Published in final edited form as:

Tob Regul Sci. 2018 January ; 4(1): 631–643. doi:10.18001/TRS.4.1.9.

Smokers' Attention to Point-of-Sale Antismoking Ads: An Eye-tracking Study

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Abstract

Objectives: We used eye-tracking to examine smokers' visual attention in one of 4 antismoking ad contexts (alone, next to cigarette ad, tobacco display, or cooler). Participants viewed 4 ad types (graphic, intended emotive, and benefits of quitting—graphic ads, and benefits of quitting—informational ads), each with 3 areas of interest (AOI) (anti-ad image, anti-ad text, and other text).

Methods: Current smokers ($N = 153$) viewed ads for 10 seconds each. Multivariable random effect linear regressions with post-test comparisons (with sidak-adjusted p-values) were used to test for differences in fixations and dwell time by ad context and type while adjusting for covariates. Visual attention was adjusted by percentage of anti-ad area taken up by each AOI.

Results: Adjusting for covariates, there were no differences by ad context ($p > .05$). Fixations and dwell time were greatest for the image of the benefits of quitting—graphic ad, the text of the graphic ad, and the other text of the intended emotive ad (all p s $< .005$). Conclusions: Visual attention to antismoking ads did not vary by ad context but varied significantly by ad type.

Keywords

eye-tracking; point of sale; advertisement; antismoking

Given decades of tobacco advertising restrictions across multiple media channels, tobacco companies now focus most of their advertising efforts on the point-of-sale (POS) environment.¹ In 2013, tobacco companies paid more than \$8 billion to retailers and wholesalers to reduce cigarette prices and prominently display tobacco products in their

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Conflict of Interest Disclosure Statement

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

stores.² Tobacco product advertising appears in the POS environment in many forms, including window displays, receipt coupons and messages, overhead hangers, racks, electronic scrolling ads, floor mats, and powerwalls (ie, large, colorful displays of tobacco products). As a result, the POS is a visually complex environment carefully designed to cue the desire to smoke and prompt tobacco purchases.¹

POS advertising and price promotions are associated with smoking initiation among never smokers.³ Among current and former smokers, exposure to POS advertising has been associated with unplanned purchases of cigarettes.⁴ Tobacco-related imagery at the POS, specifically cigarette pack displays, has been associated with cravings and attempts to purchase tobacco products among current and former smokers in experimental settings.⁵ In addition, POS advertising may exacerbate disparities in tobacco consumption because of the overrepresentation of POS price promotions in low socioeconomic status, racial and ethnic minority, and rural communities.^{6,7}

Antismoking ads (anti-ads) are one way to combat the effects of POS advertising. However, the research on this topic is sparse and conflicted. For example, consumers exposed to an experimental antismoking print POS advertising campaign in New York State, versus those not exposed, were more likely to be receptive to anti-ads, have a negative view of POS advertising, and support a ban on POS advertising.⁸ However, a virtual retail environment experiment found that anti-ads at the POS did not affect cravings or attempts to purchase tobacco products among current and former smokers.⁴

In addition, research on anti-ads suggests that consumers' attention and reactions to anti-ads may vary by the anti-ad type.^{9–15} Research on static print ads, which resemble POS ads, found that graphic images on cigarette packs are more effective than text-based warnings at drawing attention to warning labels.⁹ In a prior study using a different sample, several of the authors of this study examined differences in current and recent former smokers' reactions to static POS anti-ads by ad type and context. We found differences in self-reported perceived effectiveness and emotional responses to POS anti-ads by ad context and ad type.¹⁶ Ad contexts included ad alone, ad next to cigarette ad, or ad on a tobacco display. Ad types included: (1) health consequences of smoking communicated using a graphic image (graphic); (2) social consequences of smoking expressed through an image intended to be emotive (intended emotive); (3) benefits of quitting communicated through a graphic image (benefits—graphic); and (4) benefits of quitting emphasized through information (benefits—informational). These 4 ad types were chosen because of evidence suggesting that graphic warnings,¹⁷ messages that elicit emotion,¹⁸ and ads that elicit positive emotions such as hopefulness¹⁹ influence attitudes, beliefs, and behaviors related to quit attempts and smoking cessation. The ads elicited the greatest emotional and motivational response when they were viewed alone as opposed to when they were viewed next to a cigarette ad or on a tobacco product display. In addition, graphic ads were most resilient to the effects of context. Participants experienced more negative emotional response and affective dissonance for the graphic ad than the benefits—graphic ad or benefits—informational ad. Participants also experienced more affective dissonance and rated perceived effectiveness higher for the graphic ad compared with the intended emotive ad.

