

Promoting cessation resources through cigarette package warning labels: a longitudinal survey with adult smokers in Canada, Australia and Mexico

James F Thrasher,^{1,2} Amira Osman,¹ Crawford Moodie,³ David Hammond,⁴ Maansi Bansal-Travers,⁵ K Michael Cummings,⁶ Ron Borland,⁷ Hua-Hie Yong,⁷ James Hardin¹

¹University of South Carolina, Columbia, South Carolina, USA

²National Institute of Public Health, Cuernavaca, Mexico

³University of Stirling, Scotland, UK

⁴University of Waterloo, Waterloo, Canada

⁵Roswell Park Cancer Institute, Buffalo, New York, USA

⁶Medical University of South Carolina, Charleston, USA

⁷Cancer Council Victoria, Melbourne, Australia

Correspondence to

Dr James F Thrasher, Department of Health Promotion, Education, and Behavior, University of South Carolina, 915 Greene Street, Room 354D, Columbia, SC 29208, USA; thrasher@mailbox.sc.edu

Received 13 February 2014

Accepted 24 June 2014

Published Online First

22 July 2014

ABSTRACT

Introduction Health warning labels (HWLs) on tobacco packaging can be used to provide smoking cessation information, but the impact of this information is not well understood.

Methods Online consumer panels of adult smokers from Canada, Australia and Mexico were surveyed in September 2012, January 2013 and May 2013; replenishment was used to maintain sample sizes of 1000 participants in each country at each wave. Country-stratified logistic Generalised Estimating Equation (GEE) models were estimated to assess correlates of citing HWLs as a source of information on quitlines and cessation websites. GEE models also regressed having called the quitline, and having visited a cessation website, on awareness of these resources because of HWLs.

Results At baseline, citing HWLs as a source of information about quitlines was highest in Canada, followed by Australia and Mexico (33%, 19% and 16%, respectively). Significant increases over time were only evident in Australia and Mexico. In all countries, citing HWLs as a source of quitline information was significantly associated with self-report of having called a quitline. At baseline, citing HWLs as a source of information about cessation websites was higher in Canada than in Australia (14% and 6%, respectively; Mexico was excluded because HWLs do not include website information), but no significant changes over time were found for either country. Citing HWLs as a source of information about cessation websites was significantly associated with having visited a website in both Canada and Australia.

Conclusions HWLs are an important source of cessation information.

INTRODUCTION

Smoking cessation resources, including those that provide support through telephone counselling and websites, can be promoted through mass media campaigns and health warning labels (HWLs) on tobacco packaging.¹ However, little research has been conducted to assess awareness of cessation information on HWLs and its impact among smokers, including how the impact of this information may change over time. Tobacco companies have used this dearth of research to challenge the need for such information on HWLs. For instance, the use of HWLs to promote cessation resources is central to regulatory battles in the USA, where

tobacco industry litigation halted implementation of pictorial HWLs. In the majority as well as dissenting opinions, the Washington DC District Court perceived the inclusion of a quitline number on HWLs as going beyond the Food and Drug Administration's mandate to disclose factual information about the health consequences of smoking.² A better understanding of the impact of this information may be critical to informing the development of HWL regulations.

It has been well established that mass media campaigns can increase cessation rates among smokers,^{1 3 4} with these campaigns often promoting available help via toll-free telephone quitlines and/or websites. Campaign evaluations often involve assessment of changes in quitline call volume or website traffic, as for recent campaigns in the USA⁵ and Australia.⁶ Smokers who call quitlines are typically offered free counselling and, in some cases, free cessation medications, both of which can increase their chances of quitting successfully.⁷ Websites can offer cessation tips and other resources, including through text messaging and smartphone applications.⁵ By normalising quitting and making smokers aware that help is available should they need it, campaigns that promote cessation resources can also increase the number of quit attempts and successful quits, even among smokers who never access those resources.⁸⁻¹⁰

Mass media campaigns to promote cessation require significant resources, which makes it difficult for many jurisdictions to air campaigns with media buys that are large enough to produce a public health impact. Using HWLs to promote cessation resources is inexpensive for governments, as the tobacco industry pays for printing and dissemination, and HWLs can communicate directly with smokers about cessation resources, as recommended by Articles 11 and 12 of the Framework Convention on Tobacco Control.¹¹ HWLs that include quitlines have raised awareness about quitlines in Mexico¹² and increased quitline call volume in Australia, Brazil, Holland and New Zealand.¹³⁻¹⁵ As with HWL effects on other smoking-related responses,^{16 17} quitline call volume due to HWLs appears to wear out over time.¹⁴ No research of which we are aware has evaluated the use of HWLs to promote websites with cessation resources.

As countries increasingly implement prominent HWLs and change HWL content, research is



CrossMark

To cite: Thrasher JF, Osman A, Moodie C, *et al.* *Tob Control* 2015;**24**:e23–e31.

