Reactions of Young Adult Smokers to Warning Labels on Cigarette Packages

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Background: In 1984, the United States Congress enacted legislation requiring four new warning labels for cigarettes; warning labels in the United States have not changed since then. Other countries, such as Canada, have taken a more active and aggressive approach. The purpose of this study was to examine how U.S. smokers and former smokers might respond to stronger and more graphic warnings for U.S. cigarettes packages.

Methods: Data were collected in 2003 and analyzed in 2004. The perceived impact and effectiveness of the more-explicit Canadian labels was examined among young adult smokers ($n=572$) and former smokers ($n=191$) between the ages of 18 and 24 years in the United States, using a web-based survey that allowed participants to view both the text-only and the text-plus-graphic warning labels.

Results: Both current and former smokers thought that cigarette warning labels with text plus graphics were substantially more of a deterrent than text-only labels. The perceived effectiveness of these labels was not only higher overall, but also for the specific areas of smoking-related health effects, prevention, cessation, and maintenance of abstinence. Few differences were noted by gender.

Conclusions: The findings from this study support previous research that has found that text-plus-graphic warning labels are more salient and potentially more effective than text-only labels.

Introduction

The Federal Cigarette Labeling and Advertising Act of 1965 required that cigarette warnings state “Caution: Cigarette Smoking May be Hazardous to Your Health” and appear on one of the side panels of every cigarette package.1,2 By 1981, a Federal Trade Commission report to the U.S. Congress concluded that the current warning was no longer effective.1 In 1984, Congress enacted legislation requiring four new warning labels for cigarettes. U.S. cigarette warning labels have not changed since then.

In contrast, over the past decade, other countries have taken a more active approach toward warning labels.2–10 Canada has been an international leader, as the 1994 regulations on warnings established some important precedents concerning the size, location, color, and content of the warnings.11 Cigarette warnings were moved from the bottom to the top of the pack and covered 25% of the front and back faces of the pack (in English on one face and French on the other). In 2000, Canada implemented new regulations that required text and graphic labels to cover over 50% of the top front and back of the packages, and to include updated and youth-oriented messages as well as information on toxic substances,12–14 with cessation and specific health-risk information inside the package.15 Australia, Brazil, Singapore, and Thailand have both strong labels and pictures on their packages, and South Africa and Poland include strong labels.3–10,16

Warning labels have been used to promote interest in quitting, to educate smokers about the health effects of tobacco, and to provide information on assistance for quitting. Evaluation of new warning labels in Australia and Canada has shown that they attract the attention of smokers,17 increase awareness of the health hazards of smoking,6,8 increase beliefs about the risks associated with smoking,3,6 and decrease cigarette consumption.3,4 Most importantly, some smokers report that these warnings have motivated them to quit smoking.8,9,17,18

The purpose of the present study was to examine how U.S. young adult smokers and former smokers respond to stronger text and graphic warnings on cigarette packages. The perceived impact and effectiveness of Canadian warning labels are more salient and potentially more effective than text-only labels.

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smokers and former smokers in the United States was assessed. The focus on young adults was based on the relatively high levels of smoking among this age group,19 the targeting by the tobacco industry of this age group,20 and the transitional nature of smoking among some young adults. A secondary purpose of this research was to examine the utility of a national web-based survey for collecting information that includes graphic displays.

Methods
Sampling and Data Collection
This study was conducted in 2003, by Research Triangle Institute and Knowledge Networks,21 in collaboration with the Office on Smoking and Health at the Centers for Disease Control and Prevention (CDC), after approval by CDC’s Institutional Review Board and the Office of Management and Budget. Briefly, participants were recruited through random digit-dialing from a web-enabled online national research panel that has been used for other research studies at CDC (e.g., HIV and post-9/11 national surveys).22,23 Use of Internet-based technology allowed data to be collected from a large number of participants throughout the United States who viewed images of warning labels from computers within their homes or local communities, and responded to a series of questions.

Current and former members of the Knowledge Networks panel were contacted. Current panel members were contacted by e-mail, a description of the study and request for participation was given, with up to six reminder notices. Former panel members were sent a first-class letter describing the study and requesting their participation. Up to three e-mail or five telephone reminders were used. An attempt was made to contact 8335 panel members. Of these, 1889 (22.7%) entered the survey website, 774 (41.0%) completed the survey. Many of those selected were screened out as ineligible, based on age and not having smoked at least 100 cigarettes in their lifetime. The response rate for our study was between 22.7% and 41.0%, depending on the assumptions made about the proportion of ineligibles among those who did not respond to the invitation e-mail or letter.

