDA source. The 4 constituent messages were edited to match each of the 4 conditions, to create 16 total stimuli (see Figure 1 for stimuli of interest in all conditions). The engagement text manipulation included the presence or absence of the following words: “Within 3 months of quitting your heart and lungs work better. Ready to be tobacco free? You can quit. For free nicotine replacement, call 1–800-Quit-Now.”

Procedures

This was a one-time study. Participants were assigned to one of 4 conditions and stayed within their condition during the study period. Each participant viewed 4 messages within their condition. All study sessions were completed in an off-campus UNC building, in a private room. Participants were randomly assigned to one of the 4 conditions at the time that they were scheduled for their study session, and participants had an equal chance of being assigned to each condition. Study staff trained in eye tracking methodology and human participants research ethics obtained signed consent from participants prior to administering the study session. At the beginning of their scheduled session, participants were seated in front of the eye tracker between 60 and 70 cm from the eye tracking camera and were calibrated using the standard Tobii studio 5-point calibration.³⁵

During the eye tracking session, participants first completed a questionnaire to collect demographics as well as information related to their smoking behavior (measures are included in Supplement 1). Participants were then shown a series of 8 health messages, 4 messages from the constituent communication campaign developed by the research team which are the stimuli of interest, and 4 other unrelated health product advertisements. All participants began the eye tracking portion with an unrelated health ad in order to get them used to the instructions and eye tracking procedure. The tobacco constituent messages were shown 2nd, 4th, 6th and 8th, and their order was counterbalanced. The unrelated health ads were shown in the same order and were included as a washout or distraction from constituent messages. Before viewing each message, participants were instructed ‘Please view the message on the next screen for as long as you’d like. Press the space bar when you are done looking at the message and are ready to move on to the next section.’

After viewing each constituent message, participants answered 4 questions about (1) the believability of the message, (2) discouragement from wanting to smoke⁷, and (3) how much the message made them want to quit smoking, and (4) how much the message helps them to quit smoking. Responses were scored on a scale of 1 – 9 where 1 = Strongly Disagree, 5 =

Neutral, 9 = Strongly Agree. Questions were developed or adapted specifically for this study. After viewing each unrelated health ad, participants answered 2 questions, about (1) the believability of the message and (2) how much the message encouraged them to use the product. After answering the questions, the instructions were repeated for viewing the next message. At the end of the eye tracking session, participants were asked about recall of the source and quitline phone number, likelihood to quit or use the quitline, credibility of FDA, and risk perceptions of using cigarettes. Study sessions lasted around 30 minutes.

Eye Tracking Measures

Eye tracking measures were collected with a Tobii X2–60 eye tracker, and study protocol was programmed and administered in Tobii Studio 3.3 (Tobii 2014, Danderyd, Sweden). The eye tracker is mounted to the front of a large laptop. For reference, an image of the eye tracker is included in Supplement 2. The primary eye tracking outcome of interest is dwell time, a measure of attention to an area of interest, defined as total viewing duration in Tobii Studio.³⁵ This definition of dwell time includes both fixations within an area of interest, as well as saccades between those fixations.³⁵ For this analysis, dwell time was summed across all 4 ads that participants viewed in order to create a total dwell time for each message aspect.

When using an eye tracker, areas of interest (AOIs) are parts of the stimuli that are defined by the researcher and eye tracking metrics are collected specific to those areas.³⁶ In our study AOIs were defined *a priori* for all stimuli of interest and were static areas within the stimuli. AOIs were defined the same way for all stimuli of interest, and data were collected for each AOI, even if there was no information included in that area of the screen (ie, in the *No Source No Engagement* condition, the source AOI was defined to be the same as the conditions where FDA source was present, even though in the *No Source No Engagement* condition, the AOI was blank space). Previous studies using eye tracking in tobacco control have defined AOIs even in blank spaces, and defining AOIs this way gives us a comparison to see how much participants would attend to that area, even if nothing was present.³⁷ Figure 2 shows the AOI definitions for a message in the *FDA and Engagement* condition. Although AOIs were defined *a priori*, the AOI boundaries were not visible on the screen for participants.

