

The Impact of Canadian Versus United States Cigarette Warning Labels on Smoking Attitudes

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1 **Abstract**

2 Context. Cigarette smoking is a major source of mortality and medical costs in the United States.
3 Efforts to make warning labels for cigarettes more graphic and salient may help to reduce
4 smoking initiation and increase quit attempts.

5 Objective. To determine whether exposure to Canadian versus U.S. cigarette warning labels
6 would result in more negative attitudes towards smoking among U.S. smokers and nonsmokers.

7 Design. Smokers and nonsmokers were randomly assigned to receive exposure to Canadian or
8 U.S. cigarette warning labels. Affective reactions to cigarette warning labels and towards a
9 variety of smoking-related cues were measured.

10 Setting. A nonprofit research firm in the United States.

11 Participants. Adult volunteers recruited from the community included smokers ($n = 88$; 30%
12 female; mean age = 37) and nonsmokers ($n = 81$; 54% female; mean age = 34). Each group was
13 randomly assigned to either the Canadian or U.S. cigarette warning label condition.

14 Intervention. Participants were exposed either once each to 16 Canadian cigarette warning labels
15 or four times each to four U.S. warning labels.

16 Main Outcome Measures. Affective reactions towards smoking cues, the smoker image, and
17 cigarette warning labels were the main outcome measures.

18 Results. Canadian labels produced more negative affective reactions to smoking and to the
19 smoker image among smokers and nonsmokers compared to current U.S. labels. Smokers did not
20 show signs of defensive avoidance after exposure to the Canadian labels. Both smokers and

1 nonsmokers rated the Canadian labels as producing more negative feelings toward smoking but
2 rated both label types as credible. Exposure to Canadian labels led to support for their use in the
3 United States among both smokers and nonsmokers.

4 **Conclusions.** Large, graphic warning labels such as those used in Canada are more likely to
5 induce negative feelings towards cigarette smoking among both smokers and nonsmokers than
6 the current U.S. warning labels.

7 **Abstract word count = 300**

8

Introduction

Smoking remains the largest preventable source of mortality in the United States.¹ A recent review of successful programs for prevention and cessation of tobacco use indicates that apart from raising the price of tobacco products through taxation, several effective strategies involve dissemination of advice and information.² In particular, media campaigns have successfully reduced the uptake of smoking among adolescents and encouraged cessation among adults. In addition, reminders from health providers to their patients about the hazards of smoking and the benefits of quitting also have been found to reduce smoking. However, increasing the rate of quitting among those who either use or are beginning to use cigarettes will require a range of strategies.¹

One potentially effective way of reaching cigarette users is through warning labels on cigarette packaging. The United States pioneered the use of such warnings when Congress mandated, in 1965, that the statement "cigarette smoking may be hazardous to your health" be placed on the side of all cigarette packs. A few years later the statement was changed to "The Surgeon General has determined that cigarette smoking is dangerous to your health." The only major change made since then was in 1984 when the labels were diversified to include four statements warning of health hazards in somewhat more specific terms (e.g., "Surgeon General's Warning: Quitting smoking now greatly reduces serious risks to your health").

Evidence concerning these labels suggests that they have had little influence on tobacco sales. They have become unnoticeable and lack persuasive power compared to the more salient colorful packaging and various other forms of tobacco promotion.^{3,4} Indeed, one study with adolescents found that users were virtually unaffected by their presence.⁵ An expert panel

1 commissioned by the National Academy of Sciences described the warnings as “woefully
2 deficient when evaluated in terms of proper public health criteria.”^{6(p237)}

3 The new international Framework Convention on Tobacco Control sponsored by the
4 World Health Organization encourages the use of larger warnings on cigarette packs that contain
5 color pictures to illustrate health hazards.⁷ Canada has had such a system in place since late 2000
6 with warning labels covering over 50% of cigarette packs, front and back, with additional
7 information on the inside about resources for quitting. The European Union, Australia, and
8 several Latin American countries have now followed suit with similar labeling requirements.

