

Graphic Canadian Cigarette Warning Labels and Adverse Outcomes: Evidence from Canadian Smokers

David Hammond, MSc, Geoffrey T. Fong, PhD, Paul W. McDonald, PhD, K. Stephen Brown, PhD, and Roy Cameron, PhD

In recognition of the growing health and economic burden of tobacco use,^{1,2} the World Health Organization recently adopted the world's first public health treaty, the Framework Convention on Tobacco Control. This requires nations to implement a range of tobacco control policies, including important provisions for package labeling. The Framework Convention on Tobacco Control calls for large, clear health warnings "that may be in the form of a picture" and cover between 30% and 50% of the pack.

Warning labels that meet and exceed these requirements were introduced on Canadian cigarette packages in December 2000. The Canadian labels feature 1 of 16 full-color, sometimes graphic, health warnings, covering more than 50% of the front and back of cigarette packages. Messages that provide more detailed health risk and cessation information appear on the inside of packages.

Graphic warnings have been criticized on 4 general grounds: they will cause unnecessary or excessive emotional distress; smokers will simply avoid the warnings; graphic labels will undermine the credibility of the message; and, most notably, graphic or "grotesque" labels will cause reactance, or *increases* in consumption.^{3,4} However, at present, there are no published findings on the impact of graphic warning labels.

The present study sought to assess emotional reactions, avoidant behaviors, and self-report measures of impact in response to the new Canadian warning labels. The study also examined to what extent, if at all, emotional responses and avoidant behaviors predicted cessation behavior at a 3-month follow-up.

METHODS

Participants

Participants were 622 adult smokers living in southwestern Ontario. Adult smokers were aged 18 years or older, had smoked at least 100 cigarettes in their lifetime, and smoked at least 1 cigarette per day at the time of the survey.

Objectives. We assessed the impact of graphic Canadian cigarette warning labels.

Methods. We used a longitudinal telephone survey of 616 adult smokers.

Results. Approximately one fifth of participants reported smoking less as a result of the labels; only 1% reported smoking more. Although participants reported negative emotional responses to the warnings including fear (44%) and disgust (58%), smokers who reported greater negative emotion were more likely to have quit, attempted to quit, or reduced their smoking 3 months later. Participants who attempted to avoid the warnings (30%) were no less likely to think about the warnings or engage in cessation behavior at follow-up.

Conclusions. Policymakers should not be reluctant to introduce vivid or graphic warnings for fear of adverse outcomes. (*Am J Public Health*. 2004;94:1442–1445)

Procedure

Baseline interviews were conducted during October and November 2001, approximately 9 months after the introduction of the graphic warnings. The sample was selected using a modified Mitofsky–Waksburg random-digit dialing technique.⁵

Eligible households were identified by asking respondents the number of adult smokers in the household, and the "most recent birthday" method⁶ was used to select participants from households with more than 1 adult smoker. A total of 14% (n=111) of eligible respondents refused or failed to complete the survey: 3% of potentially eligible households (it was assumed that 23% of households contained an eligible smoker, based on regional data from the Canadian Tobacco Use Monitoring Survey⁷) "broke off" before screening, and 11% of eligible respondents refused or terminated after screening. In addition, 10% (n=80) of potentially eligible households were not reached, resulting in an American Association of Public Opinion Research No. 4 response rate of 76% (n=616).⁸ Participants completed a 3-month follow-up survey in January and February 2002.

Measures

Smoking Status and Demographic Variables. The baseline survey assessed daily cigarette consumption, number of years as a smoker, quitting history, and demographic variables.

Intention to quit smoking was measured by asking participants whether they were seriously considering quitting in the next 30 days, 3 months, 6 months, 1 year, or not at all.

Perceived Impact of the Warning Labels. Participants were asked to what extent the warning labels had affected 4 cessation-related outcomes: daily cigarette consumption, how often they thought about the health risks of smoking, confidence in their ability to quit, and the likelihood they would quit smoking. Participants responded to these items on a 5-point bipolar Likert scale coded as negative impact (e.g., "I am a little/a lot less likely to quit as a result of the warnings"), no impact, and positive impact (e.g., "I am a little/a lot more likely to quit . . .").