Data were recorded using both eyes. When valid data was recorded for both eyes, the average gaze location of both eyes was used to determine where a participant was looking at that time.³⁵ When the eye tracker recorded valid data for only one eye, the gaze location is set as the gaze location for that eye.³⁵ After data collection, a velocity threshold identification (I-VT) filter was applied in Tobii Studio, defining a fixation as when the eye is travelling at less than 30 degrees/second and stays in the same area for at least 100ms. Literature within eye tracking, as well as specific to tobacco control support these values.
38–43

After completion of data collection, study staff reviewed a random sample of the eye tracking recordings, the shortest and longest recordings, and any recordings where study staff made a note about a data quality concern. Videos were monitored for: (1) eye movements that appear to be moving implausibly quickly between 2 distant points and (2)

instances where participants appeared to be spending a lot of fixations outside of target areas, which might indicate that the calibration is off. If study staff determined that there was a problem with the data, the observation was dropped.

For this study we were interested in attention to engagement text overall and to FDA source; therefore, all eye tracking measures presented are a sum of dwell time across all 4 ads.

Survey Measures

Demographic covariates, including age, race,⁴⁴ ethnicity,⁴⁴ sex,⁴⁵ sexual identity,⁴⁶ education and income were asked at the beginning of the eye tracking session in the first questionnaire. Nicotine dependence was assessed in the same questionnaire using the Fagerström Test for Nicotine Dependence (FTND), and responses were scored on a scale of 0–10.^{47–49}

Quitline and source recall were measured for all conditions during the final questionnaire after participants had viewed all the stimuli. For quitline recall, participants were asked ‘Do you know what national phone number you can call for help to quit smoking?’ (yes, no), participants that answered yes were then asked ‘What is the national phone number?’ (free response). Responses to the quitline recall question were coded as correct if they included the phrases ‘1–800-QUIT-NOW’, 800-QUIT-NOW, or ‘800–784-8669’, and coded as incorrect for all other responses. For source recall, participants were asked ‘Do you know which agency or group sponsored the messages you saw today about smoking?’ (yes, no), participants that answered yes were then asked ‘Which agency or group sponsored the messages about smoking?’ (free response). Responses to FDA source recall question were coded as correct if they included the phrases ‘FDA’ or ‘Food and Drug Administration’, and incorrect if they did not. Coding was conducted by one coder, EEJ, and reviewed by KLJ for accuracy.

Analysis

All analyses were completed with statistical significance set at $\alpha = .05$ using SAS 9.4 (SAS, Cary, NC). For eye tracking dwell time measures, we compared mean dwell time to AOIs using non-parametric tests because the eye tracking data did not fit normality assumptions. The Wilcoxon-Mann-Whitney (WMW) test was used to compare 2 groups, and the Kruskal-Wallis test was used to compare 4 groups and followed with Dwass Steel Critchlow-Flinger (DSCF) pairwise comparisons. These non-parametric tests use median to compare among groups, instead of means. Eye tracking data were also dichotomized for the FDA source and engagement text AOIs to show the percent of participants with attention to each AOI. Recall of source and recall of quitline were coded as binary variables, and comparisons between conditions were completed using chi-square.

To determine if recall of quitline was associated with attention to engagement text AOI, race or sexual identity, we used chi-square among participants in the *Engagement Only* condition and *FDA and Engagement* condition. We repeated the same methods to determine if recall of FDA source was associated with attention to source AOI, race or sexual identity among participants in the *FDA Only* condition and *FDA and Engagement* condition.

RESULTS

The final sample was 211 participants. 230 participants enrolled in the study, 5 were removed because the eye tracker was not able to calibrate to their eye movements, 4 did not complete the study protocol, and 10 were removed due to incomplete eye tracking data. Demographic characteristics of the final sample are displayed by condition in Table 1. Participants were 36 years old, on average, more likely to be female (60%), mostly non-Hispanic (95%). The sample was 58% White, and 36% Black or African American and 18% of the sample identified as Gay, Lesbian, Bisexual, or Other, while 82% of the sample identified as Straight or Heterosexual.

Viewing the Messages and Recall

Table 2 summarizes the eye tracking and recall results by condition. Mean participant dwell times ranged between 27.1 and 44.9 seconds on the 4 constituent messages total across all conditions. Mean dwell time on the constituent text AOI was between 6 and 9 seconds, and mean dwell time on the images ranged between 12 and 14 seconds.

Mean dwell time on the engagement text AOI for participants in engagement conditions was 10.5 seconds compared to 0.1 seconds AOI for conditions where engagement text was not present. Attention to the engagement text AOI was significantly higher for the conditions where it was present (Wilcoxon $p < .001$). Kruskal-Wallis tests comparing all 4 condition means were not significant.