9 Survey research in Canada suggests that the larger labels with color pictures and 16
10 separate messages about specific risks of smoking create more negative emotional reactions
11 toward cigarettes and increase smokers’ attempts to quit.^{8,9} See Figure 1 for an example of one
12 Canadian warning label. However, this research relies on smokers’ reports of exposure to the
13 labels. Furthermore, even though sales of cigarettes have declined since the introduction of the
14 labels,¹⁰ taxes on cigarettes also increased, and new laws were passed restricting smoking in
15 public places, making causal inferences regarding the role of the labels difficult. In this study, we
16 examine exposure to warning labels in a controlled laboratory setting with both smokers and
17 nonsmokers in the United States in order to compare the effects of the Canadian-style labels
18 versus the current U.S. labels.

19 One of the ways that warning labels can reduce attraction to cigarettes among nonusers or
20 motivate quitting among users is to create unfavorable emotional associations with the behavior.
21 Bland descriptions of the health hazards of smoking, such as those currently on cigarette packs in
22 the United States, are unlikely to create such associations, either because they fail to attract
23 attention¹¹ or because they fail to make the health danger sufficiently compelling.¹² Affective

1 associations, whether achieved through learning or simple primes, are important determinants of
2 judgments and choice behavior¹³⁻¹⁵ and are highly related to initiation and quitting of smoking.¹⁶⁻
3 ¹⁸ These affective associations are easily accessed and need not require deliberation to be
4 effective.¹⁹⁻²¹

5 Smoking research has shown that the associations also should be sufficiently wide-
6 ranging to influence the many smoking-related cues that elicit craving in smokers attempting to
7 quit the habit.^{22,23} They should undermine the attractiveness of the smoker image, the
8 favorableness of which has been a key goal of cigarette advertising.^{24,25} At the same time, there
9 is the risk that overly graphic warnings will cause users to avoid exposure to the labels and may
10 even reinforce favorable reactions to smoking.^{26,27} Although a study of the effects of Canadian
11 labels²⁸ found no evidence for such defensive avoidance, the possibility for such effects should
12 be considered.

13 The present study assessed potential reactions to smoking resulting from experimentally
14 controlled exposure to Canadian and U.S. labels. To determine the breadth of effects of such
15 exposure, we assessed the emotional impact of each set of labels as well as the effects of
16 exposure on affect, both to smoking-related images and words and to the smoker image. We
17 assessed the acceptability of the Canadian-style labels by asking both smokers and nonsmokers
18 to evaluate the credibility of the labels and whether they should be employed in the U.S. market.

19 Methodology

20 Participants

21 Participants ($N = 169$) were recruited through advertisements in local papers and fliers
22 distributed in the local community (Eugene, Oregon). We employed a two-way factorial design
23 in which smokers and nonsmokers were randomly assigned to either a Canadian warning label

1 condition ($n = 84$, with 43 smokers and 41 nonsmokers) or a U.S warning label condition ($n =$
2 85, with 45 smokers and 40 nonsmokers). Each participant received \$10 for completing the
3 experiment individually in a one-hour session.

4 Procedure

5 Participants were asked, "Do you ever smoke cigarettes?" in order to be randomly
6 assigned to either the Canadian or U.S. label condition. Participants were seated at a computer
7 and responded to an overall measure of attitude toward smoking: "What is your attitude or
8 opinion about cigarette smoking?" on a 9-point scale ranging from -4 (*extremely negative*) to $+4$
9 (*extremely positive*), and then commenced to Phase I of the task. In Phase I, those in the
10 Canadian label condition viewed 16 different Canadian labels that appeared in a random order,
11 while those in the U.S. condition viewed 4 different labels, each randomly appearing 4 times.
12 The participant controlled the exposure duration of each label, which was measured in
13 milliseconds by the computer.