Research paper

needed to understand how changing HWL content may best enhance smokers' use of cessation resources, so that they are more likely to successfully quit. In this study, we explore adult smokers' awareness of smoking cessation information contained on HWLs in three countries (Canada, Australia and Mexico) which recently changed HWL size and/or content. Canada was the first country to introduce pictorial HWLs in 2001, and they changed HWL content for the first time since then in June 2012. HWL size was also increased from 50% to 75% of both principal display areas of the package. The new HWLs include quitline and website cessation information on the front as well as the back of the package ("Need help to quit?" OR "You can quit. We can help" OR "You have the will. There is a way" followed by "1-866-366-3667, gosmokefree.gc.ca/quit"); previously, this information was not on package HWLs. In December 2012, plain tobacco packaging was introduced in Australia, pictorial HWL content was changed and the HWL display area increased from 30% to 75% of the pack front; the HWL on the back of the pack, which covered 90% of the surface area and included cessation information ("Want advice on quitting?" OR "Thinking of quitting" OR "Want to talk about quitting" OR "Want help with quitting?" followed by "Call Quitline 13 7848, talk to your doctor or pharmacist, or visit <http://www.quitnow.gov.au>") remained unchanged since 2006. Since September 2010, pictorial HWLs were introduced in Mexico, covering 30% of the front of cigarette packs, and text HWLs covered 100% of the back. Since then, HWL content has changed every 3–6 months, but all HWLs have included the same telephone quitline number on the back of the pack ("Stopping smoking. Call us. 1800 966 3863"). The rotation of new HWL content in Canada, Australia and Mexico provides an opportunity to better understand how new HWLs may catalyse increased awareness of cessation resources and spur their use.

METHODS

Sample

Adult smokers were recruited from online consumer panels in Canada, Australia and Mexico, which were provided by Global Market Insights (GMI: <http://www.gmi-mr.com>). Panels were assembled in different ways in each country, but panel participants are purposively selected to be representative of key consumer segments in each country. Recruitment of participants in each country involved sending invitations to panel participants who were of eligible age and who were known smokers, as well as from general population samples for which smoking status was unknown. Eligible participants were 18–64 years of age, had smoked at least 100 cigarettes in their lifetime and smoked at least once in the previous month. Data were collected in September 2012 (wave 1, n=3001), January 2013 (wave 2, n=3002) and May 2013 (wave 3, n=3003). Participants were followed over time, with samples replenished to maintain sample sizes of approximately 1000 participants in each country at each wave. Across all three waves, the response rates to invitation emails sent to potential participants were 13% in Canada, 15% in Australia and 14% in Mexico. The follow-up rate from wave 1 to wave 2 was 57% across countries (58% in Canada; 65% in Australia; 49% in Mexico), and from wave 2 to wave 3 it was 60% across countries (57% in Canada; 69% in Australia; 54% in Mexico).

Measures

The questionnaire items analysed in this study were all asked in the same way across all three countries. The Spanish language translations for the Mexico survey were developed with a

committee translation process,¹⁸ with cognitive interviewing to ensure intended comprehension for some questions.¹⁹

Dependent variables

Quitline awareness and calls: To assess quitline awareness at each wave, participants were asked "In the last four months, have you noticed any information about a toll-free telephone number to get advice about quitting?" Those who answered affirmatively were asked to indicate all sources for this information, including HWLs, with the list of potential sources shown in random order. Participants were classified according to whether they reported HWLs as a source of information about quitlines (ie, noticed quitline information and cited HWLs as a source vs did not notice quitline information or did not cite HWLs as a source of information). Participants who reported noticing any quitline information were asked whether they had called the quitline in the prior 4 months (Yes vs No/Don't Know/Did not notice any quitline information).

Cessation website awareness and visits: Awareness of cessation websites because of HWLs was assessed similarly to quitline awareness, starting with the question "In the last four months, have you noticed any information about a website to get advice about quitting?" Those who did were asked to identify all sources of this information from a randomly ordered list of potential sources, including HWLs. Participants were then categorised into those who have reported HWLs as a source of information versus those who did not notice cessation website information or did not cite HWLs as a source of information. Participants were also asked whether they had visited a cessation website in the prior 4 months.

Independent variables

Independent variables included dummy variables for survey wave with baseline as the reference category. Sociodemographic variables of interest included age (18–24; 25–34; 35–44; 45–54; 55–64), sex, education (high school or less; college or some university; completed university or higher) and income (\$29 999 or less; \$30 000–\$59 999; \$60 000 or more). Smoking-related variables included quit intention within the next 6 months (yes=1 vs no=0); having made a quit attempt in the prior 4 months (yes=1 vs no=0) and smoking intensity that was measured in two ways: (1) a dichotomous indicator of daily versus non-daily smoking, and (2) the Heaviness of Smoking Index (HSI), which combines average cigarettes per day and time to first cigarette (range 0–6),²⁰ which was treated as a continuous variable.

Statistical analysis

All analyses were conducted using Stata V.13. χ^2 T tests were used to assess within-country differences in sample characteristics across waves. Generalised Estimating Equation (GEE) models were then estimated because the correlation matrix on which they are based uses all available pairwise contributions of information (ie, method of moments consistent estimator), and there is no requirement that the panels are balanced; this is especially true for our assumed exchangeable correlation structure for which there is a single common correlation value to be estimated. This allows for maximum utilisation of data from all participants, no matter when they are recruited or the number of surveys they complete. Furthermore, we interpreted tests based on the modified sandwich (robust) variance estimator, so our inference is robust to misspecification of the within-person correlation structure. Country-stratified logistic GEE models were estimated to assess correlates of citing HWLs as a source

of information on quitlines and on cessation websites. Separate GEE models also regressed having called the quitline and having visited a cessation website on awareness of resource because of HWLs. These models adjust for sociodemographics and smoking-related variables. Since HWLs in Mexico did not include information about a cessation website, models involving cessation websites were estimated only for Canada and Australia.