Depth of Processing. A measure of *depth of processing* was developed to assess the salience of the warning labels and the extent to which smokers attended to the warnings. Nine items assessed how carefully smokers had looked at the warnings (e.g., "How closely have you ever read the messages on the outside of packages?") or reflected and elaborated on the warnings (e.g., "How often have you thought about the warnings on the inside of the pack?"). Responses were given on 5-point Likert scales and summed to create an index of depth of processing (Cronbach $\alpha=0.83$).

Emotional Reactions, Avoidance, and Credibility. Participants were asked whether they

had made any efforts to avoid the warnings by covering or hiding the labels, using a cigarette case of their own, or requesting a specific package to avoid a particular warning. Avoidance behaviors were analyzed as a dichotomous outcome, where 0=no effort to avoid the warnings and 1=any effort to avoid the warnings. Participants were also asked to what extent, if at all, they had felt fear or disgust as a result of the labels, using a 5-point Likert scale ranging from “not at all” to “extreme.” An index of negative emotional reaction to the warnings was created by summing Likert responses for fear and disgust ($r=0.034$, $P<.001$). Credibility of the warnings was measured by asking: “How accurately do you feel the warnings depict the risks to your health?” using a 5-point bipolar scale ranging from “very inaccurately” to “very accurately.”

Follow-Up Survey. The 3-month follow-up survey assessed any changes in smoking behavior, including attempts to quit (“Have you made any attempts to quit smoking in the past 3 months that lasted at least 24 hours?”) and reductions in daily consumption. A dichotomous variable was created for cessation-related outcomes, where 0=no cessation behavior and 1=participants who had either quit, made at least 1 attempt to quit, or reduced their smoking by at least 1 cigarette per day.

Statistical Analysis

Logistic regression analyses were used to predict cessation behaviors at follow-up. All odds ratios were adjusted for measures of cigarettes per day, years smoking, intentions to quit, prior attempts to quit, gender, age, and education. All analyses were conducted using SPSS, Version 10.0 (SPSS Inc, Chicago, Ill).

RESULTS

Characteristics of Sample

A total of 616 participants completed the baseline survey. Table 1 shows that the characteristics of the study participants were similar to those of a representative sample of Canadian smokers.⁷ The 1 exception is that a greater proportion of study participants were female; however, gender was not associated

TABLE 1—Characteristics of Survey Respondents and of a Representative Sample of Canadian Smokers: Southwestern Ontario, October–November, 2001

Variable	Sample (n=616)	Canada
Female, %	56.8	46.6*
Minimum of 12 years of education, %	52.1	51.3
Mean age, y	39.0	40.2
Cigarettes per day	16.2	17.0
Years smoking	20.7	21.4
Prior attempts to quit	3.5	...
Intentions to quit within 6 mo, %	41.2	42.5

Source. Data for Canadian smokers are from the Canadian Tobacco Use Monitoring Survey.⁷

* $P<.05$.

with any of the predictors in the regression analyses, presented later. A total of 432 participants completed the 3-month follow-up survey, for a follow-up rate of 70%. There were no significant differences between completers and noncompleters on demographic

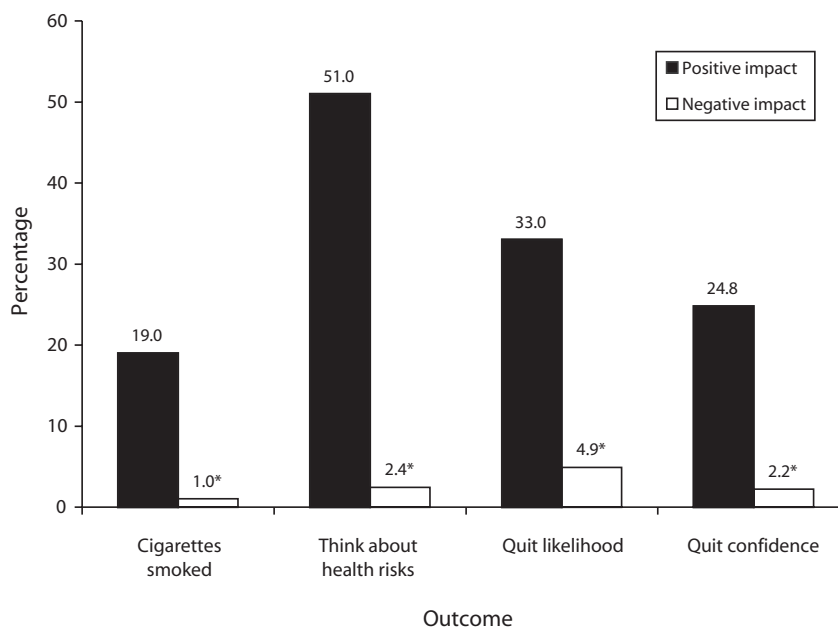
variables or any explanatory variables, including measures of smoking status, emotional reaction, credibility, and avoidance.