To improve our ability to inform future POS anti-smoking campaigns further, we used an objective measure of visual attention, eye-tracking, to understand which aspects of the static anti-ads attracted the most visual attention and whether there were differences in visual attention by ad type and context. Unlike self-report measures, eye-tracking has the advantage of being unaffected by recall bias. In addition, eye-tracking can account for the visually complex POS environment and has revealed differences in visual attention by ad context and between ads containing text alone versus a graphic image and text in previous research.^{12,15} Maynard et al¹² found that if a graphic warning label was placed on a plain cigarette pack, participants paid significantly more visual attention to the warning label than other aspects of the pack. However, when the label was placed on a branded cigarette pack, there was no significant difference. Strasser et al¹⁵ found that smokers devote more visual attention to graphic warning labels on cigarette ads than text-based warning labels.

Eye-tracking provides the opportunity to objectively measure whether smokers pay attention to anti-ads in the visually complex POS environment, which would inform anti-smoking interventions at the point of sale. In addition, eye-tracking can provide insight into which types of ads should be used in an anti-smoking POS campaign and where in the POS they should be placed to maximize their efficacy. However, existing eye-tracking research has focused primarily on cigarette warning labels. To date, no study has explored how the POS environment influences visual attention to anti-ads by ad context or type. In the present study, our goal was to establish which anti-ad context and type attracted the greatest amount of visual attention (measured via eye movement patterns with eye-tracking technology) in the POS environment to inform future attempts to counteract tobacco advertising at the POS.

METHODS

Sample

A market research firm (First in Focus Research, Inc.; FIF) recruited a convenience sample of 172 English-speaking currently smoking adults aged 18 or older from the Raleigh, North Carolina metro area to study reactions to anti-ads in the POS environment at FIF in Raleigh. Participants were selected from FIF's existing database, which they created through advertisements, word-of-mouth, organizations, cold calls, Internet searches, and more. FIF contacted potential participants them by phone or e-mail and administered screener questions to determine eligibility. To participate in the study, participants had to be current smokers (smoke every day or some days). FIF reimbursed participants with \$50 for their participation. Participants who wore bifocals or hard contact lenses were excluded because these visual aids interfere with eye-tracking equipment. Of the 172 adults recruited, 161 completed the experiment (93.60% completion). Eight respondents were dropped due to incomplete data or malfunctioning of the eye-tracking hardware or software, resulting in an analytic sample of 153 (88.95% of original sample). Participants provided signed informed consent before completing the study. After completing the study, participants were informed that the purpose of the study was to use eye-tracking equipment to determine which aspects of tobacco advertisements they viewed.

Procedures

Eye-tracking software and hardware.—Senso-Motoric Instruments (SMI) BeGaze 3.5 software was used to display the advertisements and record the eye-tracking data measured by automated contact-free eye-tracking hardware, mobile Remote Eyetracking Device, version 7.2 (a black rectangular box that sits at the hinge between the laptop screen and keyboard and captures the participant's eye movements). For all images of the tobacco display, the image was shown as large as possible on a laptop screen. Monitor settings (eg, brightness, color) were standardized across all conditions.

After all data were collected, we created AOIs by drawing boundary lines around the study images and text in the SMI BeGaze analytic software to examine the extent to which participants paid attention to specific ad components (Table 2). We identified images (ad image) and text (ad text) that were central to the message of the anti-ad. The remaining text (other text), which primarily contained quitline information, was analyzed separately.