RESULTS

Sample characteristics

Over time, in each country, the study sample comprised a similar proportion of men and women, as well as smokers at different levels of income. The study sample became somewhat older over time in Australia, but no significant differences in the age distribution were found for Canada or Mexico. In all three countries, the proportion of the sample with higher educational

attainment decreased over time. [Table 1](#) presents these and other sample characteristics by wave for each country.

Correlates of awareness of quitlines

Overall, citing HWLs as a source of information about quitlines was generally higher in Canada (33%) than in Australia (19%) or Mexico (16%; see [figure 1A](#)). In crude and adjusted models for Canada, higher educational attainment was associated with lower likelihood of citing HWLs as a quitline information source (ie, high school or less=39%; college or some university=34%; university or higher=24%; adjusted OR (AOR) some college vs high school or less=0.80, 95% CI 0.66 to 0.98; AOR university or more vs high school or less=0.50, 95% CI 0.37 to 0.68). Being female and having higher intensity of cigarettes consumption, measured in terms of HSI or daily compared with non-daily consumption, were also statistically significant correlates of greater awareness in the Canadian sample. For Australia, time was the only covariate of quitline awareness due to HWLs

Table 1 Sample characteristics of adult smokers from Canada, Australia and Mexico

| | Canada (n=3002) | | | | | Australia (n=3001) | | | | | Mexico (n=3003) | | | | |
|---|-----------------|--------|--------|-----------|---------|--------------------|--------|--------|-----------|---------|-----------------|--------|--------|-----------|---------|
| | W1 (%) | W2 (%) | W3 (%) | Total (%) | p Value | W1 (%) | W2 (%) | W3 (%) | Total (%) | p Value | W1 (%) | W2 (%) | W3 (%) | Total (%) | p Value |
| Age | | | | | | | | | | | | | | | |
| 18–24 | 14 | 13 | 11 | 13 | | 12 | 8 | 8 | 9 | <0.05 | 20 | 20 | 20 | 20 | |
| 25–34 | 22 | 22 | 23 | 22 | | 21 | 22 | 24 | 22 | | 30 | 30 | 30 | 30 | |
| 35–44 | 22 | 22 | 22 | 22 | | 20 | 23 | 24 | 22 | | 20 | 20 | 20 | 20 | |
| 45–54 | 20 | 21 | 21 | 21 | | 24 | 24 | 22 | 23 | | 15 | 15 | 15 | 15 | |
| 55–64 | 22 | 23 | 23 | 22 | | 23 | 23 | 23 | 23 | | 15 | 15 | 15 | 15 | |
| Sex | | | | | | | | | | | | | | | |
| Male | 41 | 43 | 44 | 42 | | 42 | 42 | 43 | 42 | | 55 | 55 | 53 | 54 | |
| Female | 60 | 57 | 56 | 58 | | 58 | 58 | 57 | 58 | | 45 | 45 | 47 | 46 | |
| Education | | | | | | | | | | | | | | | |
| High school or less | 30 | 33 | 37 | 33 | <0.001 | 34 | 38 | 37 | 36 | <0.01 | 35 | 39 | 45 | 40 | <0.001 |
| College or some university | 44 | 47 | 47 | 46 | | 41 | 42 | 43 | 42 | | 19 | 22 | 21 | 21 | |
| Completed university or higher | 26 | 20 | 16 | 21 | | 25 | 20 | 20 | 22 | | 46 | 39 | 34 | 40 | |
| Income | | | | | | | | | | | | | | | |
| \$29 999 or less | 28 | 28 | 29 | 28 | | 23 | 24 | 24 | 24 | | 20 | 17 | 17 | 18 | |
| \$30 000–\$59 999 | 33 | 32 | 32 | 32 | | 28 | 25 | 28 | 27 | | 26 | 26 | 25 | 26 | |
| \$60 000 or more | 39 | 40 | 40 | 40 | | 49 | 51 | 48 | 49 | | 54 | 57 | 58 | 56 | |
| Quit intentions in next 6 months | | | | | | | | | | | | | | | |
| Yes | 53 | 57 | 58 | 56 | <0.05 | 55 | 60 | 60 | 59 | | 59 | 52 | 53 | 55 | <0.01 |
| Quit attempts in the past 4 months | | | | | | | | | | | | | | | |
| Yes | 58 | 60 | 63 | 60 | | 60 | 66 | 66 | 64 | <0.001 | 52 | 47 | 45 | 48 | <0.01 |
| Heaviness of smoking index | | | | | | | | | | | | | | | |
| 0 | 18 | 18 | 18 | 18 | | 16 | 15 | 13 | 15 | <0.05 | 65 | 63 | 63 | 64 | |
| 1 | 12 | 10 | 10 | 11 | | 12 | 9 | 10 | 10 | | 12 | 14 | 12 | 13 | |
| 2 | 19 | 21 | 20 | 20 | | 20 | 17 | 19 | 19 | | 12 | 11 | 12 | 11 | |
| 3 | 25 | 25 | 27 | 26 | | 25 | 24 | 24 | 24 | | 8 | 8 | 9 | 8 | |
| 4+ | 26 | 26 | 25 | 25 | | 27 | 35 | 33 | 32 | | 4 | 4 | 4 | 4 | |
| Cigarette consumption | | | | | | | | | | | | | | | |
| Non-daily | 22 | 16 | 16 | 18 | <0.001 | 21 | 12 | 13 | 15 | <0.001 | 51 | 53 | 49 | 51 | |
| Daily | 78 | 84 | 84 | 82 | | 79 | 88 | 87 | 85 | | 49 | 47 | 51 | 49 | |
| Time in sample | | | | | | | | | | | | | | | |
| 1 wave | 100 | 46 | 45 | 64 | <0.001 | 100 | 38 | 32 | 57 | <0.001 | 100 | 52 | 45 | 66 | <0.001 |
| 2 waves | 0 | 54 | 19 | 24 | | 0 | 62 | 19 | 27 | | 0 | 48 | 23 | 23 | |
| 3 waves | 0 | 0 | 36 | 12 | | 0 | 0 | 49 | 16 | | 0 | 0 | 32 | 11 | |

Omnibus χ^2 square tests for within-country differences in the distribution of characteristics across all three waves.

