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Warning Size Affects What Adolescents Recall From Tobacco Advertisements

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Abstract

Objectives—In the U.S., print advertisements for smokeless tobacco (SLT) feature a large black-and-white text warning covering 20% of the advertisement space. Cigarette and e-cigarette advertisements feature a small warning covering approximately 4% of advertisement space. We explored how warning size affects adolescent boys' spontaneous recollection of the warning, brand-relevant advertisement features, and product risks.

Methods—1,220 adolescent males (ages 11–16) viewed SLT, cigarette, and e-cigarette advertisements. After each advertisement, boys were asked to recall what they remembered most. Coders identified recalls of the warning label, brand-relevant advertisement features, and risks associated with the product in responses.

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Human Subjects Statement

All study procedures were reviewed and approved by The Ohio State University Institutional Review Board, protocol number 2014C0030.

Conflict of Interest Statement

The authors declare that they have no conflicts of interest to report.

Results—Participants were less likely to recall warnings in the cigarette vs. SLT (OR=0.30, $p<0.001$) and e-cigarette vs. SLT (OR=0.15, $p<0.001$) ads. Separate GEEs revealed that boys who recalled warnings were less likely to mention brand-relevant advertisement features (OR's<0.32, p 's<0.001). Logistic regressions revealed that boys who recalled the warnings were more likely to mention risks associated with the products (OR's>3.50, p 's<0.001).

Conclusions—Youth are more likely to recall large SLT warnings than small cigarette and e-cigarette warnings. Warning recall is associated with lower likelihood of recalling brand-relevant advertisement features and greater likelihood of mentioning product risks.

Keywords

warning labels; marketing; advertising; youth

INTRODUCTION

Exposure to tobacco advertising predicts tobacco use among youth.^{1–3} Although tobacco companies are prohibited from advertising directly to adolescents, youth in the U.S. are still exposed to their print advertisements in retail outlets and through adult magazines with heavy youth readership.⁴ Such advertisements utilize themes that appeal to adolescents' interests and aspirations,^{5,6} and result in more positive attitudes and greater use intentions.⁷

To inform consumers about the dangers of tobacco and to protect youth from misleading advertisements, the 2009 Family Smoking and Tobacco Control Act (TCA) mandated that 20% of the advertisement space in printed tobacco product advertisements be covered in a bold black-and-white text warning. Smokeless tobacco (SLT) advertisements currently adhere to this requirement. However, legal challenges from the tobacco industry have prevented this requirement from affecting cigarette advertisements. Instead, cigarette advertisements show one of 4 black-and-white text warnings that have not changed since 1984 and cover only 4% of advertisement space. Although electronic cigarettes (e-cigarettes) were brought under the Food and Drug Administration's (FDA's) regulatory authority in 2016 (and will soon feature a black-and-white text warning that covers 20% of advertisement space), their advertisements are not currently regulated and have no warning label requirements. Most e-cigarette advertisements include a warning element, but these warnings only cover a very small percentage of advertisement space and utilize advertisement-consistent colors that lack the visual salience of black-and-white text used in cigarette and SLT advertisements (see Figure 1).

The current research takes advantage of differences in warning label size and coloring across print advertisements for different types of tobacco products to examine the effects of warning format on adolescent boys' recollection of advertisement content. We predict that after viewing tobacco advertisements, boys will be more likely to spontaneously recall the large, black-and-white warnings from SLT advertisements than the smaller warnings from cigarette and e-cigarette advertisements.

In order to promote tobacco use, tobacco companies have branded their products and advertisements to appeal to values and lifestyles of young people.⁸ Warning labels may

reduce the power of tobacco advertisements to communicate this information. We predict that boys who recall seeing a warning label in tobacco advertisements will be less likely to recall advertisement features that communicate brand identity such as product packaging,⁹ brand slogans,¹⁰ and the presence of models.¹¹

Warning labels on tobacco product advertisements and packaging are a visible and cost-efficient way of communicating risk information.¹² Risk perceptions are an important predictor of tobacco use initiation among youth.¹³ We predict that boys who spontaneously recall seeing a warning label will be more likely to mention the risks of the product in the advertisement than boys who do not mention the warning.