In conditions where the FDA Source was present, mean dwell time was 1.7 seconds. This is significantly higher than in conditions where the FDA Source did not appear, for which mean dwell time was 0.2 seconds (Wilcoxon $p < .001$). Kruskal-Wallis tests comparing all 4 conditions were not significant.

When dwell time was dichotomized into participants that did and did not have attention in each AOI, most of the participants in *Engagement Only* condition and *FDA and Engagement* condition attended to engagement text (84% and 96%, respectively), and most participants in *FDA Only* condition and *FDA and Engagement* condition attended to the FDA source (73% and 74%, respectively).

Recall of the quitline was low in the *No Source No Engagement* condition and *FDA Only* condition, where engagement text was not present, but some participants in those conditions (9% and 11% respectively) did recall the national quitline phone number. Recall was significantly higher, 29% and 33%, in *Engagement Only*, and *FDA and Engagement* conditions, respectively, where the quitline phone number was presented as part of the engagement text.

Few participants that were presented with messages with FDA source recalled that FDA was the source of the messages (31% in *FDA Only* condition, and 17% in *FDA and Engagement* condition).

Recall by Attention to AOIs

Table 3 describes the results of comparisons of recall by quitline with attention to engagement text, race and sexual identity. Quitline recall was not significantly related to attention to the engagement text AOI, race or sexual identity. Similarly, comparisons of recall of FDA source by attention to source AOI, race and sexual identity did not find significant differences in recall by group.

DISCUSSION

Few studies have examined impacts of communication about different cigarette smoke constituents, impacts of FDA as the message source, or strategies to augment anti-smoking campaign messages with engagement text on smoking cessation. In this study, we found that participants spent more than 40 seconds looking at 4 constituent messages with the full manipulation (eg, engagement text and source). Among participants where engagement text was present, most participants attended to the engagement text and 30% recalled the quitline telephone number. In the conditions where FDA source was present, most attended to the source information, but few participants recalled that FDA was the source.

Across all conditions, mean attention to the messages was 27 to 45 seconds overall, meaning that even in the condition with lowest attention to messages, participants looked at each of the 4 messages for an average of 6.8 seconds. In the conditions with the most attention, participants looked at each of the 4 messages for an average of more than 11 seconds. Similarly, our findings indicate that the constituent text and image aspects of the messages are attention grabbing across all conditions. These findings are consistent with other eye tracking studies within tobacco control that found mean dwell time on advertisements between 6 and 16 seconds.^{30,31,50,51} The addition of the engagement text and source did not, moreover, lead to less overall dwell time on the constituent or the image. Rather, it appeared to be additive, an important finding indicating that the full condition, with engagement text and source, was likely the optimized condition for respondent exposure.

The engagement text manipulation included several components: (1) a specific positive health effect of quitting smoking (“Within 3 months of quitting, your heart and lungs work better”), (2) an interrogative cue (“Ready to be tobacco free?”), (3) a manipulation to enhance coping appraisal (“You can quit. For free nicotine replacement, call 1–800-quit-now.”). Although, we did not examine which specific component within the engagement text manipulation (or any AOI) that participants attended to, we do know that participants spent 10 seconds on average looking at the engagement text information, and nearly a third of participants in the conditions with the engagement text correctly recalled the quitline phone number. These findings are important for 2 reasons. First, in eye tracking research, spending at least 0.1 seconds looking in an area indicates that a participant is acquiring information from that area.^{40–43} Participants in conditions with engagement text had an average of 10 seconds of attention to those areas, meaning that they were interested in that information, and the higher recall of the quitline among those participants indicates that many of the participants remembered a portion of the information after the message was no longer on the screen. The significant difference in attention to the engagement AOI between conditions

where it was and was not present indicates that this information does catch attention when presented in the context of a constituent message.

Second, that almost a third of participants correctly recalled the quitline phone number is noteworthy. In another eye tracking study, only 10 out of 195 respondents mentioned the quitline in an open ended question.³¹ Messages featuring quitlines (or national telephone ‘helplines’) increase calls to smoking cessation helplines.^{52,53} For instance, when the Netherlands introduced new health warnings on cigarette packages that included the telephone number of the Dutch quitline, calls to the quitline increased more than 3.5 times after 12 months.⁵⁴ Similar trends have also been observed in the UK, Australia, and New Zealand.^{15,55,56} In the United States, evaluations of the *Tips from Former Smokers* campaign (which prompted calls to “1-800-Quit-Now”) found that during the campaign, the average weekly numbers of calls and website visitors increased by 75% and almost 38-fold, respectively, compared with the 4 weeks before the campaign.⁵⁴ Moreover, in an evaluation of a state-sponsored mass media campaign in Florida, researchers found that messages advertising free nicotine replacement therapy resulted in significantly increased number of registrants to telephone quitlines and web-based cessation services than messages not mentioning nicotine replacement therapy.⁵³