14 In Phase II, participants were asked to quickly and accurately give their impressions of a
15 series of four smoking images (i.e., a close-up picture of a burning cigarette in an ashtray; a
16 distant picture of a cigarette in an ashtray; an extreme close-up of a lit cigarette showing smoke
17 and burning-red tobacco; and a picture of a lit cigarette in a smoker's hand) and four smoking-
18 related words (i.e., nicotine, tobacco, cigarette, and smoking). They provided similar reactions to
19 four food-related images (e.g., meat and vegetables on a plate) and words (e.g., nutrition). For
20 each word and image, participants responded to the question "What is your attitude or opinion?"
21 by pressing one of two buttons for each of four adjective pairs (e.g. good-bad, positive-negative,
22 favorable-unfavorable, and like-dislike). For example, if the word "nicotine" appeared on the
23 screen with the good-bad adjective pair underneath it, and the participant felt good about it, she

1 would press the button under the word “good.” The adjective pairs were presented in random
2 order for each image with a randomized right-left orientation at the bottom of the screen.

3 Participants then answered a series of smoking questions on the computer. They were
4 shown a U.S. cigarette label and a Canadian cigarette label and were asked whether Canadian
5 labels should be used in the United States. They were also asked whether the minimum age for
6 buying cigarettes should be raised, and smokers were asked how much they smoked.

7 Participants next completed a task designed to measure affective images of smokers.
8 Adapted from Haire’s²⁹ “Shopping List Survey,” participants were shown a shopping list of
9 groceries bought by a student and were asked to “... project yourself into the situation as far as
10 possible until you can more or less characterize the University of Oregon undergraduate who
11 bought the groceries. Then write a brief description of his personality and character.” The
12 shopping list contained six food items and a pack of cigarettes.

13 Participants then viewed all 16 Canadian labels or all 4 U.S. labels again (e.g., if they
14 were originally shown the U.S. labels, they were shown them again) and were asked their
15 affective reaction to each label, “How does this warning label make you think and feel about
16 cigarette smoking?” on a 9-point scale ($-4 = \textit{extremely negative}$ to $+4 = \textit{extremely positive}$). In
17 addition, they were asked to rate the credibility of the labels, “How much do you believe the
18 information in the warning label is true or false?” on a 9-point scale ($-4 = \textit{completely false}$ to
19 $+4 = \textit{completely true}$). Finally, participants provided demographics such as age, gender, and
20 education (1 = 8th grade or less to 7 = more than a four-year college degree).

21 Results

22 Age, education, and gender were not significantly different between participants exposed
23 to Canadian and U.S. warning labels (see Table 1; age mean = 37 and 35 for Canadian and U.S.

1 participants, respectively; education mean = 4.8 and 4.6 for the same two groups, respectively,
2 where 4 = vocational or trade school and 5 = some college or two-year degree). Smokers were
3 less educated than nonsmokers ($p < .001$). No other differences reached significance.

4 Looking time at warning labels

5 In Phase I, participants in the Canadian label condition looked at the warning labels for
6 longer than did participants in the U.S. label condition: means (medians) = 8.4 (8.3) and 4.5 (4.4)
7 seconds; $F(1,165) = 115.7, p < .0001$. Neither smoker status nor its interaction with the label
8 condition were significant predictors of looking time (smokers' and nonsmokers' mean looking
9 times in the Canadian condition were both 8.2 seconds, and were 4.1 and 4.3 seconds,
10 respectively, in the U.S. condition).