Research paper

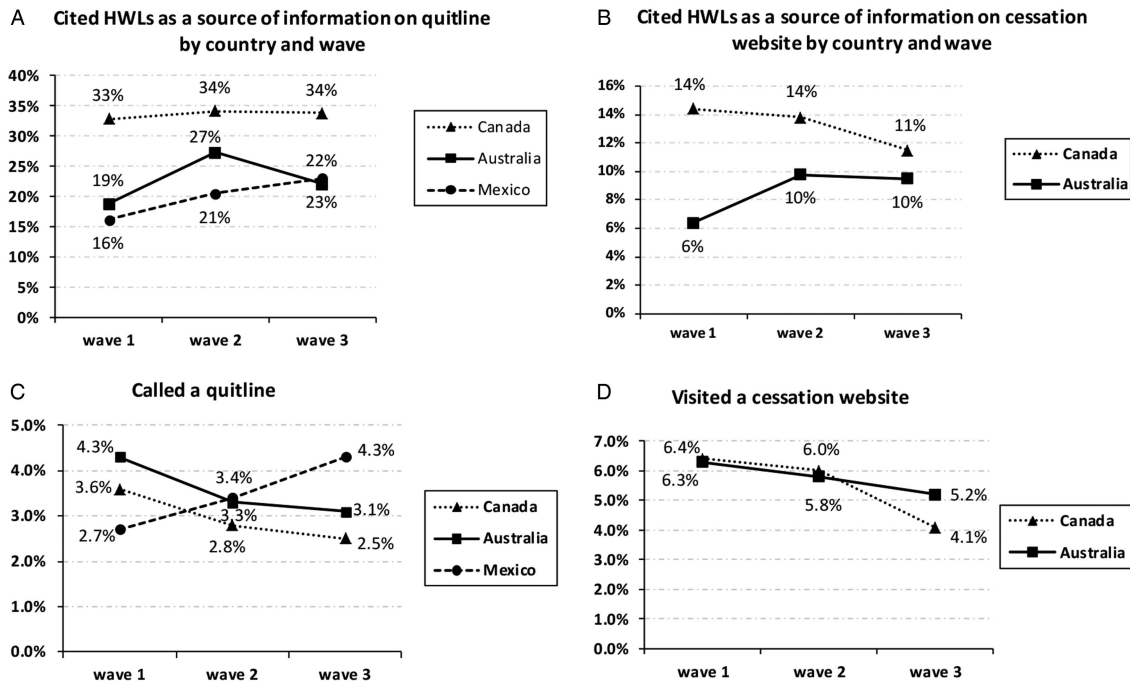


Figure 1 Percentage of respondents who (A) cited health warning labels (HWLs) as a source of information on quitline number, (B) cited HWLs as a source of information on cessation website, (C) called a quitline and (D) visited a cessation website, by country and wave of data collection.

that was statistically significant in crude as well as adjusted models (see [table 2](#)). There was an initial increase from baseline to the first follow-up wave, from 19% to 27% ($AOR_{wave2 \text{ vs } wave1}=1.97$, 95% CI 1.54 to 2.52), which thereafter decreased at the second follow-up wave, from 27% to 22%, but nonetheless remained significantly higher than at baseline ($AOR_{wave3 \text{ vs } wave1}=1.47$, 95% CI 1.08 to 1.98). In the models for Mexico, awareness due to HWLs increased significantly over time, from 16% to 20% to 23%, but these differences were no longer significant in the multivariate model. Greater awareness was found for participants with higher consumption intensity measured in terms of HSI as well as daily versus non-daily cigarette consumption (see [table 2](#)).

Correlates of calling a quitline

In all three countries, 3–4% of smokers reported having called a quitline in the prior 4 months (see [figure 1C](#)), and no statistically significant changes over time were found in models for any country. However, citing HWLs as a source for quitline information was independently and positively associated with having called the quitline in all three countries ($AOR_{aware \text{ vs } not \text{ aware}}=2.13$, 2.87 and 5.42 in Canada, Australia and Mexico, respectively; see [table 3](#)).

Correlates of awareness of cessation websites

Citing HWLs as the source of information about websites was more prevalent in Canada (14.4%) than in Australia (6.4%) at baseline (Mexico was excluded from the analysis because the HWLs in Mexico do not contain this information); however, this increased in Australia (9.5%) and became comparable to Canada (11.5%) at follow-up (see [figure 1B](#)). In the multivariate model for Canada, greater awareness of cessation websites due to HWLs was consistently associated with being younger, higher cigarette consumption as measured by HSI and intending to quit in the next 6 months ([table 4](#)). In the models for Australia, time was the only covariate that had a statistically significant

association with awareness of websites due to HWLs in the multivariate models ([table 4](#)).