Default settings were used for the eye tracking software. Eye movements were recorded at a sampling rate of 120Hz, consistent with the range of sampling speeds used in other studies.^{20,21} For each AOI, measures of interest were fixations and dwell time. Fixations, which are the number of times the participant's eye was essentially stationary in an AOI, were defined as the primary event and operationalized as any time-period of 80ms or longer in which eye movement was restricted to a 100-pixel diameter space. This definition is consistent with guidelines for collecting eye-tracking data.²² The software calculated dwell time as the sum of the duration of all fixations and saccades. The software defined saccades, which are rapid re-orienting eye movements, as the eye movements (and time) between a blink or fixation created by the software and the previous blink or fixation. The software defined blinks as a special type of fixation in which the pupil diameter is zero or outside of the valid pupil range (computed by the software based on all trial data) or when the horizontal and vertical gaze positions were zero).

Calibration.—First, participants completed a survey on a laptop that included questions about demographics and smoking behavior. Second, on a separate laptop, study staff calibrated the eye-tracking equipment. Study staff ensured that the participant's chair was positioned the recommended distance from the laptop and asked participants to track a black dot with their eyes as it moved across the screen. If calibration was unsuccessful (ie, the participant did not see 4 red dots close to 4 black dots at the end of the calibration), the procedure was repeated until calibration was successful (or the experiment was terminated). All images were shown on the laptop that contained the eye-tracking device, and all surveys were completed on a separate laptop.

Free-viewing task.—Third, the eye-tracking hardware collected eye-tracking data while the participant completed a free-viewing task (ie, participants freely explore the visual field of presented stimuli) in one of 4 contexts (participants were randomly assigned to one context) for 4 anti-ad types. Each participant viewed 4 images in this condition in random order for 10 seconds each, answering 3 questions about the anti-ads on a separate laptop in between tasks. The eye-tracking hardware was recalibrated each time. Because this

procedure was followed by an additional free-viewing task, each participant viewed 5 to 7 images total. After viewing all images, the participant completed an additional survey and debriefing.

Study Design

Ad context.—Using a random number generator, participants were randomized to view anti-ads in one of 4 contexts (between subjects): (1) alone; (2) next to a cigarette ad; (3) on a tobacco display (display); and (4) on a drink cooler (cooler) (Table 1). The cooler condition was designed as a control condition for the display (attempting to separate visual attention to any background stimuli from attention to tobacco-related background stimuli). For the cigarette ad, the brand advertised matched the participant's preferred cigarette brand out of the top 3 cigarette brands at the time: Camel, Marlboro, and Newport. Participants who did not choose a preferred brand viewed an ad for a brand that was randomly selected from the 3.

Ad type.—Each participant was exposed to the same 4 anti-ad types (within subjects) used in a previous study of current and recent former smokers¹⁶ for 10 seconds each: (1) graphic; (2) intended emotive; (3) benefits of quitting—graphic; and (4) benefits of quitting—informational (Table 2). For the benefits—informational ad, the sex of the model in the ad was matched to the sex of the participant, resulting in 2 ad types: benefits—informational female and benefits—informational male. Each participant viewed the 4 ads in random order.

Measures

Descriptive variables.—Demographic variables used to describe the overall characteristics of the sample included sex (male or female), race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black, Asian, American Indian or Alaska Native, non-Hispanic multiple races, or refused), education (some high school, high school graduate or GED, some college, college graduate, or postgraduate), annual household income from all sources (<\$25,000, \$25K–\$49,999, \$50K–\$74,999, \$75K or more, refused), and age (18–24, 25–34, 35–44, 45–54, or 55 or older). We also examined several questions about tobacco use, such as the last time the participant smoked (within last hour, 1–2 hours ago, 2–5 hours ago, 5–10 hours ago, within the past day, or 2 days ago or longer), whether the participant smokes within the first 30 minutes of waking (yes or no), whether the participant attempted to quit smoking in the past 12 months (yes or no), and whether the participant planned to quit smoking in the next 30 days (yes or no).

Outcome variables.—Fixations and dwell time were adjusted for AOI size by dividing each by the percentage of the anti-ad area covered by the AOI. Fixations and dwell time were calculated separately for each AOI. Because the amount of the screen covered by the ads varied by ad type (but not ad context) because of the different shapes of the ads, we divided fixations and dwell time by the percentage of the ad covered by each AOI examined.