11 Initial attitudes toward cigarette smoking

12 Not surprisingly, nonsmokers had significantly more negative initial attitudes toward
13 cigarette smoking than smokers (mean attitudes = -3.0 and $.5$, respectively, $p < .0001$). The
14 initial attitudes of participants in the Canadian condition were marginally more negative than
15 those in the U.S. condition ($p < .10$); the interaction of smoker status and condition was not
16 significant (initial-attitude means = -1.0 and -3.1 for smokers and nonsmokers, respectively, in
17 the Canadian condition and 0.0 and -3.0 for smokers and nonsmokers, respectively, in the U.S.
18 condition). A large proportion of nonsmokers gave the most extreme negative rating for their
19 initial smoking attitude (49% and 60% of nonsmokers in the Canadian and U.S. conditions,
20 respectively, rated their attitude towards smoking as -4 compared to 16% and 2% of smokers in
21 the same two conditions). For these participants, exposure to warning labels cannot make their

1 attitudes more negative. In view of these initial attitude differences, it was important to control
2 for them in all analyses.

3 Affective reactions to the warning labels

4 We asked participants how the warning labels made them think and feel about smoking.
5 In this direct measure of affect associated with the labels, Canadian label participants reported
6 that their warning labels made them feel more negative toward smoking than U.S. label
7 participants (mean = -2.9 and -1.5, respectively, $p < .0001$; this remained significant after
8 controlling for initial attitude towards smoking). It is noteworthy that the mean ratings of the 16
9 Canadian labels (see Table 2) were uniformly more negative than any of the four U.S. labels.
10 Smoking status was not a significant predictor of affective reactions to the labels after controlling
11 for initial attitude (mean affect for the Canadian labels was -2.4 and -3.5 for smokers and
12 nonsmokers, respectively, while mean affect for the U.S. labels was -.9 and -2.1 for smokers
13 and nonsmokers, respectively).

14 We asked participants how much they believed the information in the labels to be true or
15 false using a scale from *completely false* (-4) to *completely true* (+4; see Table 2). Overall,
16 participants in each of the four groups believed their labels to be truthful (mean belief in truth =
17 2.6 and 3.1 for smokers in the Canadian and U.S. conditions, $p < .10$; mean belief in truth = 3.4
18 and 3.3 for nonsmokers in the Canadian and U.S. conditions, n.s.).

19 Affect towards smoking words and images after exposure to warning labels

20 We assessed reactions to smoking-related words and images that might elicit craving in
21 smokers and possible interest in nonsmokers. An index of affect towards smoking cues was

1 created in response to 4 smoking-related words and 4 smoking-related images. This index was
2 calculated from the mean response to each stimulus after deleting the first adjective pair
3 encountered for each stimulus. As hypothesized, affect towards smoking cues was more negative
4 for Canadian than U.S. participants (mean affect = $-.8$ and $-.5$, respectively, RM ANOVA, $p <$
5 $.01$; eta-squared = $.05$). After controlling for initial smoking attitude, amount of smoking, age,
6 and gender, a significant difference remained between the Canadian and U.S. conditions (see
7 Figure 2). Thus, smokers and nonsmokers reported more negative affect towards smoking cues
8 after exposure to the Canadian labels than after exposure to U.S. labels. There was no significant
9 difference between Canadian and U.S. label participants in affect towards the food stimuli.

10 Affective images of smokers

11 In the final task, participants described the person who purchased groceries that included
12 a pack of cigarettes. Two independent coders blind to condition rated the attitude or affective
13 tone each participant conveyed about the person buying groceries on a 3-point scale ($-1 =$
14 negative, $0 =$ neutral, $+1 =$ positive). The last author, also blind to condition, compared all
15 responses and calculated the coders' overall reliability as a simple percent by counting the
16 number of times the coders agreed on the affect rating and dividing by the total number of affect
17 ratings. With this analysis, coders averaged 82% agreement. The last author resolved any
18 differences prior to analysis.

