The Effectiveness of Cigarette Warning Label Threats on Nonsmoking Adolescents

This experiment investigated three levels of threat in cigarette warning labels: no warning/text warning only/text + graphic warning. Teenagers in Canada and the US were exposed to one of these labels in a web-surfing environment. Participants surfed a website sponsored by a familiar cigarette brand or an unfamiliar cigarette brand. After surfing, three dependent measures were assessed: brand attitude, website attitude, and smoking intent. Results indicated that the graphic label was the most effective for Canadian participants, leading to negative attitudes and lower smoking intentions, but the graphic label was least effective at lowering smoking intentions for US participants.

Despite the efforts of many health organizations in the United States and Canada, smoking among adolescents continues to be a major health problem in both countries that has consequences for future smoking behavior. For example, in the US, 90% of adult smokers began smoking before the age of 21 (American Lung Association 2008) and in Canada, 85% of adult smokers began smoking before the age of 19 (Health Canada 2008). In the US, 20% of seniors in high school, 12% of 10th graders, and almost 6% of 8th graders smoke daily (American Lung Association 2008). In Canada, 20% of teenagers aged 15–19 become adult smokers (Health Canada 2004). These statistics emphasize the importance of messages, including cigarette warning labels, targeted in part at nonsmoking adolescents in an effort to reduce the numbers of those who pick up the habit.

The US and Canada have taken different approaches to the types of warning labels mandated for cigarette packaging. In the US, warning

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labels are textual messages with no visuals. In Canada, since 2001, warning labels include graphic images that accompany the text. These warning labels, which include strong threats, have been shown to be effective among adults (Hammond et al. 2003). However, the impact of such labels on adolescents has not been fully investigated.

Much research has been conducted on responses to threats in cigarette advertising and warning label domains, often with contradictory findings. For example, Smith and Stutts (2006) found that antismoking advertisements targeted at adolescent nonsmokers reduced the prevalence of smoking. However, Wolburg (2006) found boomerang effects. Part of the confusion may be caused by a tendency in past studies to equate the degree of the threat contained in the message with the degree of fear experienced by the target (Rotfeld 1988). Given the difference between the US and Canadian warning label system, and the lack of research on nonsmoking adolescents’ responses to threats contained in the differing labels, the purpose of the experiment reported here is simply to determine which approach leads to the most positive outcomes.

Very little research has investigated the effectiveness of threats in warning labels (for exceptions, see Hammond et al. 2003; Sabbane et al. 2008). Warning labels can elicit strong reactions. In Europe during the 1990s, for example, smokers placed stickers over warning labels that read “Tomorrow, you could get hit by a bus” (Bhatti 2004). Since nonsmoking adolescents are just as likely, if not more so, to be confronted with warning labels as ad campaigns during a smoking decision scenario, the effects of threats used in warning labels is an important area of study. Given the contradictory results reported above, and the fact that the impact of cigarette warning labels on attitudes and behavioral intentions is not fully understood, the purpose of this experiment was to investigate whether the Canadian warning label approach has positive consequences among Canadian adolescents (in terms of reducing their intentions to smoke) and, furthermore, to investigate what the effects might be of this approach on US adolescents.

Due to previous results obtained in past research, however, we felt it was necessary to pit two competing hypotheses against one another, to see which pattern might emerge from the data. Thus, three conditions of warning labels were created: no warning label vs. text warning label only vs. text + graphic warning label. If threats are effective, we would expect a clear, downward linear trend such that attitudes become more negative and intentions to smoke are lower as you move from no label to the text only label to the graphic label. That is, we would expect the lowest attitudes and smoking intentions for the text + graphic warning label. If,
on the other hand, a boomerang effect is observed, we would expect a clear, upward linear trend such that attitudes become more positive and intentions to smoke are higher as you move from no label to the text-only label to the graphic label. That is, we would expect the highest attitudes and smoking intentions for the text + graphic warning label. Thus, rather than formal hypotheses, our research question involves an exploratory investigation into which of these competing patterns might be obtained.

In addition to the three warning label conditions, we wanted to investigate whether brand familiarity plays a role in the process. Our assumption was there might be a main effect for brand familiarity, such that more familiar brands might be viewed more positively than unfamiliar brands. We also felt it was important to see if brand familiarity would interact with warning label type in a way that might be difficult to predict.