METHODS

We analyzed data from a large cohort study of 11 to 16 year-old boys living in urban and rural areas in Ohio. Participants completed the tasks and measures described here as part of the baseline assessment (see Friedman et al., under review¹⁴). The parent study was designed to identify factors that predict tobacco use uptake, and particularly SLT uptake. Because SLT use is much more common among males than females,¹⁵ the sample was limited to adolescent boys. Recruitment was conducted primarily through address-based sampling. To ensure an adequate sample size, address-based sampling efforts were augmented with community-based recruitment and snowball sampling strategies. This approach allowed us to recruit regionally representative samples of boys from urban and rural areas of central Ohio. Parents provided permission for their child's participation and the boys provided assent. Trained interviewers administered the survey in-person. In order to protect the boys' privacy while their parents were in the home, the survey included both interviewer-administered and audio-administered items. All study procedures were approved by The Ohio State University Institutional Review Board.

Ad Viewing Task

Participants viewed 5 magazine advertisements that had recently appeared in print magazines with a high youth readership (see Friedman et al., under review¹⁴). As part of this task, each boy viewed an advertisement for cigarettes, an advertisement for e-cigarettes, and an advertisement for SLT one at a time in a random order. The 2 other advertisements were for alcohol and soft drinks. Because the alcohol and soft drink ads did not consistently include warning labels, participant responses to these ads were not analyzed in this investigation. For each product, one of several advertisements in recent circulation was randomly selected. Participants viewed the ads for as much or as little time as they wished. After viewing each advertisement, participants were asked "What do you remember most about this ad?"

Responses were recorded and then coded by trained coders. Among other things, responses were coded for recollection of having seen a warning label, including mentions of the size or text of the warning (eg "The giant warning sign" "Cancer warning at the bottom," "The Surgeon General note written on the bottom..."). Responses were also coded for recollection of the brand in the advertisement, product packaging, positive product attributes, and recollection of models in the advertisement. Mentions of the risks associated with the

product (eg “It can get you gum disease...” “It could cause cancer,” “Smoking is bad because it causes lung capacity limits”) were coded separately from warning label memory. This category included mentions of both risks printed in the warnings and mentions of any other risk associated with the product. 4 coders completed the coding, and reliability was assessed after every 800 coded responses. Krippendorff alpha values ranged from 0.71 to 0.97. Although positive product attributes received a marginal Krippendorff’s alpha value (0.71), all other codes used in the present research received very good Krippendorff’s alpha values (0.91).

Demographics and Control Variables

Demographics including age, race/ethnicity, and urban/rural location, were recorded during the interview. Participants reported their tobacco use history by responding to the items “Have you ever tried cigarette smoking, even one or 2 puffs?,” “Have you ever used an e-cigarette, such as Smoking Everywhere, NJOY, Blu or Vapor King, even one or 2 times?,” and “Have you ever used any of the following smokeless tobacco products, even one or 2 times?” (followed by a list of smokeless tobacco products). They also reported tobacco product risk perceptions by responding to items that asked “How much do you think people harm themselves when they [smoke cigarettes; use e-cigarettes; use smokeless tobacco]?” (0=No Harm/10=Extreme Harm). Parents also completed a survey at baseline and reported the number of adult and minor tobacco users in their home.

Analytic Approach

We used generalized estimating equation (GEE) models with a logit link function and an exchangeable correlation matrix to compare boys’ likelihood of recalling the warnings across products. Separate GEEs with the same parameters were used to examine the effect of warning recall on mentions of brand-relevant advertisement features. Logistic regression models were used to examine the effect of warning recall on likelihood of mentioning risks associated with the advertised product. Survey weights were used in all analyses to create a region-representative data set. All analyses controlled for race (Non-Hispanic White vs. non-Hispanic African American and Non-Hispanic White vs. other), age (11–13 vs. 14–16), region (urban vs. rural), the presence of adult and minor tobacco users in the home (absent vs. present), product use status (have never used vs. have used), and baseline risk perceptions.

RESULTS

A total of 1,220 male youth completed the baseline survey (average age 14.0 [$SD = 1.6$] years, 69.2% non-Hispanic White, 26.4% rural). Full demographics are available in Table 1.

Warning Memory

Nearly 20% of participants (19.5%) recalled the warnings in cigarette advertisements, 11.5% recalled the warning in e-cigarette advertisements, and 44.2% recalled the warnings in SLT advertisements. Boys were less likely to mention warnings in the cigarette vs. SLT (Odds Ratio [OR] = 0.30, 95% Confidence Interval [CI]: 0.24 to 0.39, $p < .001$) and e-cigarette vs. SLT (OR = 0.15, 95% CI: 0.11 to 0.19, $p < .001$) advertisements, see Table 2.