19 In a 2-way ANCOVA controlling for initial attitude towards smoking, participants
20 exposed to Canadian labels were more negative in their descriptions of the shopper's personality
21 and character (mean affect = $-.3$ and $-.1$, for the Canadian and U.S. conditions, respectively, $p <$
22 $.05$). This main effect was qualified by a significant interaction such that nonsmokers showed a

1 greater impact of the label condition compared to smokers (Canadian- and U.S.-label means
2 were -0.4 and -0.1 for nonsmokers and -0.2 and -0.1 for smokers, respectively, interaction $p < .05$).
3 Smoking status was not significant as a main effect.

4 Beliefs about cigarette policies in United States

5 Those in the Canadian label condition were marginally more likely to favor raising the
6 minimum purchase age for buying cigarettes to 21 compared to those in the U.S. label condition
7 (60% and 42%, respectively, favored raising the age; $p < .10$ after controlling for smoking status,
8 its interaction with condition, and initial attitude).

9 A strong majority of nonsmokers (81%) thought the United States should use warning
10 labels similar to the Canadian labels; a majority of smokers (60%) thought the same. This finding
11 did not differ by condition.

12 Discussion

13 Graphic color warning labels, covering over 50% of the cigarette package, were installed
14 in Canada in December, 2000. Surveys beginning in October/November of 2001 indicated that
15 the extent to which smokers reported reading, thinking about, and discussing the new labels were
16 associated with greater intentions to quit smoking and with actual quit attempts.⁸ Smokers who
17 quit before and after the introduction of the new labels were asked whether warning labels were a
18 factor in their decision.⁹ Those who quit after the introduction of new graphic labels were 2.8
19 times more likely to cite warning labels as a quitting influence than those who quit prior to their
20 introduction (and would have seen only the old warning labels).³⁰

1 Despite these promising results, the causal influence of the new warning labels remained
2 unclear. Smokers who intended to quit may have been more likely to read the labels and discuss
3 them. Also, as noted earlier, laws requiring all indoor public places in the study region to be
4 smoke-free were implemented prior to the study.⁹ Furthermore, reactions to the warnings may
5 not generalize from Canada to the United States. These limitations motivated the present study,
6 conducted in a laboratory setting in the United States where exposure to Canadian and U.S.
7 warning labels could be randomly assigned and closely monitored among both smokers and
8 nonsmokers.

9 The results showed that the Canadian labels were voluntarily examined for longer
10 durations than the U.S. labels and also led to consistently more negative affect towards smoking
11 cues and smokers themselves. Nonsmokers appeared to be influenced more by the Canadian
12 labels than were smokers. Smokers, nonetheless, showed evidence of significant transfer of
13 negative associations and feelings from the warning labels to smoking cues and to a shopper who
14 purchased cigarettes after exposure to the Canadian labels. Also noteworthy was greater support
15 by both smokers and nonsmokers for raising the minimum purchasing age for cigarettes and for
16 introducing Canadian-style labels in the United States after exposure to the Canadian labels.

17 We found no evidence to suggest that the Canadian labels elicited defensive avoidance of
18 the warnings among smokers. Smokers spent as much time viewing the labels as nonsmokers,
19 rated them as equally credible to existing U.S. labels, and supported their use in the U.S. market.
20 At the same time, they reported that the Canadian labels were more emotionally powerful than
21 the U.S. labels and their reactions to smoking words and cues in the Canadian condition were
22 more negative than in the U.S. condition. This pattern of reactions was expected given the
23 careful research conducted by the Canadians in developing the warning labels.³⁰ These results in

1 combination with the less favorable images of smokers created by the Canadian labels support
2 the contention that large, graphic warning labels, such as those used in Canada and proposed for
3 use in the United States and many other countries, are more likely to contribute to negative
4 attitudes towards cigarette smoking than current warning labels and also may facilitate more
5 attempts and greater success at smoking cessation.⁹