METHOD

Participants and Procedure

Two hundred and ninety-eight teenagers participated in the experiment; 170 students were recruited from a secondary school in the Montreal region of Canada and 126 students were recruited from secondary schools in a Southwestern state of the US. Following proper protocol for collecting data from minors, parents of all participants first provided their consent to allow their child to participate in the study after reading a brief description of the procedure. Second, the students themselves provided their own consent to participate and were free to abandon the study at any time. Eight participants failed to complete the entire study, and their data were removed from the analysis. In addition, because our interest was in determining how nonsmokers would react to the experimental manipulations, data from those participants who claimed they smoked every day ($n = 51$; 17% of the sample) and those who claimed to smoke occasionally ($n = 19$; 6% of the sample) were also removed from the analysis. Participants ranged in age from 12 to 20, with the majority between the ages of 13 and 15 (82%), and were fairly balanced in terms of gender (59% were female).

Participants were randomly assigned to one of the six experimental treatments (three warning labels $\times$ two levels of brand familiarity). The experiment was conducted in the school’s computer lab or the library, depending on availability. In all sessions, the participants were alone in the room with a teacher and a research assistant. Sessions were conducted in groups ranging from 10 to 20 participants, and lasted no longer than 45
minutes. Each participant was seated at a personal computer with instructions displayed on the monitor that emphasized that responses would remain anonymous and confidential. The research assistant explained the purpose of the study, as well as reminding participants of proper behaviors during the study—no communication was allowed between students, who were seated apart to protect privacy. The research assistant described how they would be able to surf on a website sponsored by either a local (familiar) or foreign (unfamiliar) brand of cigarettes and that they would later be asked about their website experience. There was no mention of any warning label to be presented (or not) at the beginning of the surfing session. Participants in the “no warning label” condition saw only a sponsor brand name before the surfing session began. Participants in the “text only” condition saw both a sponsor brand name and a warning label text message about health risks associated with smoking cigarettes. Participants in the “text + graphic” condition saw a sponsor brand name and the same text message superimposed over an explicit image of the consequences of the relevant health risks (see Appendix 1). Exposure to the information in all three conditions was fixed at two seconds, a time interval determined to render the information explicit without focusing attention on the warning label (Pechmann and Knight 2002). Immediately after this exposure, participants started surfing on the website, which contained information about upcoming concerts, bios of pop music stars, and pictures of young people dancing—the sort of information that adolescents might be particularly interested in. The website was sponsored by a cigarette brand that appeared in the lower-right part of the web page (see Appendix 2). At the conclusion of the surfing period, participants responded to several measures designed to assess their overall brand attitude toward the sponsor brand, their attitude toward the website, and their smoking intent. A manipulation check of brand familiarity was also included, as well as general demographic information.

Stimuli

The actual graphic warning label used was prepared by Health Canada and determined by Environics Canada to be one of the most effective for both nonsmokers and smokers (Environics Research Group 2001), and included a photograph of a diseased mouth, along with a textual message explaining the risks of contracting oral diseases as a result of smoking. To create the text-only version of the warning label, a professional web designer was recruited who both built the website and removed the graphic image from the original warning label.
Brand familiarity was manipulated by selecting eight different brands, four of which would be familiar to participants and four which would be unfamiliar to participants. For Canadian participants, the four familiar brands included Craven A, du Maurier, Export A, and Players. For US participants, the four familiar brands included Lucky Strike, Marlboro, Newport, and Virginia Slims. The four familiar Canadian brands comprised the set of unfamiliar brands for US participants, and the four familiar US brands comprised the set of unfamiliar brands for Canadian participants. Brand identification occurred throughout the experiment. First, the brand was identified during the brief warning label exposure before website surfing commenced. Second, the brand appeared in the lower right corner of the website throughout the surfing period.

Manipulation Check and Demographic Factors

The online questionnaire that was completed at the end of the surfing period included a brand familiarity manipulation check. The brand familiarity manipulation check was a seven-point semantic differential scale anchored by very unfamiliar to very familiar with the brand sponsor. There was a significant difference on this measure ($F[1, 210] = 11.37$, $p = .001$), with familiar brands having a higher mean (3.01) than unfamiliar brands (2.01). Thus, the manipulation of familiarity worked as expected. Demographic factors analyzed included gender and age. Neither of these factors had a significant effect on any of the dependent variables, so were not included in further analyses.