The Survey Instrument
The questionnaire asked about knowledge of current U.S. labels; concerns about the health effects of smoking; and perceptions of the impact of the labels for prevention, cessation, and maintenance of abstinence (former smokers only). A pilot study of 100 adults was conducted to assess the feasibility of the web-based approach for displaying labels and data collection; no major changes were needed.

Both current and former smokers were asked a series of questions about current U.S. warning labels; concerns about the health effects of smoking; and perceptions of the impact of the labels for prevention, cessation, and maintenance of abstinence (former smokers only). A pilot study of 100 adults was conducted to assess the feasibility of the web-based approach for displaying labels and data collection; no major changes were needed.

Table 1. Concerns about health effects of smoking: percentage agreementa with warnings by age

<table>
<thead>
<tr>
<th>Label</th>
<th>Age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text label: cigarettes cause cancer</td>
<td>18–19</td>
</tr>
<tr>
<td></td>
<td>20–21</td>
</tr>
<tr>
<td></td>
<td>22–23</td>
</tr>
<tr>
<td></td>
<td>24</td>
</tr>
<tr>
<td>Text label: cigarettes cause strokes and heart disease*</td>
<td>29.5</td>
</tr>
<tr>
<td></td>
<td>35.5</td>
</tr>
<tr>
<td></td>
<td>40.1</td>
</tr>
<tr>
<td></td>
<td>40.5</td>
</tr>
<tr>
<td>Text label: tobacco smoke causes fatal lung disease in nonsmokers</td>
<td>24.8</td>
</tr>
<tr>
<td></td>
<td>36.5</td>
</tr>
<tr>
<td></td>
<td>40.0</td>
</tr>
<tr>
<td></td>
<td>39.5</td>
</tr>
<tr>
<td>Picture: respirator—cigarettes cause lung cancer*</td>
<td>44.8</td>
</tr>
<tr>
<td></td>
<td>56.3</td>
</tr>
<tr>
<td></td>
<td>62.1</td>
</tr>
<tr>
<td></td>
<td>66.3</td>
</tr>
<tr>
<td>Picture: brain—cigarettes cause strokes*</td>
<td>49.5</td>
</tr>
<tr>
<td></td>
<td>61.7</td>
</tr>
<tr>
<td></td>
<td>63.8</td>
</tr>
<tr>
<td></td>
<td>71.2</td>
</tr>
<tr>
<td>Picture: baby—tobacco smoke hurts babies</td>
<td>53.4</td>
</tr>
<tr>
<td></td>
<td>57.7</td>
</tr>
<tr>
<td></td>
<td>60.6</td>
</tr>
<tr>
<td></td>
<td>65.8</td>
</tr>
</tbody>
</table>

*aPercentage of responses equal to 4 or 5 on the Likert-type scale, where 5 = “strongly agree.”

*Chi-square p < 0.05. Test is for difference in reaction to a particular warning label between age groups.

Figure 1. Text-only Canadian warning labels, 1994.
The key outcome was the perceived effectiveness of the Canadian-type text-only and text-plus-graphic labels. Effectiveness was assessed using four statements:

1. Compared to current U.S. cigarette warning labels, this [Canadian] label would discourage people from starting to smoke.
2. This [Canadian] label would motivate me to quit smoking. (current smokers only)
3. This [Canadian] label would motivate me not to start smoking again. (former smokers only)
4. This [Canadian] label would make me more worried about the health effects of smoking.