Self-Report Impact

Figure 1 indicates that a substantial proportion of smokers perceived a cessation-related benefit from the warning labels. Most important, 19% of smokers reported that the warnings had made them smoke less, in contrast to only 1% who reported that they smoked more as a result of the labels ($\chi^2=1334.6$, $P<.001$, $df=1$). Overall, 63% of smokers reported at least 1 cessation benefit, whereas only 6% reported any negative impact ($\chi^2=2462.2$, $P<.001$, $df=1$).

Avoidance

A total of 36% of respondents reported making at least some effort to avoid the labels. Specifically, 19% had tried to cover or hide warnings, 21% had used a different case as a result of the warnings, and 17% had requested a specific package to avoid a particular warning label. Avoidance was not associated with either depth of processing of the warning labels at baseline (odds ratio [OR]=



* $P<.001$.

FIGURE 1—Self-reported outcomes of Canadian warning labels, at baseline (n = 616).

0.97, 95% confidence interval [CI]=0.93, 1.01) or cessation behaviors at follow-up (OR=0.86, 95% CI=0.56, 1.32).

Emotional Reactions

A substantial proportion of smokers reported experiencing at least some fear (44%) and disgust (58%). Smokers who reported greater fear and disgust in response to the labels were significantly more likely to have read and thought about the warnings at baseline ($\beta_{\text{stand}}=.39, P=.001$). Fear and disgust were also positively associated with each of the 4 self-report measures of perceived effectiveness at baseline. For example, smokers who reported greater fear were significantly more likely to indicate that the labels had reduced the amount they smoke (OR=2.02, 95% CI=1.59, 2.60), and increased their likelihood of quitting (OR=1.82, 95% CI=1.50, 2.22). Finally, a logistic regression was conducted to determine whether negative emotional reactions to the warnings at baseline predicted cessation behavior at follow-up. Smokers who reported greater fear and disgust were significantly more likely to have quit, made an attempt to quit, or reduced their smoking at follow-up (OR=1.37, 95% CI=1.15, 1.64). The results were similar when fear and disgust were analyzed as individual variables, rather than being combined in the index of negative emotion.

Credibility

Only 13% of smokers felt that the warnings were at all inaccurate in depicting the health risks of smoking. In addition, only 27% of smokers reported that the warnings contained “too much” health risk information, whereas 50% of all smokers wanted to see even more health information on cigarette packages.

DISCUSSION

The Canadian warning labels have elicited strong emotional reactions from smokers. However, these findings indicate that negative emotional reactions were associated with *greater* effectiveness of the warning labels. Most important, smokers who reported greater fear and disgust were more likely to either have quit, made an attempt to quit, or reduced their smoking at follow-up.

These results are consistent with the primary intent of the warning labels, which is to communicate health risks that are manifestly frightening and harsh. Warnings of lung cancer, for example, that fail to contain arousing information also fail to communicate these risks in a truthful, forthright manner. In this context, emotional reactions should be interpreted as a measure of effectiveness. In addition, although some respondents reported trying to avoid the warnings, those who avoided the warnings were no less likely to read and think about the warnings, and no less likely to engage in cessation behavior at follow-up.