Dependent Variables

Brand Attitude

Brand attitude was measured on four 7-point semantic differential scales anchored by: bad/good; unfavorable/favorable; disagreeable/agreeable; and unpleasant/pleasant. The four scales were combined into a single brand attitude measure due to high inter-item reliability (Cronbach’s $\alpha = .95$).

Website Attitude

Website attitude was measured on three 7-point Likert scales anchored by like/dislike; good/bad; and nice/not nice. The three scales were combined into a single website attitude measure due to high inter-item reliability (Cronbach’s $\alpha = .94$).
Smoking Intent

Intention to smoke was measured on three 7-point semantic differential scales anchored by: unlikely/likely; improbable/probable; and uncertain/certain. The third item (uncertain/certain) was dropped to improve scale reliability from .66 to .83.

Findings

We conducted a 2 (brand familiarity: familiar/unfamiliar) × 3 (warning label: no warning label/text only/text + graphic label) × 2 (country: Canada/US) MANOVA on the three dependent measures since it’s possible that there might be relations between the three dependent variables (Sabbane et al. 2008). However, main effects and interactions are discussed for each dependent measure separately.

Brand Attitude

There was a main effect for type of warning label, as might be expected ($F[2, 290] = 12.56; p < .001$). A Bonferroni Post-hoc test showed that brand attitudes in the text-only condition (3.13) were not significantly different from those in the no-warning condition (2.60; $p = .28$). However, brand attitudes in the text + graphic warning condition were significantly inferior to those under the other two conditions (1.90; $p < .001$).

There was also a significant two-way interaction between brand familiarity and country ($F[1, 196] = 7.12; p = .008$), in which Canadian participants had more positive attitudes for familiar brands and US participants had more positive attitudes for unfamiliar brands (see Figure 1). In exploring this relation further, it was determined that the mean differences for US participants were significant ($F[1, 62] = 4.64; p = .035$), but the mean differences for Canadian participants were not ($p = .16$).

Website Attitude

There was a similar significant main effect for type of warning label, which demonstrated the same general pattern as that obtained for brand attitude ($F[2, 196] = 6.39; p = .002$). Again, website attitudes were not significantly different in the text-only and no-warning conditions ($M$ for none = 3.15; $M$ for text only = 3.40; $p = 1.00$). However website
attitudes in the text + graphic condition were significantly lower than under the other two conditions ($M$ for graphic = 1.90; $p < .01$). There was also a marginal main effect ($p = .07$) for brand familiarity, in that attitudes were more favorable for familiar brands ($M = 3.09$) than for unfamiliar brands ($M = 2.91$).

**Smoking Intent**

There was a significant main effect ($F [1, 197] = 9.51; p = .002$) for country of origin on smoking intent, with US participants having higher intentions to smoke ($M = 2.36$) than did Canadian participants ($M = 1.88$). More importantly is that a similar significant two-way interaction between country and brand familiarity was obtained ($F [1,197] = 5.18; p = .024$), similar to the pattern obtained for brand attitude (see Figure 2). This time, however, mean differences for Canadian participants were significant ($F [1, 147] = 9.08; p = .003$), but mean differences for US participants were not ($p = .88$).
In addition, a significant two-way interaction between country and warning label condition was obtained ($F\ [2,197]= 3.12;\ p = .046$), in which Canadian participants showed a similar pattern as that obtained for the main effects of warning labels on brand attitude and website attitude, but US participants showed a pattern more in keeping with a boomerang effect (see Figure 3). However, separate $t$-tests indicated that the only significant difference between means was in the graphic label condition ($p = .000$).

A marginally significant two-way interaction between warning label condition and brand familiarity was obtained ($F\ [2, 197] = 2.35;\ p = .098$), in which participants exposed to familiar brands showed a similar pattern obtained both for the main effects of warning labels on brand attitude and website attitude, and for Canadian participants in the two-way interaction between country and warning label on smoking intent just described. The pattern for participants exposed to unfamiliar brands is similar to that obtained for US participants in that same two-way
FIGURE 3
*Mean Smoking Intent as a Function of Warning Label Condition and Country*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Canadian Participants</th>
<th>US Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-warning label</td>
<td>1.95a</td>
<td>2.17a</td>
</tr>
<tr>
<td>Text-only warning label</td>
<td>2.04a</td>
<td>2.25a</td>
</tr>
<tr>
<td>Graphic warning label</td>
<td>1.67a</td>
<td>2.80b</td>
</tr>
</tbody>
</table>

Note: Different subscripts differ significantly ($p < .05$)

interaction (see Figure 4). However, separate $t$-tests indicated that the only significant difference between means was for familiar brands in the text only and graphic warning label conditions ($p = .04$).