Independent variables.—We analyzed 2 sets of independent variables: ad context (alone, next to cigarette ad, display, or cooler) and ad type (graphic, intended emotive, benefits—graphic, benefits—in formational female, and benefits—informational male).

Data Analysis

First, we obtained frequencies and percentages for categorical descriptive variables and means and standard deviations for continuous variables to describe the sample. Then, we used t-tests and chi-square analyses to examine whether the characteristics of the sample varied by ad context. Then, we conducted bivariate analyses of fixations and dwell time by ad type and context using WSAANOVA in Stata 14. WSAANOVA conducts a within-subjects (ad type) ANOVA with one between-subjects factor (ad context) (also called a 4×4 ANOVA or between-and-within subjects ANOVA), extends the application of a traditional ANOVA, and allowed us to use one command to test for significant differences in eye-tracking measures by ad context and ad type (adjusting for multiple observations per person) while also testing for interactions between ad context and type.²³ For multivariable analyses, we used random effects linear regression models (Stata xtreg with mle) with post-test comparisons of all ad types and contexts (with sidak-adjusted p-values) to test for differences by ad type and ad context while adjusting for multiple observations per person and multiple comparisons. These models did not include interaction terms for ad type and context because they were not significant in bivariate analyses. Descriptive variables that differed by context at the $p < .10$ were included in all multivariable models. Fixations and dwell time for each AOI were modeled separately.

RESULTS

Sample Demographics

The sample was almost evenly split between female (49.02%) and male (50.98%) participants (Table 3). Most participants were non-Hispanic white (63.40%) with some college education (39.22%) or a college degree (32.03%) and household income between \$25,000 and \$74,999 (39.22% \$25,000-\$49,999 and 20.92% \$50,000-\$74,999). Mean age was 39.88 (SD=11.72). Most participants reported smoking on 30 of the past 30 days (70.59%). More than half of the participants had smoked their last cigarette within the past hour (54.25%). Slightly less than half smoked their first cigarette within 30 minutes of waking (46.41%) and had attempted to quit smoking in the past 12 months (41.18%). Approximately one-fourth of participants (24.64%) were planning to quit in the next 30 days. We compared these characteristics by ad context. Education ($p = .006$), current days smoked per week (Fishers $p = .025$), race/ethnicity ($p = .088$), last time smoked ($p = .097$), and nicotine addiction ($p = .058$) all differed by context at the $p < .10$ significance level. There were no significant differences in sex ($p = .544$), household income ($p = .369$), past-month quit attempt ($p = .130$), or planning to quit in next 30 days ($p = .908$) by ad context at the $p < .10$ significance level.

Bivariate Analyses of Ad Context and Type

WSAANOVA revealed non-significant differences by context for fixations (message image: $p = .128$, message text: $p = .814$, other text: $p = .997$, Table 4). For dwell time, there was a

significant difference by context for message image ($p = .048$) but not for message text ($p = .959$) or other text ($p = 1.00$). WS ANOVA produced significant differences in fixations and dwell time for all areas of interest by ad type (all p s $< .001$; Table 5). The interaction terms for context and ad type were not statistically significant for fixations (message image: $p = .230$, message text: $p = .614$, other text: $p = .479$) and dwell time (message image: $p = .249$, message text: $p = .666$, other text: $p = .554$).