Statistical Methods

Univariate and bivariate analyses were conducted in 2004 comparing the percentage of panel members who agreed or strongly agreed with each of the above statements. Bivariate analyses were conducted by age group (18–19, 20–21, 22–23, 24 years), gender, and smoking status where appropriate (current versus former). Analyses were performed separately for each of the three text-only and three text-plus-graphic labels; chi-square tests were used to assess differences among groups (SAS Institute Inc., Cary NC, 1999; Research Triangle Institute, Triangle Park NC, 2001). Comparisons were then made of the perceived effectiveness of Canadian text-only with Canadian text-plus-graphic labels using a proportional odds regression model. A score was constructed for each respondent that captured the number of text plus graphic and number of text-only labels for which the respondent indicated agreement (combining agree or strongly agree) with the statements above. A separate score was developed for text-only and text-plus-graphic labels. Scores ranged from 0 (no labels are effective) to 3 (all labels are effective). In the regression model, there were two observations per respondent, one for the number of picture labels that he/she rated as “agree” or “strongly agree,” and one for the number of text labels that he/she rated as “agree” or “strongly agree.” The model included an independent variable that indicated whether the observation was for picture labels or text labels. An odds ratio for this variable significantly >1.0 indicated that the text-plus-graphic labels were more effective than text-only labels. Other independent variables in the model included gender, age, Census region, smoking status, concerns about the health effects of smoking, belief that smoking has affected his/her health, and knowledge of current U.S. cigarette warning labels.

Results

Of the 763 panel members, 572 (75.0%) were current smokers and 191 (25.0%) were former smokers. Former smokers had quit smoking an average of 2.2 years. Forty-three percent of the participants were men, 76.0% non-Hispanic white, 12.5% Hispanic, and 5.1% African American. Fourteen percent were aged 18 to 19 years, 26.0% were aged 20 to 21, 35.6% were aged 22 to 23, and the remaining 24.4% were aged 24 years. Forty-seven percent had attended some college, and 23.4% had received a bachelor’s degree. Fifty-one percent reported smoking every day, with 23.8% smoking on some days. Sixty-eight percent of current smokers and 47.9% of former smokers believed that smoking had affected their health; 30.1% of current smokers, and 50.5% of former smokers reporting concern about the health effects of smoking.

Knowledge of, and Attitudes Toward, Current U.S. Warning Labels

Similar percentages of current (55.6%) and former (51.1%) smokers identified at least three of the four warning messages on U.S. cigarette packs. Forty-three percent of all panel members believed that cigarette warning labels were an important source of health information; current and former smokers were similar in their responses. A higher percentage of former smokers than current smokers (62.0% and 40.8%, respectively) thought that current U.S. labels should be larger (chi-square p<0.001).

Beliefs About Canadian Text-Only and Text-Plus-Graphic Labels

The text-plus-graphic warnings were judged more effective on prevention, motivation to quit, motivation not to start smoking, and concern about health effects. Not all data reported in this section are shown in the figures and tables.

Concern about health effects. Of the three text-only labels, “Cigarettes cause cancer” produced the highest percentage (37.6%) of panelists reporting that the label would make them more concerned about the health effects of smoking. In contrast, 63.1% said that the text-plus-graphic warning label with the brain would make them more worried about health effects. For all three of the text-plus-graphic labels, significantly more women than men said that the label would make them more concerned about the health effects than the text-only labels. Interestingly, the percentage who said that the text-plus-graphic labels would make them more worried about the health effects of smoking increased with age for all six labels (Figure 2).

Motivation to quit smoking/remain abstinent. Current smokers’ beliefs concerning the text-plus-graphic labels were much stronger than their beliefs concerning the text-only labels: <30.0% of the current smokers agreed that any of the text-only labels would motivate them to quit smoking (range 22.1% to 27.2%) compared with the text-plus-graphic labels (range 52.8% to 57.2%). Significantly more women than men agreed that the text-plus-graphic label with the baby would motivate them to quit (Figure 3). Increased age was a significant predictor of perceived effectiveness for the respiratory and brain text-plus-graphic labels (Figure 2). Current smokers who were concerned about the health effects...
of smoking had stronger reactions to all of the warning labels than those with little or no health concerns; similarly, a higher percentage of current smokers who believed that smoking has affected their health believed that all warning labels increased their motivation to quit smoking.

Higher levels of agreement (former smokers only) about the perceived impact for remaining abstinent were seen for text plus graphic compared to text-only labels (range 60.9% to 69.3% vs 36.8% to 41.8%, respectively) (data not shown), with the highest level of agreement for the brain text-plus-graphic label. Again there was a statistically significant difference by gender to the baby text-plus-graphic label, with 78.0% of the females, compared with 48.6% of males, saying that this label would motivate them to remain abstinent (Figure 4). Furthermore, for five of the six labels, a higher proportion of women than men said the labels would motivate them to not start smoking again, but only one of these comparisons was statistically significant (baby label).