We tested if the effects of warnings on smoking intent could be mediated by attitudes toward the website and toward the cigarette brands. As already noted the *direct* effects of warnings on smoking intent are not significant, which precludes the possibility of a genuine mediation. However, it was found that the attitudes toward the cigarette brand-sponsored website and toward the brands affected intent to smoke. A linear regression showed that both attitudes significantly affected smoking intent ($r^2 = .09$); the respective betas were .07 for attitudes toward the website ($p = .09$) and .60 for attitudes toward the brand ($p < .0001$). Thus, warnings may not affect smoking intent directly but may do so through attitudes toward brands and toward brand-sponsored websites.
FIGURE 4
Mean Smoking Intent as a Function of Warning Label Condition and Brand Familiarity

<table>
<thead>
<tr>
<th></th>
<th>Familiar Brand</th>
<th>Unfamiliar Brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>No-warning label</td>
<td>2.23a</td>
<td>1.75a</td>
</tr>
<tr>
<td>Text-only warning label</td>
<td>2.42b</td>
<td>1.87a</td>
</tr>
<tr>
<td>Graphic warning label</td>
<td>1.85a</td>
<td>2.05a</td>
</tr>
</tbody>
</table>

Note: Different subscripts differ significantly ($p < .05$)

DISCUSSION

We hypothesized that attitudes and intentions might differ across the three levels of warning labels (none/text only/text + graphic) in either a downward sloping linear fashion or in an upward sloping linear fashion due to a boomerang effect. The latter pattern was demonstrated for subsets of our participants (US participants for smoking intent and marginally for participants exposed to unfamiliar brands for smoking intent). The slight pattern of a boomerang effect for US participants on smoking intent may be explained by noting that the warning labels themselves were also quite unfamiliar to US teenagers, whereas
Canadian teenagers have seen these types of warning labels for several years now.

However, the majority of significant findings followed an unhypothesized pattern, one in which the text only warning label condition led to more favorable attitudes and higher intentions to smoke among nonsmokers. This pattern was observed for all participants for brand attitude, for all participants for website attitude, and for Canadians and those exposed to familiar brands for smoking intent. Additional research is required to determine what may be driving this pattern. It’s possible that the warning label selected focused on outcomes that were not extremely important to adolescents. However, as mentioned previously, the label was determined by Environics Canada to be one of the most effective (for details, see Environics Research Group 2001). The other effective warning label selection dealt with lung disease, which is arguably even less important to adolescents. In other words, lung disease may seem much more abstract than the concrete physical deformities that can result from oral disease. In addition, although brand familiarity was successfully manipulated, the Canadian participants were clearly more familiar with the graphic warning label than were US participants.

In conclusion, a main effect of country was obtained both for brand attitude and website attitude, with Canadian participants tending to prefer familiar brands and US participants tending to prefer unfamiliar brands. It is difficult to determine why this might be the case. Far more importantly, however, is the fact that for intentions to smoke, Canadian participants were most impacted by the graphic warning label (with which they were familiar)—that is, the graphic warning label led to the lowest smoking intentions. In contrast, US participants were most impacted by no warning label—the graphic warning label (with which they were unfamiliar) led to the highest smoking intentions. It would seem that a boomerang effect was obtained for US participants, suggesting that such graphic visuals might not work effectively in the US, at least among adolescents. However, given that the graphic warning label was the most effective for the Canadian participants in terms of lowering smoking intentions, one possible interpretation is that graphic visuals might take time to be effective tools in the fight to keep adolescents from smoking. For both Canadian and US high school students, text + graphic warnings proved to affect attitudes toward brands and brand-sponsored websites more than text-only warnings, which proved no more efficient than no warning. Though such warnings did not directly affect smoking intent, however, they affected intent indirectly through attitudes.
APPENDIX 1

Warning Labels Used as Stimuli

![Warning Label 1](image1)

![Warning Label 2](image2)
APPENDIX 2

Brand Stimuli

REFERENCES