Multivariable Analyses for Ad Context

Adjusting for covariates and ad type, there were no statistically significant differences in fixations or dwell time by ad context ($p > .05$ for all comparisons). Multivariable models revealed significantly higher fixations and longer dwell time for the image of the benefits of quitting—graphic ad than all other ad types ($p < .001$ for all comparisons). Fixations and dwell time were greater for the image of the intended emotive ad than for the image of the graphic ($p = .029$ for fixations, $p = .024$ for dwell time) and benefits of quitting—informational ads ($p < .001$ for fixations and dwell time for the male and female ads). Fixations and dwell time for the image of the graphic and intended emotive ads were also greater than for the benefits of quitting—informational male (fixations: $p < .001$, dwell time: $p = .004$) and female (fixations: $p = .014$, dwell time: $p = .010$) ads. Fixations were significantly greater for the text of the graphic ad compared to the text of all other ad types (for fixations, $p < .001$ for graphic vs all other ad types; for dwell time, $p < .001$ for graphic vs intended emotive and graphic versus benefits of quitting—graphic ads, $p = .007$ for graphic vs the benefits of quitting—informational female ad, and $p = .001$ for graphic vs benefits of quitting—informational male ad). For ad text, fixations were also significantly greater for the benefits of quitting—graphic ad than for the intended emotive ad ($p < .001$). Dwell time was significantly greater for the text of the benefits of quitting—graphic ($p = .003$) and benefits of quitting—informational ads ($p < .001$) compared to the intended emotive ad. Fixations and dwell time were significantly greater for the other text of the intended emotive ad versus the other text of all other ad types and significantly greater for the other text of the graphic and benefits of quitting—graphic ads compared with the other text of the benefits of quitting—informational ads ($p < .001$ for all comparisons).

DISCUSSION

We found no statistically significant differences by ad context after adjusting for covariates. We found several differences in visual attention by ad type. Overall, the image of the benefits—graphic ad, the text of the graphic ad, and the other text of the intended emotive ad attracted the most visual attention.

A previous analysis that tested the efficacy (ie, perceived effectiveness, cognitive dissonance, and motivational reaction) of the same set of ads by ad context found that these anti-ads were most effective when viewed alone.¹⁶ However, we did not find statistically significant differences by ad context, possibly due to low statistical power. Although this is a potential limitation of our study, our sample size is consistent with the tobacco-related eye-tracking studies presented in a 2016 systematic review; 83% of the reviewed studies had sample sizes under 200.²⁴

In terms of differences by ad type, this is the first analysis to find greater visual attention to other text (such as quitline information) displayed in combination with an image that is intended to be emotive compared with similar information presented in combination with other types of images. One potential reason for this finding is that, compared to all other ad types, the other text of the intended emotive ad contained the greatest number of words within the text box. Future analyses should test whether this effect remains after making quitline information identical across all ad types.

The finding that participants focused on the text of the graphic ads and the image of the benefits—graphic ad is consistent with research that found participants paid greater visual attention to the entire warning label area of a cigarette ad when the warning included a graphic image (compared with text only).¹⁵ Research suggests that graphic ads may be particularly useful in the POS environment for improving recall and promoting a desire to quit.^{9,10,13,14,25} In addition, former smokers approve of graphic warning labels on cigarette packs, and may therefore, be supportive of graphic advertising in the POS environment.²⁶ Also, a previous analysis of the efficacy of the same set of ads (but different participants than the current study) found that graphic ads elicited more negative emotion and affective dissonance than benefits—graphic or benefits—informational ads and greater affective dissonance and perceived effectiveness than the intended emotive ads.¹⁶ However, the relationship between self-reported reactions to antismoking POS ads and measures of eye tracking for those same ads has not been explored in the existing literature. We did not explore this relationship in the current analysis because limited sample size prevented these comparisons.

Limitations

This analysis has several limitations. First, eye-tracking is a complex science and because we used real ads, the visual stimuli contained some variation that we could not account for. However, we standardized monitor settings to control for some of these factors. In addition, we did not assess prior exposure to the anti-ads, which may have resulted in variability in visual attention due to different levels of familiarity with the ads. Another limitation is the placement of all anti-ads on the left side of the screen, which may have resulted in leftward bias (the tendency for English speakers to view images or text on the left-hand side first because they read left to right). However, because this was the case for all ad types, this factor would only potentially affect comparisons by context, not by ad type. Relatedly, the placement of the message image, message text, and other text within each ad varied by ad type and may have resulted in differences in visual attention by ad type. Finally, the experiment consisted of a single exposure to the POS. In the real world, the effect of anti-smoking ads on visual attention may increase or decrease over time due to repeated exposures. Initially, when the ads are relatively new, repeated exposures might lead to increased awareness. Over a longer time-period, as the novelty of the ads wears off, visual attention might decrease.