### Perceived Effectiveness of Text-Plus-Graphic versus Text-Only Labels: Overall Comparison

Separate logistic regression models were used to compare text-only versus text-plus-graphic labels with regard to perceived effectiveness for discouraging people from starting to smoke (prevention); encouraging smokers to quit; motivating former smokers to remain abstinent; and level of concern about health effects of smoking. The perceived effectiveness was much higher for the text-plus-graphic compared to the text-only label for prevention (odds ratio \( OR = 4.85 \); 95% confidence interval [CI] = 4.18–5.63); motivation to quit (\( OR = 4.21 \); 95% CI = 3.54–5.01); motivation not to start smoking (\( OR = 3.51 \); 95% CI = 2.64–4.66); and concern about the health effects (\( OR = 2.93 \); 95% CI = 2.26–3.78).

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**Figure 2.** Text and graphics, Canadian warning labels, 2000.

**Figure 3.** This warning would motivate me to quit smoking, by gender (current smokers, \( n = 571 \)). Percentage of responses equal to 4 or 5 on the Likert-type scale, where 5 = “strongly agree.” *Chi-square \( p < 0.05 \). Test is for difference in reaction to a particular warning label between age groups.

**Figure 4.** This warning would motivate me not to start smoking again, by gender (former smokers, \( n = 192 \)). Percentage of responses equal to 4 or 5 on the Likert-type scale, where 5 = “strongly agree.” *Chi-square \( p < 0.05 \). Test is for difference in reaction to a particular warning label between age groups.
Perceived Effectiveness of Text-Plus-Graphic Versus Text-Only Labels:
Specific Warning Labels

After viewing all three text-only labels, 26.3% indicated that the three text-only labels would be equally effective, and 11.5% said that none would be effective. Of the 404 panel members who selected one label as most effective (Table 2), 43.6% (N=176) selected “Cigarettes cause cancer,” 30.9% (N=125) chose “Tobacco smoke causes fatal lung disease in nonsmokers,” and 25.5% (N=103) selected “Cigarettes cause strokes and heart disease.” There were no significant differences by gender, age, or level of concern about the health effects of smoking.

Many panel members (37.8%) said that all three text-plus-graphic labels would be equally effective, and only 3.9% said that none would be effective. Of the 388 people who chose one text-plus-graphic label as most effective (Table 3), 41.0% (N=159) chose the baby label, 38.4% (N=149) the brain label, and 20.6% (N=80) the respirator label. There were significant gender differences for selection of the most effective text-plus-graphic label: 50.0% of women and 30.1% of men selected the baby label, and 43.8% of men and 34.0% of women chose the brain label (p=0.0003).

Discussion

Current and former cigarette smokers perceived that text-plus-graphic warning labels were more effective than text-only labels. Perceived effectiveness was higher overall and for specific areas of smoking-related health effects, prevention, cessation, and the maintenance of abstinence. The few differences found were for gender, where women were more likely than men to believe that labels with text-plus-graphic labels picturing babies were most effective, while men believed that the label with a text-plus-graphic image of brain damage from stroke was most effective. Interest in quitting and quit attempts were highest among those who were aged 18 to 24 and 25 to 44 years.25 Given the relatively narrow age range of the participants, it is not clear what the explanation is for the age effect.

Consistent with other research, audiences are much more likely to attend to messages with graphic images than those relying solely on text-only messages.26 The Elaboration Model has been used to explain the route or type of communication dependency on characteristics of the receiver.27 If the message is of importance to the receiver, then the central route to persuasion is most effective. However, if the receiver is not interested in the message or cannot process the information, the peripheral route will provide the way to produce attitude change. In the case of warning labels, the use of a peripheral message, with a visual image, may provide a means for gaining audience attention for quitting smoking among smokers who are not interested in quitting.27 Finally, overexposure or “wear-out” is a major problem for any message that audiences are exposed to repeatedly over time.26,29 Pictorial labels may reduce the wear and effect. It might be easier to avoid reading a text message than to avoid seeing a picture of cancerous lungs that covers half of the front of the cigarette pack.