Correlates of visiting cessation websites

In all three countries, 4–6% of smokers reported having visited a cessation website in the prior 4 months (see [figure 1D](#)). Citing HWLs as a source of information on cessation websites had a strong, statistically significant association with report of having visited a website with cessation information ($AOR=8.55$ in Canada, $AOR=8.47$ in Australia, see [table 3](#)). No statistically significant changes over time were found. In both countries, having visited a website with cessation information was also positively associated with educational attainment, having recently attempted to quit and intending to quit. In models for Australia only, men and daily smokers were more likely to visit websites with cessation information than their counterparts (results not shown in tables).

Sensitivity analyses

Given that study data were from unknown sampling frames that may not be representative of the general population of smokers, for each country we created weights to weight the data to sex, age and educational profiles of nationally representative data on smokers. Furthermore, to determine if our results were driven by time-in-sample effects, we created country-specific propensity scores that involved estimating predicted probabilities of participating in only one survey wave versus participating twice or participating in all three survey waves. In creating these propensity scores, we included all potential variables that may be associated with time-in-sample and that were not already adjusted for in our analyses (eg, race/ethnicity, employment status, marital status, number of online surveys completed in the past 4 months, number of online surveys on smoking in the last month, overall health status and reasons for considering quitting smoking). All adjusted models reported in this paper were estimated again, while adjusting separately for weights and for

Table 2 Crude and AORs from GEE models to determine correlates of awareness of quitlines because of warning labels in Canada, Australia and Mexico

| | Canada | | | | | Australia | | | | | Mexico | | | | |
|--------------------------------|----------|---------|----------------|---------|----------------|-----------|---------|----------------|---------|----------------|----------|---------|----------------|---------|----------------|
| | Per cent | OR | (95% CI) | AOR | (95% CI) | Per cent | OR | (95% CI) | AOR | (95% CI) | Per cent | OR | (95% CI) | AOR | (95% CI) |
| Age | | | | | | | | | | | | | | | |
| 18–24 | 30 | 1 | | 1 | | 23 | 1 | | 1 | | 20 | 1 | | 1 | |
| 25–34 | 32 | 1.22 | (0.92 to 1.61) | 1.11 | (0.82 to 1.49) | 19 | 0.78 | (0.55 to 1.11) | 0.66* | (0.45 to 0.96) | 22 | 1.27 | (0.96 to 1.69) | 1.16 | (0.86 to 1.56) |
| 35–44 | 39 | 1.50** | (1.12 to 1.99) | 1.19 | (0.87 to 1.62) | 23 | 0.92 | (0.64 to 1.31) | 0.81 | (0.55 to 1.18) | 18 | 0.97 | (0.70 to 1.34) | 0.83 | (0.59 to 1.17) |
| 45–54 | 29 | 1.01 | (0.75 to 1.37) | 0.79 | (0.57 to 1.09) | 24 | 0.98 | (0.69 to 1.39) | 0.87 | (0.59 to 1.27) | 19 | 0.99 | (0.70 to 1.40) | 0.76 | (0.52 to 1.20) |
| 55–64 | 36 | 1.22 | (0.91 to 1.65) | 0.96 | (0.69 to 1.33) | 25 | 1.04 | (0.72 to 1.48) | 0.95 | (0.64 to 1.41) | 17 | 0.94 | (0.66 to 1.34) | 0.75 | (0.51 to 1.11) |
| Sex | | | | | | | | | | | | | | | |
| Male | 30 | 1 | | 1 | | 21 | 1 | | 1 | | 18 | 1 | | 1 | |
| Female | 37 | 1.35*** | (1.13 to 1.61) | 1.38** | (1.14 to 1.66) | 24 | 1.23* | (1.01 to 1.51) | 1.19 | (0.96 to 1.48) | 22 | 1.17 | (0.96 to 1.44) | 1.14 | (0.92 to 1.42) |
| Education | | | | | | | | | | | | | | | |
| High school or less | 39 | 1 | | 1 | | 24 | 1 | | 1 | | 20 | 1 | | 1 | |
| College or some university | 34 | 0.78** | (0.65 to 0.93) | 0.80* | (0.66 to 0.98) | 23 | 0.95 | (0.77 to 1.17) | 1.05 | (0.83 to 1.31) | 19 | 0.89 | (0.68 to 1.17) | 0.86 | (0.65 to 1.15) |
| Completed university or higher | 24 | 0.48*** | (0.37 to 0.62) | 0.50*** | (0.37 to 0.68) | 21 | 0.78 | (0.60 to 1.03) | 1.02 | (0.75 to 1.40) | 21 | 1.01 | (0.80 to 1.26) | 0.86 | (0.66 to 1.10) |
| Income | | | | | | | | | | | | | | | |
| \$29 999 or less | 35 | 1 | | 1 | | 23 | 1 | | 1 | | 18 | 1 | | 1 | |
| \$30 000–\$59 999 | 34 | 0.99 | (0.80 to 1.22) | 1.09 | (0.88 to 1.36) | 26 | 1.15 | (0.89 to 1.5) | 1.21 | (0.92 to 1.59) | 20 | 1.18 | (0.88 to 1.60) | 1.30 | (0.95 to 1.78) |
| \$60 000 or more | 33 | 0.95 | (0.77 to 1.17) | 1.14 | (0.92 to 1.42) | 22 | 0.94 | (0.73 to 1.2) | 1.00 | (0.77 to 1.29) | 21 | 1.22 | (0.92 to 1.60) | 1.22 | (0.90 to 1.65) |
| HSI | | 1.18*** | (1.12 to 1.24) | 1.09** | (1.03 to 1.16) | | 1.04 | (0.98 to 1.09) | 1.01 | (0.94 to 1.09) | | 1.19*** | (1.10 to 1.28) | 1.12* | (1.02 to 1.22) |
| Cigarette consumption | | | | | | | | | | | | | | | |
| Non-daily | 21 | 1 | | 1 | | 20 | 1 | | 1 | | 16 | 1 | | 1 | |
| Daily | 37 | 2.16*** | (1.73 to 2.70) | 1.85*** | (1.42 to 2.42) | 23 | 1.18 | (0.92 to 1.52) | 1.10 | (0.81 to 1.50) | 24 | 1.56*** | (1.30 to 1.96) | 1.53*** | (1.22 to 1.92) |
| Quit intention | | | | | | | | | | | | | | | |
| No | 33 | 1 | | 1 | | 22 | 1 | | 1 | | 20 | 1 | | 1 | |
| Yes | 36 | 1.07 | (0.92 to 1.25) | 1.17 | (0.98 to 1.41) | 24 | 1.18 | (0.99 to 1.40) | 1.12 | (0.93 to 1.37) | 20 | 1.01 | (0.83 to 1.21) | 0.87 | (0.70 to 1.09) |
| Quit attempts | | | | | | | | | | | | | | | |
| No | 34 | 1 | | 1 | | 22 | 1 | | 1 | | 19 | 1 | | 1 | |
| Yes | 34 | 0.96 | (0.82 to 1.12) | 0.97 | (0.81 to 1.17) | 25 | 1.16 | (0.97 to 1.38) | 1.15 | (0.94 to 1.41) | 21 | 1.13 | (0.93 to 1.36) | 1.25* | (1.00 to 1.56) |
| Wave | | | | | | | | | | | | | | | |
| 1 (September 2012) | 33 | 1 | | 1 | | 19 | 1 | | 1 | | 16 | 1 | | 1 | |
| 2 (January 2013) | 34 | 1.09 | (0.94 to 1.27) | 1.05 | (0.85 to 1.29) | 27 | 1.65*** | (1.39 to 1.98) | 1.97*** | (1.54 to 2.52) | 20 | 1.45*** | (1.18 to 1.79) | 1.05 | (0.81 to 1.35) |
| 3 (May 2013) | 34 | 1.12 | (0.96 to 1.31) | 0.90 | (0.71 to 1.16) | 22 | 1.30** | (1.09 to 1.56) | 1.47* | (1.08 to 1.98) | 23 | 1.73*** | (1.39 to 2.16) | 1.01 | (0.74 to 1.38) |
| Time in sample | | | | | | | | | | | | | | | |
| 1 wave | 34 | 1 | | 1 | | 23 | 1 | | 1 | | 16 | 1 | | 1 | |
| 2 waves | 32 | 1.02 | (0.88 to 1.19) | 1.03 | (0.84 to 1.26) | 24 | 1.15 | (0.98 to 1.36) | 0.81 | (0.65 to 1.02) | 24 | 1.62*** | (1.36 to 1.94) | 1.68*** | (1.33 to 2.14) |
| 3 waves | 34 | 1.16 | (0.97 to 1.39) | 1.42* | (1.05 to 1.90) | 21 | 1.10 | (0.91 to 1.32) | 0.96 | (0.68 to 1.33) | 30 | 2.12*** | (1.67 to 2.69) | 2.32*** | (1.62 to 3.34) |