Conclusions

Eye-tracking data may be a useful measure of visual attention, particularly when the viewing environment is complex, as is the case with the POS environment. The results of this

analysis demonstrate that measures of visual attention likely vary by ad type. In addition, our analysis found that different features or components of the ads (such as the image and text) attract different amounts of visual attention. Despite its limitations, our research has the potential to be important given the reliance of tobacco companies on the POS environment for advertising and limited information about how ads are noticed at the POS. Research that employs a larger sample size should be conducted to further explore differences in visual attention anti-ads by ad context and type. In addition, future analyses should explore the relationship between self-reported reactions to anti-ads and eye-tracking data to elucidate how visual attention relates to emotional and motivational responses to ads and their perceived efficacy.

IMPLICATIONS FOR TOBACCO REGULATION

In 2016, the Food and Drug Administration announced that it was planning a POS campaign targeting tobacco users.²⁷ One option, previously tested in New York, is placing antismoking ads at the POS.²⁵ Our results suggest that antismoking ads have the potential to attract visual attention in the POS environment. Because visual attention is likely to vary by ad type, campaign planners should carefully consider this factor when planning a campaign that uses antismoking ads. In addition, more research should be conducted to further understanding of the impact of the visually complex POS environment on attention to antismoking ads and to determine the most effective location for ad placement within the POS environment.

Acknowledgements

The NIH/NIDA and FDA Center for Tobacco Products (grant P50DA036128) funded this research.

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Human Subjects Statement

All data collection procedures were approved by the RTI International Institutional Review Board (IRB) under the title “Eyetracking studies to examine consumers visual attention to pro- and anti-tobacco images at the point-of-sale” and IRB ID number 13886.

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Table 1
Antismoking Ad Contexts for Eye-Tracking Experiment (Intended Emotive Ad Shown)

Ad Context	Ad
Alone	
Next to Cigarette Ad (Marlboro)	
Tobacco Display	
Drink Cooler	

Ad with AOI		Ad	Ad Type
Legend
Message Image
Message Text
Other Text			
Benefits of Quitting—Infor-mational Male

Table 3

Demographics of Sample for Eye-tracking Experiment on Antismoking Ads (N = 153)

Sample Characteristics	% (N)
Sex	
Female	49.02% (75)
Male	50.98% (78)
Race/Ethnicity	
Hispanic	3.27% (5)
Non-Hispanic White	63.40% (97)
Non-Hispanic Black	28.10% (43)
Asian	0.65% (1)
American Indian/Alaska Native	1.31% (2)
Non-Hispanic multiple races	1.96% (3)
Refused	1.31% (2)
Education	
Some high school (grades 9–11)	1.96% (3)
High school graduate or GED (Grade 12)	18.30% (28)
Some college	39.22% (60)
College graduate	32.03% (49)
Postgraduate (Masters/Doctorate/JD/MD)	8.50% (13)
Annual Household Income (All Sources, 2013)	
<\$25,000	17.00% (26)
\$25,000-\$49,999	39.22% (60)
\$50,000-\$74,999	20.92% (32)
\$75,000+	20.26% (31)
Refused	2.61% (4)
Age	
18–24	7.19% (11)
25–34	33.33% (51)
35–44	19.61% (30)
45–54	21.57% (33)
55+	18.30% (28)
Days Smoked in the Past 30	
0 to 1 day	0.00% (0)
3 to 5 days	0.65% (1)
6 to 9 days	3.92% (6)
10 to 19 days	10.46% (16)
20 to 29 days	14.38% (22)
All 30 days	70.59% (108)
Last Time Smoked	
Within last hour	54.25% (83)
1–2 hours ago	20.26% (31)

Sample Characteristics	% (N)
2–5 hours ago	9.15% (14)
5–10 hours ago	4.58% (7)
Within the past day	7.19% (11)
2 Days ago or longer	4.58% (7)
Smokes Within 30 Minutes of Waking	
Yes	46.41% (71)
No	54.59% (82)
Quit Attempt in Past 12 months	
Yes	41.18% (63)
No	58.82% (90)
Planning to Quit in Next 30 Days	
Yes	24.64% (34)
No	75.36% (104)