In contrast to the engagement text manipulation, we found that a minority of participants attended to the source or correctly recalled the source of the message. However, participants in conditions where source was present had significantly higher attention to the FDA source AOI, which indicates that the FDA source presence did capture more attention when compared to the blank space. This finding aligns with previous research suggesting mixed results on the effect of source on message impact. Some research suggests that source credibility is an important dimension of message persuasiveness, particularly when comparing credible sources to non-credible sources.⁵⁸ Source credibility is also an important predictor of persuasiveness among individuals with high perceived credibility in the FDA as a tobacco regulator.³⁴ However, other research suggests that tobacco messages heard over the phone without a source may be just as *believable* as messages with a governmental source (eg, Surgeon General, FDA, Centers for Disease Control and Prevention).^{59–61} It is possible that participants in this study did not associate the FDA logo in the ad with the idea of a source, since the manipulation did not include a phrase like ‘brought to you by’. These findings suggest the need for additional research regarding the role of source credibility in tobacco communication campaigns. It is possible that the inclusion of the engagement text in the *FDA and Engagement* condition contributed to lower attention to source in that condition. Although condition did not have a significant impact on attention to source or recall, future analyses from this study will include other potential impacts of source, including on believability and discouragement of the messages, and on credibility of FDA. Promisingly, lack of differences in terms of recall by race and sexual identity may indicate that the constituent messages are conveying information about the quitline and source similarly across sub-groups.

Limitations

Several limitations exist to this study. First, this study is examining a one-time exposure to 4 tobacco control messages about the harmful constituents in tobacco smoke, and it was not designed to assess the effect of repeated exposure to these messages over time, outside of the laboratory. Although attention to the messages was high in the laboratory setting, these messages may not elicit the same attention outside of our experimental conditions. Other concurrent studies have examined the effects of these types of messages when applied on cigarette packages, and on websites.^{62,63} An ongoing online RCT is using the same constituent messages from this study to assess how exposure over time may effect intentions to quit and cigarette smoking behavior over the course of a month.⁶⁴ Since eye tracking only measures attention, we cannot know whether participants who were looking at an area of interest were processing that information, and our results show that even when people do attend to an AOI, they may not recall the information presented there. However, by relating attention to other measures, such as recall, we can put the eye tracking measures in context, and determine how they relate to downstream outcomes.^{30,31} Finally, generalizability of the survey measures may be limited because participant recruitment was restricted to the Raleigh, Durham, Chapel Hill area of North Carolina. However, the objective measure of attention from the eye tracking data is robust due to the study's large sample size, not often obtainable for eye tracking studies.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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IMPLICATIONS FOR TOBACCO REGULATION

Tobacco control campaigns from FDA are relatively new, and little research has examined the best strategies for FDA to leverage its moderate credibility or to augment campaign impact with text to encourage cigarette smokers to quit. This eye tracking study experimentally manipulated FDA source and text encouraging smokers to quit and information about the quitline. While relatively few participants recalled FDA source, larger numbers of participants in the conditions with quit information attended to and recalled that information. In future campaigns, FDA should consider including information about the health benefits of quitting paired with the quitline.

	Condition 1 No Source No Engagement	Condition 2 FDA Only	Condition 3 Engagement Only	Condition 4 FDA and Engagement
Arsenic				
Formaldehyde				
Uranium				
No Constituent				

Figure 1.
Stimuli by Condition

Figure 2.
Example Area of Interest Definitions

Table 1

Demographic and Smoking Behavior of Eye Tracking Study Sample by Condition (N = 211)