The secondary purpose of this study was to assess the feasibility of using a web-based system to collect data from geographically dispersed individuals. Conducting such a study in which graphic images are presented would not have been feasible in a typical telephone survey. Personal interviews or focus groups could have been used, but

### Table 2. Most effective text label (n=763)

<table>
<thead>
<tr>
<th>Of the three labels you just saw, which do you think would be the most effective?</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text label: cigarettes cause cancer</td>
<td>176</td>
<td>23.1</td>
</tr>
<tr>
<td>Text label: cigarettes cause strokes and heart disease</td>
<td>103</td>
<td>13.5</td>
</tr>
<tr>
<td>Text label: tobacco smoke causes fatal lung disease in nonsmokers</td>
<td>125</td>
<td>16.4</td>
</tr>
<tr>
<td>All three text labels would be equally effective</td>
<td>201</td>
<td>26.3</td>
</tr>
<tr>
<td>None of the text labels would be effective</td>
<td>88</td>
<td>11.5</td>
</tr>
<tr>
<td>Don’t know/not sure</td>
<td>68</td>
<td>8.9</td>
</tr>
<tr>
<td>Refused</td>
<td>2</td>
<td>0.3</td>
</tr>
</tbody>
</table>

### Table 3. Most effective picture label (n=763)

<table>
<thead>
<tr>
<th>Of the three labels you just saw, which do you think would be the most effective?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Picture: respirator-cigarettes cause lung cancer</td>
<td>80</td>
</tr>
<tr>
<td>Picture: brain-cigarettes cause strokes</td>
<td>149</td>
</tr>
<tr>
<td>Picture: baby-tobacco smoke hurts babies</td>
<td>159</td>
</tr>
<tr>
<td>All three picture labels would be equally effective</td>
<td>288</td>
</tr>
<tr>
<td>None of the picture labels would be effective</td>
<td>30</td>
</tr>
<tr>
<td>Don’t know/not sure</td>
<td>50</td>
</tr>
<tr>
<td>Refused</td>
<td>7</td>
</tr>
</tbody>
</table>

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would have been geographically limited or expensive. The use of the Internet for the presentation of such material provides a feasible method for collecting information quickly and economically. Because we did not compare the findings with those collected in other ways, comparisons are not possible. There were no difficulties with the presentation of graphic displays of warning labels to the panel members or the completion of the survey instrument. We did not collect information on how long they took to respond to the survey. The purpose of this study was to get reactions to the different labels and not necessarily compare those reactions. Future studies may want to compare smokers’ reactions from the different warning labels.

This study has some limitations. A detailed description and a discussion of the limitations of this web panel are described in Wiebe and colleagues. The response rate was low and participants in the Knowledge Networks panels are not necessarily representative of current or former smokers within their age group. Young adults who agree to participate in a web-based study may have more interest in the technology than the general population. In addition, while there were specific procedures for securing the responses of individuals, it is not possible to determine whether the presumed individuals were the actual respondents. The beliefs and perceptions of U.S. smokers about the text-plus-graphics Canadian labels do not necessarily imply that modifying warning labels by themselves will change current or former smokers’ attitudes, beliefs, or behaviors. Respondents were presented U.S. labels first, followed by Canadian labels. Presenting the Canadian warnings second may have biased responses, which is a further limitation to this study. Future studies may want to ensure that the order of presentation of warnings is counter-balanced. Furthermore, the “perceived effectiveness” statement may be biased toward positive responses. It is recommended in future work that a mix of positive and negative statements be used.

Current U.S. warning labels have not changed in two decades. Several studies suggest that the current labels may not be effective in communicating the health risks of smoking, especially for young adults and teenagers. Similar to the findings in the 1981 Federal Trade Commission report, current U.S. warning labels fail to get the attention of smokers, an important first step in communicating health risks. A recall and eye-tracking study with 61 adolescents found that only 8.0% of viewing time was spent on the warning message. In addition, 44% of participants did not view the labels at all. Other research has shown that, although individuals can recall seeing warnings on cigarette packages, they do not recall specifics.

Qualitative and quantitative studies from the United States, Canada, and Australia have found major elements of warning labels that increase their noticeability and believability. Recommendations for improving U.S. labels include increasing the size, adding color images, using strong, personalized messages; using plain packaging that does not include logos, colors, or text that may distract the consumer from the warning, and including ingredients on the packages.

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