Table 4
Mean Fixations and Dwell Time for Antismoking Advertisements by Ad Context (N = 153)

	Antismoking Ad Context				
	Alone N = 39	Next to Cigarette Ad N = 37	Tobacco Display N = 40	Drink Cooler N = 37	Overall p-value
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	
Fixations					
Message image	31.27 (10.63)	26.26 (8.92)	29.96 (10.66)	31.08 (11.36)	0.1281
Message text	56.72 (13.35)	55.95 (14.59)	58.06 (16.81)	54.59 (18.55)	0.8140
Other text	13.24 (6.07)	13.21 (6.23)	13.05 (6.08)	12.99 (6.11)	0.9973
Dwell Time					
Message image	8.76 (3.89)	6.74 (2.48)	7.55 (2.81)	8.31 (3.93)	0.0478
Message text	14.70 (4.47)	14.48 (4.35)	14.65 (4.86)	14.14 (5.83)	0.9592
Other text	3.60 (1.83)	3.63 (1.86)	3.64 (1.96)	3.60 (1.77)	0.9996

All means adjusted for percentage of the ad covered by area of interest (normalized AOI=visual attention measure/ % of ad covered by AOD).

The p-values for trend produced using within-subjects ANOVA adjusted for ad type (within-subjects factor) and ad context (between-subjects factor).

Pairwise comparisons were conducted using xtreg. All were $p > .05$.

Table 5

Mean Fixations and Dwell Time for Antismoking Advertisements by Ad Type (N = 153)

	Antismoking Ad Type					
	Graphic	Intended Emotive	Benefits of Quitting—Graphic	Benefits of Quitting—Informational Female	Benefits of Quitting—Informational Male	
Fixations	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Message Image	24.49 (14.91) ^{a,b,c,d}	27.43 (16.77) ^{b,c,d,e}	50.81 (24.08) ^{a,c,d,e}	17.21 (12.52) ^{a,b,e}	14.72 (9.99) ^{a,b,e}	
Message Text	80.61 (29.71) ^{a,b,c,d}	42.59 (18.58) ^{b,e}	54.24 (26.31) ^{a,e}	46.98 (25.02) ^e	49.08 (22.74) ^e	
Other Text	10.80 (8.33) ^{a,c,d}	28.80 (19.87) ^{b,c,d,e}	10.19 (8.37) ^{a,c,d}	2.48 (4.85) ^{a,b,e}	2.90 (4.67) ^{a,b,e}	
Dwell Time						
Message Image	6.52 (4.21) ^{a,b,c,d}	7.67 (5.43) ^{b,c,d,e}	12.88 (6.33) ^{a,c,d,e}	4.37 (4.12) ^{a,b,e}	4.26 (5.44) ^{a,b,e}	
Message Text	19.11 (7.71) ^{a,b,c,d}	10.50 (5.18) ^{b,c,d,e}	13.05 (7.07) ^{a,c,e}	15.53 (10.53) ^{a,b,e}	15.14 (8.19) ^{a,e}	
Other Text	2.56 (1.94) ^{a,c,d}	8.65 (6.33) ^{b,c,d,e}	2.67 (2.34) ^{a,c,d}	0.57 (1.27) ^{a,b,e}	0.60 (0.98) ^{a,b,e}	

All means adjusted for percentage of the ad covered by area of interest.

The p-values for trend obtained from within-subjects ANOVA adjusted for ad type (within subjects) and ad context (between-subjects) and were $p < .0001$ for all comparisons.

Pairwise comparisons (denoted by a-e) obtained using a mixed effects regression that accounts for multiple observations per person and uses restricted effects maximum likelihood estimates to match output from ANOVAs.

^a : Significant ($p < .05$) compared with the intended emotive antismoking ad.^b : Significant ($p < .05$) compared with the benefits of quitting—graphic antismoking ad.^c : Significant ($p < 0.05$) compared with the benefits of quitting—informational, female antismoking ad.^d : Significant ($p < .05$) compared with the benefits of quitting—informational, male antismoking ad.^e : Significant ($p < .05$) compared with the graphic antismoking ad.