Most important, this research provides no evidence of any reactance or boomerang effect in response to graphic pictorial warning labels. On the contrary, the findings suggest that the Canadian warnings may yield a public health benefit: approximately one third of smokers reported that the labels have increased their likelihood of quitting. Although the current study cannot speak directly to any public health benefit, the warnings may also act as a harm reduction measure, as 20% of smokers reported smoking less as a result of the warnings.

Finally, the graphic nature of the Canadian warnings does not appear to have compromised their credibility. Approximately 13% of smokers rated the warnings as inaccurate, only a 2% increase from the same question asked in 1999 of the previous text-only Canadian warning labels.⁹ These findings add to the evidence that smokers perceive government-mandated cigarette warnings to be a credible source of health information.^{9,10}

This research has several limitations. First, in the absence of pre-post measurements, the current study was not able to assess changes in avoidance and emotional reactions from the previous generation of Canadian warning labels. Second, there is no control group against which to compare the impact of the Canadian warnings. However, the current findings are consistent with those from a quasi-experimental study of US and Canadian youth indicating a lack of adverse outcomes and greater impact for Canadian warning labels compared with US labels.¹¹

Overall, the current research suggests that policymakers should not be reluctant to introduce graphic cigarette warning labels

based on potential adverse outcomes. Rather, short of exaggerating the risks of smoking or crossing the bounds of public decency, warning labels should adopt vivid and striking features that increase their salience among smokers. ■

About the Authors

David Hammond and Geoffrey T. Fong are with the Department of Psychology at the University of Waterloo, Waterloo, Ontario. Paul W. McDonald and Roy Cameron are with the Department of Health Studies, and K. Stephen Brown is with the Department of Statistics and Actuarial Science at the University of Waterloo. Paul W. McDonald and K. Stephen Brown are also with the Ontario Tobacco Research Unit. Geoffrey T. Fong, Paul W. McDonald, Roy Cameron, and K. Stephen Brown are also with the Centre for Behavioural Research and Program Evaluation, University of Waterloo.

Requests for reprints should be sent to David Hammond, Department of Psychology, University of Waterloo, 200 University Avenue West, Waterloo, Ontario, N2L 3G1, Canada (e-mail: dhammond@uwaterloo.ca).

This article was accepted June 7, 2003.

Contributors

D. Hammond conceived the study, conducted the analysis, and was the principal author of the article. G. T. Fong, P. W. McDonald, R. Cameron, and K. S. Brown contributed to the study design, analysis, and article preparation.

Acknowledgments

This research was supported by the National Cancer Institute of Canada (NCIC) with funds from the Canadian Cancer Society (CCS), the CCS/NCIC Centre for Behavioural Research and Program Evaluation, and the Ontario Tobacco Research Unit, and by a grant from the National Cancer Institute of the United States (R01 CA90955). We gratefully acknowledge the assistance of the Survey Research Centre and the Health Behavior Research Group at the University of Waterloo, Waterloo, Ontario. We also thank Jennifer Topham and 2 anonymous reviewers for their comments and suggestions on an earlier version of this article.

Human Participant Protection

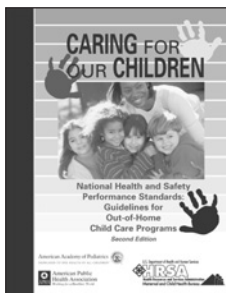
This study was reviewed and approved by the office of research ethics at the University of Waterloo.

References

1. *Reducing Tobacco Use: A Report of the Surgeon General*. Atlanta, Ga: Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2000.
2. Gajalakshmi CK, Jha P, Ranson K, Nguyen S. Global patterns of smoking and smoking-attributable mortality. In: Jha P, Chaloupka FJ, eds. *Tobacco Control in Developing Countries*. Geneva, Switzerland: World Bank and World Health Organization; 1999.
3. Key Area Paper—Public Affairs: Smoking and Health-Health Warning Clauses. British-American Tobacco Company. May 28, 1992. Bates No. 502605183.

Available at: <http://www.library.ucsf.edu/tobacco/batco/html/7000/7067/>. Accessed December 22, 2002.