6 There are several reasons why the use of Canadian-style labels may be an important
7 component of a national smoking-reduction strategy. First, smokers and nonsmokers who are
8 experimenting with tobacco can be easily and efficiently reached with these warnings whenever
9 they purchase or use cigarettes. Current warnings in the United States are easily ignored and do
10 not transmit the same level of emotional impact as the colorful and graphic Canadian warnings.
11 Indeed, a major moderator of the effectiveness of product warnings is the salience and vividness
12 of the label.¹¹ Second, considerable psychological research suggests that the mere presentation of
13 hazard information is not sufficient to motivate perceptions of risk.³¹ Risk is most readily
14 communicated by information that arouses emotional associations with the activity.³² The
15 present results indicate that brief exposure to the Canadian-style labels produces emotional
16 connotations that transfer to smoking cues and have the potential to reduce attraction to the
17 activity. Third, emotional associations can be readily accessed from memory by the mere
18 presentation of the relevant stimulus.^{20,21} These associations can then work to reduce attraction to
19 the stimulus and motivate cessation. Indeed, emotional associations to smoking appear to be
20 powerful predictors of smoking behavior and may well be causally implicated in efforts to either
21 start or stop smoking.^{8,17-18,28}

22 One limitation of the present study is the brief level of exposure to the labels. This is
23 possibly more detrimental to the impact of the Canadian labels, which are new, than to the

1 impact of the more familiar U.S. labels. Furthermore, although the U.S. labels are smaller and
2 less salient than the Canadian labels, both labels were presented as nearly equal in size on the
3 computer screen. Nevertheless, the Canadian labels had more impact. Another limitation is the
4 fact that all measures were taken very near in time to the exposure to the labels. Effects of long-
5 term exposure and effects at a time distant from exposure were not studied.

6 Despite these limitations, the present study, combined with similar results from nonlaboratory
7 surveys in Canada, lend support to recommendations to employ Canadian-style warnings on all
8 cigarette packages. Warning labels for tobacco products are controlled by Congress and cannot
9 be mandated by federal regulatory agencies. One step toward achieving this objective would be
10 for the President to submit and for the Senate to ratify the International Framework Convention
11 on Tobacco Control that encourages signatories to employ Canadian-style warnings.

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Figure Legends

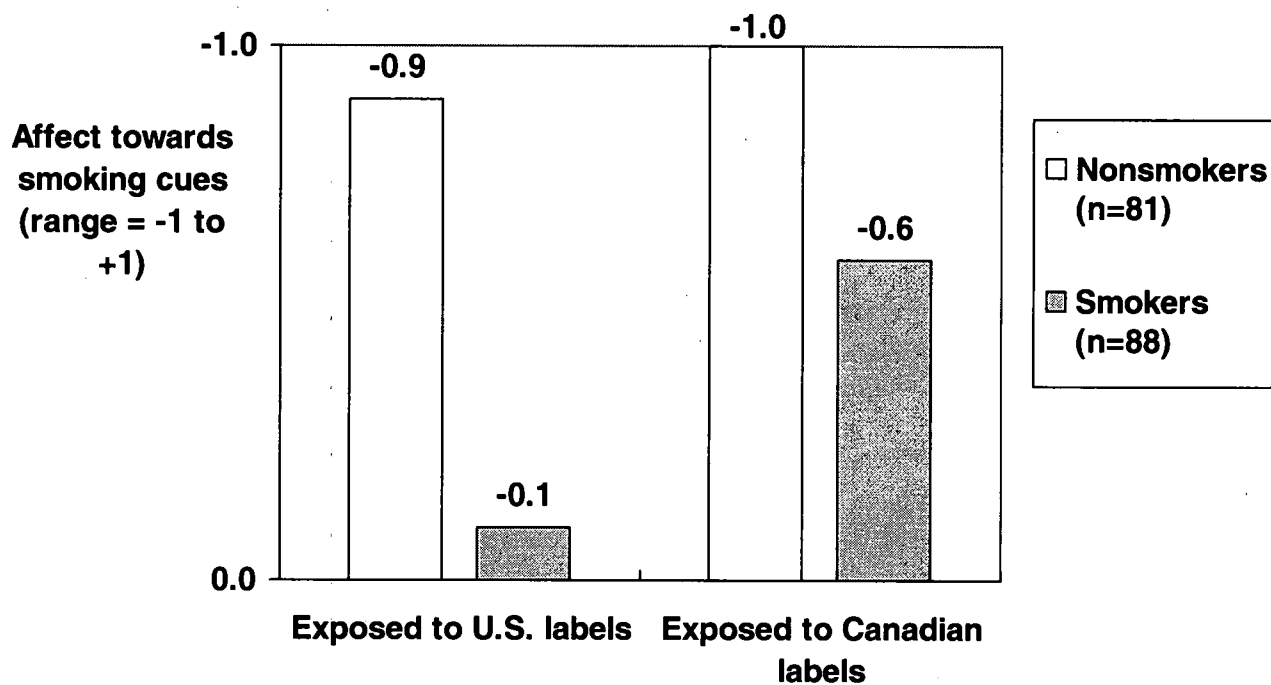
Figure 1. One of 16 warning labels used on cigarette packages in Canada.