Brand-Relevant Ad Features

For all 3 products, participants who recalled seeing a warning were less likely to recall brand-relevant advertisement features in cigarette (OR = 0.32, 95% CI: 0.22 to 0.45, $p < .001$), e-cigarette (OR = 0.22, 95% CI: 0.13 to .039, $p < .001$), and SLT (OR = 0.31, 95% CI: 0.22 to .042, $p < .001$) advertisements than those who did not recall seeing a warning. For full results, see Table 3.

Mentions of Risks

Boys who recalled the warnings were dramatically more likely to mention the risks of cigarettes (OR = 44.33, 95% CI: 21.28 to 92.36, $p < .001$), e-cigarettes (OR = 31.02, 95% CI: 14.47 to 66.50, $p < .001$), and SLT (OR = 39.77, 95% CI: 20.81 to 75.99, $p < .001$) than those who did not recall the warnings. For full results, see Table 4.

DISCUSSION

After viewing tobacco advertisements, adolescent boys were less likely to recall having seen warnings in cigarette and e-cigarette advertisements compared to SLT advertisements. One plausible explanation for this finding is that the warning labels were larger and therefore more noticeable in the SLT advertisements than they were in cigarette or e-cigarette advertisements. This is consistent with past research showing that, in adult samples, larger and more attention-grabbing warnings (including both text-only and pictorial warnings) better attract and retain attention than smaller warnings with less conspicuous text.^{16, 17} Our findings suggest that larger text warnings are also more memorable for adolescent boys than smaller text warnings.

We also found that participants who recalled seeing the warnings were less likely to recall other brand-relevant advertisement features like the products brand name, packaging, or the presence of models in the advertisements, than boys who did not recall the warnings. This is important because the tobacco industry uses brand identity to make tobacco attractive to youth⁸ and identification with brand information predicts use intentions.¹¹ These data suggest that large, attention-grabbing warnings may disrupt the impact of tobacco advertisements on adolescents' attention to this brand-identity information.

Finally, boys who recalled seeing the warning labels were also more likely to mention risks associated with using the product than those who did not. Smoking risk perceptions are an important predictor of smoking uptake among adolescents.¹³ This suggests that making the warnings in tobacco product advertisements more memorable could prevent youth tobacco use by increasing tobacco product risk perceptions.

The current research capitalizes on existing differences in warning label size across marketed tobacco products. Participants were shown real tobacco advertisements that they might encounter when reading popular magazines rather than fictional advertisements created by a researcher. For each product, each participant saw one of several advertisements that were in circulation at the time of the study, so our results are generalizable beyond any one specific advertisement. Additionally, participants viewed the advertisements in a random order, so order effects are unlikely to explain our results. However, an important limitation

of this approach is that warning label size and product type were not manipulated independently, meaning that the observed relationships between mentions of the warnings, brand-identity information, and product risks are correlational in nature. However, the consistency of warning recall effects on recollection of brand-relevant advertisement features and mentions of risks across products is consistent with a general pattern of warnings label effects. Further, the data, are consistent with the broader risk literature demonstrating that greater risk perceptions are associated with lower benefit perceptions (and vice versa).¹⁸ To allow for causal claims, future research should create advertisements that manipulate product type and warning size orthogonally. Future research should also consider the possibility that text warnings larger than 20% of the advertisement space could be even more effective. For example, text warnings that cover 50% of the advertisement space might be even more memorable to youth. This might lead to even lower levels of recall for brand relevant advertisement features and a further increased likelihood of mentioning product risks. We look forward to future research that explores this important question.

Another limitation of the current research is that we did not examine the effects of warning mentions on actual tobacco use behavior or tobacco-use intentions. Future research should directly investigate spontaneous recall of warning labels as a potential moderator for the relationship between tobacco advertisement exposure and tobacco use uptake. Finally, because smokeless tobacco use is more prevalent among males¹⁵ and in rural areas, our sample consisted of only boys from Ohio. Thus, our results may not generalize to girls or to boys outside of Ohio.

Pictorial warning labels are a more effective means of attracting consumer attention and conveying tobacco product-risk information than text-only warnings.^{12, 16, 17, 19} The TCA mandates that cigarette warnings must cover 20% of print advertisements space and include one of nine text warnings mandated by Congress, paired with an image that illustrates the text warning. Tobacco industry litigation blocked the FDA from mandating pictorial warnings in 2013. However, the tobacco industry voiced no objection to the nine text warnings. The current research suggests that requiring text-only warnings that cover 20% of the advertisement space in all tobacco product advertisements would make teens less likely to recall brand relevant information from these advertisements. Identification with brands is an important predictor of smoking uptake,¹¹ so reducing the likelihood of teens recalling brand-identifying information could decrease tobacco-use initiation more broadly. Beginning in 2018, 20% of advertisement space in e-cigarette advertisements will be required to display a warning that these products contain nicotine and that nicotine is addictive. Our data suggest that these larger warnings will be more effective in attracting the attention of teens and will make them more likely to spontaneously recall information about the addiction risk carried by e-cigarettes. It is possible that making this risk information more memorable for teens will help offset the disturbing trend of increased e-cigarette use among young people¹⁵; however, longitudinal studies are needed to investigate this possibility.