*p<0.05; **p<0.01; ***p<0.001.

OR from crude analyses. AOR from multivariate analyses adjusting for all variables in the table.

AOR, adjusted OR; GEE, Generalised Estimating Equation; HSI, Heaviness of Smoking Index.

Table 3 Crude and AORs for use of cessation resources and citing HWLs as information source in Canada, Australia and Mexico

| | Canada | | | Australia | | | Mexico† | | | |
|----------------------|----------|---------|-----------------|-----------|-----------------|----------|---------|----------------|---------|-----------------|
| | Per cent | OR | (95% CI) | AOR | (95% CI) | Per cent | OR | (95% CI) | AOR | (95% CI) |
| | | | | | | | | | | |
| <i>Quitline use</i> | | | | | | | | | | |
| Saw quitline on HWLs | | | | | | | | | | |
| No | 2 | 1 | | 1 | | 2 | 1 | | 1 | |
| Yes | 4 | 1.91** | (1.25 to 2.91) | 2.13** | (1.34 to 3.39) | 7 | 2.45*** | (1.64 to 3.66) | 2.87*** | (1.85 to 4.46) |
| <i>Website use</i> | | | | | | | | | | |
| Saw website on HWLs | | | | | | | | | | |
| No | 3 | 1 | | 1 | | 4 | 5.62*** | (3.83 to 8.25) | 8.47*** | (5.55 to 12.93) |
| Yes | 21 | 7.34*** | (5.12 to 10.53) | 8.55*** | (5.67 to 12.90) | 25 | 5.34*** | (3.49 to 8.16) | 5.42*** | (3.44 to 8.53) |

* p<0.05; **p<0.01; ***p<0.001. †Models predicting use of cessation website were not estimated for Mexico because it does not include cessation website information on cigarette HWLs. OR from crude analyses. AOR from multivariate analyses adjusting for age, sex, education, income, daily versus non-daily cigarette consumption, HSI, quit intention, quit attempts, wave of data collection and time in sample. AOR, adjusted OR; HSI, Heaviness of Smoking Index; HWL, health warning label.

propensity scores. The pattern of results from each model was similar in direction, magnitude and significance to the results presented in our tables and would not have changed any of our conclusions (results are not presented and available on request).