Figure 2. Affect towards smoking cues among smokers and nonsmokers in the Canadian and U. S. conditions.

Figure 1. One of 16 warning labels used on cigarette packages in Canada



Figure 2. Affect towards smoking cues among smokers and nonsmokers in the Canadian and U.S. conditions



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Table 1. Demographic characteristics by smoking status and warning label condition				
		Canadian	U.S.	Average
Age (years)	Smoker	37	38	37
	Nonsmoker	37	32	34
	Mean	37	35	36
Education <i>(1 = 8th grade or less to 4 = vocational or trade school to 7 = more than a 4-year college degree)</i>	Smoker	4.3	4.3	4.3
	Nonsmoker	5.3	5.0	5.1
	Mean	4.8	4.6	4.7
Gender (% female)	Smoker	30%	29%	30%
	Nonsmoker	46%	63%	54%
	Mean	38%	45%	41%
Amount Smoked <i>(1 = less than 1 cigarette a day to 4 = 11-14 cigarettes per day to 8 = 2 packs a day or more)</i>	Smoker	3.5	4.1	3.8

Note: No significant differences existed between conditions or smoking status except that smokers were significantly less educated than nonsmokers.

Table 2. Rated affect towards and truthfulness of warning labels

	Affect	Truthfulness
U.S. Labels		
Smoking by pregnant women	-2.1	3.2
Smoking causes lung cancer, etc.	-2.0	3.4
Cig smoke contains carbon monoxide	-1.1	3.4
Quitting reduces serious risks	-0.8	2.9
Mean	-1.5	3.2
Canadian labels		
Smoke hurts babies (baby in ICU)	-3.4	3.3
Mouth diseases	-3.2	3.1
Cigarettes hurt babies (pregnant)	-3.1	3.3
Equivalent of small city dies	-3.1	2.9
Lung cancer (person in hospital)	-3.1	3.3
Cigarettes cause strokes (brain)	-3.1	3.0
Lung cancer (lung)	-3.0	3.2
Children see children do	-2.9	2.9
Don't poison us (children)	-2.9	3.1
Leaves you breathless (cough)	-2.9	3.3
Heartbreaker (clogged arteries)	-2.9	2.9
Idle but deadly	-2.8	3.0
Highly addictive (heroin or cocaine)	-2.7	3.0

Hydrogen cyanide	-2.7	2.8
You're not the only one smoking	-2.6	2.7
Tobacco can make you impotent	-2.6	2.2
Mean	-2.9	3.0

Note: Affect was rated in response to the question: "How does this warning label make you think and feel about cigarette smoking?" (-4 = *extremely negative* to +4 = *extremely positive*). Truthfulness was rated in response to: "How much do you believe the information in the warning label is true or false?" (-4 = *completely false* to +4 = *completely true*).

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