IMPLICATIONS FOR TOBACCO REGULATION

U.S. adolescents are frequently exposed to print advertisements for tobacco products. Relative to the small warnings currently being used in cigarette and e-cigarette advertisements, large text-only warnings that utilize 20% or more of advertisement space filled with black and white risk information (like those used in smokeless tobacco advertisements) may increase the likelihood of adolescents spontaneously recalling the warning. Boys who recall warning labels after viewing advertisements are less likely to recall brand-relevant advertisement features and more likely to mention the risks of product use. This could reduce the impact of tobacco-related advertising on youth tobacco use initiation.

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Figure 1.

De-identified example tobacco product advertisements used in the current research. Left is a smokeless tobacco advertisement, center is a cigarette advertisement, and right is an e-cigarette advertisement. Warning text is original to the ads. Actual ads can not be published due to copyright laws, but are available to interested individuals from the corresponding author.

Table 1

Weighted Participant Demographics.

Characteristics	% yes
Race/Ethnicity	
Non-Hispanic White	69.2%
Non-Hispanic African American	16.3%
Other	14.5%
Age (Mean, SD)	14.0 (1.6)
Region	
Urban	73.6%
Rural	26.4%
Household Tobacco Users	
Adult user at home	29.9%
Minor user at home	7.0%
Tobacco Use	
Ever smoked	8.2%
Ever used e-cigarettes	9.7%
Ever used smokeless tobacco	3.1%
Baseline risk perceptions (Mean, SD)	
Cigarette risk perceptions	8.1 (1.6)
E-cigarette risk perceptions	6.3 (2.4)
Smokeless tobacco risk perceptions	7.7 (2.1)

Table 2

Full Results for Generalized Estimating Equations Analysis Examining The Likelihood of Mentioning The Warning Across Product Types.

Product	Odds Ratio	Semi-robust standard error	z	p > z	95% Conf. Interval
Cigarettes vs. SLT	0.30	0.04	-9.26	.000	0.24 0.39
E-cigarettes vs. SLT	0.15	0.02	-13.32	.000	0.11 0.19
Race					
White vs. AA	1.00	0.23	-0.01	.992	0.63 1.58
White vs. Other	0.76	0.20	-1.07	.282	0.46 1.26
Age (young/old)	1.04	0.16	0.27	.790	0.77 1.42
Region	1.24	0.21	1.29	.196	0.90 1.72
Adult user at home	1.00	0.17	-0.02	.981	0.71 1.40
Minor user at home	0.96	0.35	-0.12	.901	0.47 1.95
Ever smoked	1.05	0.34	0.15	.879	0.55 1.99
Ever used e-cigarettes	1.06	0.30	0.19	.847	0.61 1.83
Ever used smokeless tobacco	0.51	0.18	-1.87	.061	0.26 1.03
Cigarette risk perceptions	0.94	0.05	-1.01	.313	0.85 1.06
E-cigarette risk perceptions	1.00	0.04	-0.13	.896	0.93 1.07
SLT risk perceptions	1.06	0.05	1.16	.247	0.96 1.16
constant	0.91	0.34	-0.26	.794	0.43 1.91

GEE Examining The Impact of Warning Recollection on Likelihood of Mentioning Brand-Relevant Information for Cigarette Ads.