DISCUSSION

This study suggests that many smokers report HWLs as a source of information about cessation resources, and that awareness of this information promotes the use of these resources. Canada had the highest percentage of smokers who reported that HWLs provided them with quitline information (33%), followed by Australia (19%) and Mexico (16%). This remained true even in later waves, although the magnitude of the difference was attenuated. If these results are generalisable to the broader population of smokers, all of whom are regularly exposed to HWLs, then cessation resources information on HWLs remains salient for a substantial number of smokers. Higher awareness of cessation information (quitline and website) on HWLs in Canada may be due to the introduction of this information on HWLs, for the first time in 2012, just a few months before baseline data were collected for our study. Cessation information on HWLs was introduced in 2010 in Mexico and was on packs since 2006 in Australia. Alternatively, the positioning on the pack of this cessation information may help explain the higher awareness in Canada. Canada was the only country studied that includes the quitline and cessation website on both the front and back of packs. The WHO Framework Convention on Tobacco Control (FCTC) highlights the importance of the more visible pack front in effective warning design,¹¹ and these findings suggest that positioning cessation information within prominent HWLs on both the front and back of the pack may produce the greatest awareness of this information among smokers.¹⁶

Among smokers in Australia, awareness of the quitline and website because of the HWLs increased (19–27% for quitline and 6.4–9.5% for website) from before to immediately after the implementation of new, larger HWLs and plain packaging. The new HWLs as well as prior HWLs included similarly prominent quitline and website information, suggesting that other features of the HWLs and packaging might account for the increased attention paid to the specific HWL content on cessation resources. This would be consistent with experimental studies showing how packaging and HWL characteristics often interact with each other to influence consumer perceptions.²¹ Mass media campaigns in Australia also accompanied the initial implementation of the new HWLs and plain packaging, and this may have helped draw smokers' attention to quit resource information on HWLs, as other research suggests that media campaigns linked to HWLs enhance HWL impacts.^{22–23} By our third survey wave, the media campaign had stopped, and Australian smokers' attention to quitline information on HWLs dropped (from 27% to 22%). This drop may be due to the absence of media campaign or to the 'wear out' of HWL effects over time, which has been found for the impacts of HWLs in general.^{24–25} In Canada and Mexico, the prevalence was more stable over the entire study period, suggesting that the drop in attention may be most severe in the initial period after introduction of new HWL content, as observed in Australia. Future research should determine the most effective HWL content and design, as well as accompanying media campaign messages, so that smokers will be more aware of, and more likely to utilise, cessation resources.

Across all countries, awareness of quitlines and websites due to HWLs was consistently associated with utilisation of these resources. The 4-month incidence of quitline utilisation was 3–4% of the study population in each country, and it was 5–6%

Table 4 Crude and AORs from GEE models to determine correlates of awareness of cessation websites because of warning labels in Canada and Australia