4. Ad Hoc Committee of the Canadian Tobacco Industry. A Canadian tobacco industry presentation on smoking and health: a presentation to the House of Commons Standing Committee on Health, Welfare and Social Affairs. House of Commons Standing Committee on Health, Welfare and Social Affairs. Minutes of Proceedings and Evidence, June 5, 1969; 1579–1689. Available from the Library and Archives Canada (Finding Aid: 14-27).
5. Waksberg J. Sampling methods for random digit dialing. *J Am Stat Assoc.* 1978;73:40–46.
6. O'Rourke D, Blair J. Improving random respondent selection in telephone surveys. *J Marketing Res.* 1983;20:428–432.
7. Tobacco Control Program, Health Canada. *Canadian Tobacco Use Monitoring Survey, February–December 2001*. Ottawa, Ontario: Health Canada; 2002.
8. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. Lenexa, Kan: American Association for Public Opinion Research; 2000.
9. Environics Research Group. *Baseline Surveys: The Health Effects of Tobacco and Health Warning Messages on Cigarette Packages: Report for Health Canada*. Ottawa, Ontario: Health Canada; 2001. Available at: <http://www.hc-sc.gc.ca/hecs-sesc/tobacco/research/smoking-4774/index.html>. Accessed December 21, 2002.
10. Centre for Behavioural Research in Cancer, Anti-Cancer Council of Victoria. *Health Warnings and Contents Labeling on Tobacco Products*. Carlton South, Victoria, Australia: Anti-Cancer Council of Victoria; 1992.
11. Fong GT, Cameron AJR, Brown KS, Campbell HS, Zanna MP, Murnaghan D. Effects of the Canadian graphic warning labels among high school students: a quasi-experimental longitudinal survey. Paper presented at: 2002 National Conference on Tobacco or Health; November 20, 2002; San Francisco, Calif.



2nd Edition

ISBN 0-97156-820-0
2002 ■ 544 pages
Softcover

\$24.50 APHA Members
\$34.95 Nonmembers
plus shipping and handling

Caring For Our Children: National Health and Safety Performance Standards for Out-of-Home Child Care

C*aring for Our Children* is the most comprehensive source of information available on the development and evaluation of health and safety aspects of day care and child care centers. The guidelines address the health and safety needs of children ranging from infants to 12-year-olds. This field-reviewed book provides performance requirements for child care providers and parents, as well as for regulatory agencies seeking national guidelines to upgrade state and local child care licensing.

The second edition is extensively revised based on the consensus of ten technical panels each focused on a particular subject. The book includes eight chapters of 658 standards and a ninth chapter of 48 recommendations for licensing and community agencies and organizations.

American Public Health Association

Publication Sales

Web: www.apha.org

E-mail: APHA@TASCO1.com

Tel: (301) 893-1894

FAX: (301) 843-0159



CAR02J1

American Journal of PUBLIC HEALTH

Call for Papers

Health Policy Challenges Affecting American Indians and Alaska Natives

The *American Journal of Public Health (AJPH)*, in collaboration with the Henry J. Kaiser Family Foundation, is planning to publish a collection of papers on how the United States can more effectively meet the health care needs of American Indians and Alaska Natives (AIANs). The guest editors are soliciting contributions to the "Health Policy and Ethics" and "Research and Practice" sections of the *AJPH*. Research Articles (180 word structured abstract, 3500 word text, up to 4 tables/figures) and Analytic Essays (120 word unstructured abstract, 3500 word text, up to 4 tables/figures) for the department "Health Policy and Ethics" are encouraged that address the challenges or approaches to eliminating health care disparities (in access, quality, or financing of care) between AIANs and other population groups. All papers will undergo peer review by the *AJPH* editorial team, the guest editors, and a slate of referees, as per *AJPH* policy. In order to be considered for inclusion in this series, papers must be submitted by September 1, 2004 through the online submission system at <http://submit.ajph.org>. This website also provides *Instructions for Authors*, including specific guidelines for various types of papers. When submitting articles, please select the "AIAN series" under the Theme Issue menu. Additional information concerning this series can be obtained by contacting AIAN_AJPHseries@kff.org.

Marsha Lillie-Blanton, DrPH, and Yvette Roubideaux, MD, MPH, Guest Editors