	Condition 1 <i>No Source No Engagement</i>	Condition 2 <i>FDA Only</i>	Condition 3 <i>Engagement Only</i>	Condition 4 <i>FDA and Engagement</i>	Sample Overall (N = 211)
Age, Years (mean, standard deviation)	36.4 (11.6)	34.3 (11.8)	37.8 (12.8)	36.4 (13.5)	36.2 (12.4)
Sex					
Male	40.7%	50.0%	39.2%	31.5%	40.3%
Female	59.3%	50.0%	60.8%	68.5%	59.7%
Sexual Identity					
Straight or Heterosexual	81.5%	84.6%	82.3%	81.5%	82.4%
Gay or Lesbian	1.9%	13.5%	9.8%	13.0%	9.5%
Bisexual	14.8%	1.9%	5.6%	5.6%	7.1%
Other	1.9%	-	2.0%	-	1.0%
Ethnicity					
Latino/Hispanic	7.4%	3.9%	3.9%	5.6%	5.2%
Not Latino/Hispanic	92.6%	96.2%	96.1%	94.4%	94.8%
Race					
White	63.0%	53.9%	56.9%	59.3%	58.3%
Black or African American	31.5%	38.5%	39.2%	37.0%	36.5%
Other	5.6%	7.7%	3.9%	3.7%	5.2%
Education					
Less than High School	-	9.6%	2.0%	3.7%	3.8%
High School Graduate	18.5%	13.5%	19.6%	18.5%	17.5%
Some College	51.9%	57.6%	49.0%	55.6%	53.6%
College Graduate	24.1%	13.5%	21.6%	16.7%	19.0%
Post College Education	5.6%	5.8%	7.8%	5.6%	6.2%
Income					
Below \$25,000	46.3%	38.5%	43.1%	37.0%	41.2%
\$25,000 - \$49,999	37.0%	48.1%	33.3%	40.7%	39.8%
\$50,000 - \$74, 999	9.3%	1.9%	15.7%	13.0%	10.0%
\$75,000 - \$100,000	3.7%	7.7%	2.0%	1.9%	3.8%
Above \$100,000	3.7%	3.9%	5.9%	7.4%	5.2%
Fagerström Test for Nicotine Dependence (FTND) (mean, standard deviation)	4.2 (2.6)	4.7 (2.4)	4.3 (2.8)	3.4 (2.4)	4.1 (2.6)

Table 2

Attention to AOI and Recall of Source and Quitline by Condition

	Condition 1 <i>No Source No Engagement</i>	Condition 2 <i>FDA Only</i>	Condition 3 <i>Engagement Only</i>	Condition 4 <i>FDA and Engagement</i>	p-value
Mean Dwell Time^a (seconds)					
Whole Ad	27.1	35.7	44.9	44.8	<.001 ^b
Constituent Text	6.2	8.9	8.1	7.0	.24 ^b
Image	14.2	14.4	11.8	12.1	.43 ^b
FDA Source	0.03	2.2	0.4	1.2	.39 ^b
Engagement Text	0.01	0.1	10.9	10.1	.66 ^b
Percent Attending to AOI					
FDA Source	-	73.1	-	74.1	
Engagement Text	-	-	84.3	96.2	
Percent Correct Recall					
Source	-	30.8	-	16.7	.09 ^c
Quitline	-	-	29.4	33.3	.67 ^c

^aMean Dwell Time is a sum of dwell time on each AOI across all four ads^bKruskal-Wallis test^cChi-square

Table 3

Chi Square Comparisons of Recall

		Attention to Source, N (column %)		Chi-Square p-value
Recall of Source (N = 106) ^a		No	Yes	0.45 ^c
	No	23 (82%)	58 (74%)	
	Yes	5 (17%)	20 (26%)	
	Race, N (column %)			
		White	All other races	0.39
	No	44 (73%)	37 (80%)	
	Yes	16 (27%)	9 (20%)	
	Sexual Identity, N (column %)			
		Heterosexual or Straight	Gay, Lesbian, Bisexual or Other	0.28
	No	69 (78%)	12 (67%)	
	Yes	19 (22%)	6 (33%)	
Recall of Quitline (N = 105) ^b		Attention to Engagement Text, N (column %)		0.50 ^c
	No	8 (80%)	64 (67%)	
	Yes	2 (20%)	31 (33%)	
	Race, N (column %)			
		White	All other races	0.72
	No	41 (67%)	31 (70%)	
	Yes	20 (32%)	13 (30%)	
	Sexual Identity, N (column %)			
		Heterosexual or Straight	Gay, Lesbian, Bisexual or Other	0.10
	No	62 (72%)	10 (53%)	
	Yes	24 (28%)	9 (47%)	

^aIncludes participants in *FDA Only*, and *FDA and Engagement* Conditions

^bIncludes participants in *Engagement Only*, and *FDA and Engagement* Conditions

^cFishers Exact Test Reported