Table 3

	Odds Ratio	Std. Err.	z	p > z	95% Conf. Interval
Cigarette Advertisements					
Mention of cigarette warning	0.32	0.06	-6.23	.000	0.22 0.45
Race					
White vs. AA	1.06	0.16	0.39	.693	0.79 1.44
White vs. Other	1.01	0.16	0.04	.966	0.74 1.37
Age (young/old)	1.03	0.10	0.31	.756	0.85 1.26
Region	0.97	0.10	-0.26	.793	0.79 1.19
Adult user at home	1.00	0.11	-0.02	.985	0.81 1.23
Minor user at home	0.72	0.15	-1.56	.120	0.48 1.09
Ever smoked	1.48	0.27	2.14	.032	1.03 2.13
Cigarette risk perceptions	0.98	0.03	-0.82	.411	0.93 1.03
constant	0.23	0.05	-6.58	.000	0.15 0.36
E-Cigarette Advertisements					
Mention of e-cigarette warning	0.22	0.06	-5.37	.000	0.13 0.39
Race					
White vs. AA	1.22	0.21	1.14	.256	0.87 1.72
White vs. Other	1.04	0.16	0.26	.791	0.77 1.42
Age (young/old)	1.22	0.14	1.77	.077	0.98 1.53
Region	1.13	0.13	1.09	.276	0.91 1.41
Adult user at home	1.01	0.11	0.05	.959	0.81 1.25
Minor user at home	1.02	0.23	0.07	.946	0.65 1.57
Ever used e-cigarettes	1.11	0.23	0.53	.593	0.75 1.66
E-cigarette risk perceptions	1.01	0.02	0.30	.765	0.96 1.05
constant	0.15	0.02	-11.49	.000	0.11 0.20
SLT Advertisements					
Mention of SLT warning	0.31	0.05	-7.18	.000	0.22 0.42

	Odds Ratio	Std. Err.	z	p > z	95% Conf. Interval
Race					
White vs. AA	1.48	0.33	1.77	.076	0.96 2.29
White vs. Other	1.20	0.27	0.82	.410	0.77 1.88
Age (young/old)	1.34	0.18	2.14	.032	1.03 1.76
Region	1.39	0.18	2.52	.012	1.08 1.80
Adult user at home	1.04	0.15	0.27	.785	0.78 1.39
Minor user at home	1.10	0.21	0.50	.619	0.76 1.60
Ever used SLT	1.43	0.34	1.50	.135	0.90 2.27
SLT risk perceptions	1.00	0.03	-0.17	.866	0.94 1.05
constant	0.14	0.04	-7.44	.000	0.09 0.24

Table 4

Logistic Regressions Examining The Impact of Warning Recollection on Likelihood of Mentioning the Risks in Ads, By Tobacco Product.

	Odds Ratio	Std. Err.	z	p > z	[95% Conf. Interval]
Cigarette Advertisements					
Mention of cigarette warning	44.33	16.58	10.14	.000	21.28
Race					92.36
White vs. AA	2.23	1.01	1.78	.075	0.92
White vs. Other	1.49	0.69	0.87	.386	0.60
Age (young/old)	0.96	0.09	-0.44	.661	0.80
Region	0.49	0.17	-2.00	.046	0.25
Adult user at home	1.09	0.37	0.26	.797	0.56
Minor user at home	0.36	0.37	-1.00	.316	0.05
Ever smoked	1.00	0.09	0.03	.976	0.85
Cigarette risk perceptions	1.02	0.06	0.40	.691	0.91
constant	0.05	0.08	-1.92	.055	0.00
E-Cigarette Advertisements					
Mentions of e-cigarette warning	31.02	12.05	8.84	0	14.47
Race					66.50
White vs. AA	0.74	0.39	-0.58	.565	0.26
White vs. Other	0.71	0.43	-0.56	.576	0.21
Age (young/old)	0.88	0.11	-1.08	.280	0.69
Region	0.39	0.17	-2.16	.031	0.16
Adult user at home	1.19	0.46	0.46	.648	0.56
Minor user at home	3.62	2.03	2.29	.023	1.20
Ever used e-cigarettes	1.06	0.09	0.66	.507	0.89
E-cigarette risk perceptions	1.03	0.06	0.56	.579	0.92
constant	0.21	0.38	-0.85	.394	0.01
SLT Advertisements					
Mentions of SLT warning	39.77	13.12	11.16	.000	20.81
					75.99

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	Odds Ratio	Std. Err.	z	p > z	[95% Conf. Interval]
Race					
White vs. AA	1.76	0.69	1.44	.151	0.81 3.80
White vs. Other	0.62	0.22	-1.34	.180	0.31 1.25
Age (young/old)	0.97	0.07	-0.42	.673	0.84 1.12
Region	0.41	0.10	-3.77	.000	0.26 0.66
Adult user at home	0.92	0.22	-0.34	.733	0.58 1.48
Minor user at home	2.14	0.81	2.03	.043	1.03 4.48
Ever used SLT	1.15	0.13	1.25	.213	0.92 1.44
SLT risk perceptions	0.94	0.04	-1.63	.103	0.86 1.01
constant	0.16	0.19	-1.5	.133	0.01 1.75