| | Canada | | | | | Australia | | | | |
|--------------------------------|----------|---------|----------------|---------|----------------|-----------|--------|----------------|---------|----------------|
| | Per cent | OR | (95% CI) | AOR | (95% CI) | Per cent | OR | (95% CI) | AOR | (95% CI) |
| Age | | | | | | | | | | |
| 18–24 | 16 | 1 | | 1 | | 11 | 1 | | 1 | |
| 25–34 | 14 | 0.83 | (0.57 to 1.21) | 0.71 | (0.47 to 1.06) | 10 | 0.93 | (0.59 to 1.48) | 0.89 | (0.55 to 1.45) |
| 35–44 | 14 | 0.82 | (0.56 to 1.20) | 0.65* | (0.43 to 0.99) | 8 | 0.71 | (0.44 to 1.16) | 0.68 | (0.40 to 1.14) |
| 45–54 | 11 | 0.60* | (0.41 to 0.90) | 0.45** | (0.29 to 0.69) | 7 | 0.58* | (0.35 to 0.96) | 0.58 | (0.34 to 1.00) |
| 55–64 | 12 | 0.67* | (0.45 to 0.99) | 0.52** | (0.33 to 0.80) | 9 | 0.77 | (0.47 to 1.26) | 0.78 | (0.47 to 1.31) |
| Sex | | | | | | | | | | |
| Male | 12 | 1 | | 1 | | 8 | 1 | | 1 | |
| Female | 14 | 1.2 | (0.94 to 1.52) | 1.16 | (0.90 to 1.50) | 9 | 1.2 | (0.89 to 1.62) | 1.22 | (0.89 to 1.66) |
| Education | | | | | | | | | | |
| High school or less | 13 | 1 | | 1 | | 7 | 1 | | 1 | |
| Some college or university | 15 | 1.21 | (0.94 to 1.56) | 1.25 | (0.95 to 1.63) | 9 | 1.27 | (0.91 to 1.75) | 1.28 | (0.92 to 1.79) |
| Completed university or higher | 10 | 0.74 | (0.51 to 1.07) | 0.66* | (0.44 to 0.99) | 9 | 1.23 | (0.83 to 1.84) | 1.29 | (0.84 to 2.00) |
| Income | | | | | | | | | | |
| \$29 999 or less | 14 | 1 | | 1 | | 8 | 1 | | 1 | |
| \$30 000–\$59 999 | 12 | 0.89 | (0.66 to 1.20) | 0.89 | (0.65 to 1.20) | 10 | 1.19 | (0.79 to 1.77) | 1.22 | (0.80 to 1.87) |
| \$60 000 or more | 14 | 0.99 | (0.75 to 1.33) | 1.07 | (0.79 to 1.45) | 9 | 1.08 | (0.75 to 1.56) | 1.09 | (0.73 to 1.62) |
| HSI | | 1.07 | (0.99 to 1.14) | 1.10* | (1.01 to 1.20) | | 1.00 | (0.92 to 1.09) | 1.00 | (0.90 to 1.12) |
| Cigarette consumption | | | | | | | | | | |
| Non-daily | 11 | 1 | | 1 | | 8 | 1 | | 1 | |
| Daily | 14 | 1.21 | (0.90 to 1.63) | 1.23 | (0.84 to 1.79) | 9 | 1.10 | (0.75 to 1.61) | 1.33 | (0.84 to 2.12) |
| Quit intention | | | | | | | | | | |
| No | 11 | 1 | | 1 | | 7 | 1 | | 1 | |
| Yes | 17 | 1.64*** | (1.32 to 2.04) | 1.75*** | (1.37 to 2.24) | 11 | 1.42* | (1.08 to 1.87) | 1.20 | (0.87 to 1.65) |
| Quit attempts | | | | | | | | | | |
| No | 12 | 1 | | 1 | | 7 | 1 | | 1 | |
| Yes | 16 | 1.25 | (0.99 to 1.58) | 1.00 | (0.77 to 1.31) | 11 | 1.46** | (1.11 to 1.91) | 1.34 | (0.97 to 1.84) |
| Wave | | | | | | | | | | |
| 1 (September 2012) | 14 | 1 | | 1 | | 6 | 1 | | 1 | |
| 1 (January 2013) | 14 | 0.92 | (0.74 to 1.16) | 0.77 | (0.56 to 1.07) | 10 | 1.60** | (1.19 to 2.16) | 2.04*** | (1.40 to 2.99) |
| 3 (May 2013) | 12 | 0.83 | (0.66 to 1.05) | 0.53*** | (0.38 to 0.74) | 10 | 1.55** | (1.16 to 2.09) | 1.78* | (1.14 to 2.78) |
| Time in sample | | | | | | | | | | |
| 1 wave | 13 | 1 | | 1 | | 9 | 1 | | 1 | |
| 2 waves | 13 | 0.99 | (0.79 to 1.25) | 1.26 | (0.90 to 1.76) | 8 | 1.00 | (0.76 to 1.32) | 0.73 | (0.52 to 1.03) |
| 3 waves | 14 | 1.12 | (0.86 to 1.47) | 2.31*** | (1.53 to 3.49) | 9 | 1.17 | (0.87 to 1.58) | 0.96 | (0.59 to 1.54) |

*p<0.05; **p<0.01; ***p<0.001.

OR from crude analyses. AOR from multivariate analyses adjusting for all variables in the table.

AOR, adjusted OR; GEE, Generalised Estimating Equation; HSI, Heaviness of Smoking Index.

for website resource utilisation in Canada and Australia, where cessation support websites are included on HWLs (a website is not included in Mexico). Self-reported resource utilisation did not consistently change in any country over the 8-month study period. However, our sample was likely underpowered to detect those changes, and complementary studies should be designed to assess policy-related and campaign-related changes in quitline call volume data, visits to cessation websites and cessation-related internet searches.

Limitations

Our conclusions should be tempered by a number of limitations. Self-reported awareness of cessation information from HWLs may be biased. Our unprompted assessment of noticing any cessation resource information before asking about the source of that information (eg, HWLs and other potential sources) likely underestimates attention to this information. Our estimates would have likely been higher if participants were cued to state whether they had seen this information on HWLs.

Nevertheless, our awareness assessments were consistently associated with reported utilisation of the resources. Future research should explore whether HWLs are more effective in promoting awareness and utilisation of cessation resources compared with other sources of this information (eg, media campaigns, doctor's advice, etc). Also, we did not squarely address the issue of temporality. Examination of HWLs as a motivating factor for calling quitlines or utilising websites would be stronger if enrolment data were analysed from quitline surveys and cessation websites. Differences in country samples over time may have also biased results related to changes over time; however, our multivariate models included statistical adjustment for sample differences over time.

Study data were collected from online panels of consumers from unknown sampling frames; hence, the results may not be representative of the general population of smokers, even though panel participants were purposefully recruited to be broadly representatives of consumer markets in each country. Because the consumer panel provider does not provide

Research paper

information on how panel members are recruited, the directionality of biases that may stem from how panels are assembled is difficult to assess. Unknown differences in panel recruitment across countries also suggest the need for caution when comparing results across countries. For this reason, we did not pool data across countries and conduct statistical tests of the difference between them. In general, however, the Canadian and Australian samples are more similar to the general population of smokers than the Mexico sample. Internet penetration rates are high in Australia (90%) and Canada (82%), but substantially lower in Mexico (37%), according to 2013 estimates.²⁶ This helps explain why the Mexico sample has a greater proportion of participants with higher educational attainment. Prior research on responsiveness to HWLs among representative, population-based samples of smokers suggests that Mexican smokers with higher educational attainment have weaker responses to HWLs than smokers with lower educational attainment,^{12 22} although the current study results did not show that pattern. Nevertheless, we may have underestimated the impacts of HWLs on awareness of quitlines in Mexico, as general awareness of quitlines appear higher than we estimated,¹² and HWLs are the only source for this information in Mexico.

HWLs have increased awareness of smoking-related dangers in observational as well as experimental research¹⁶; however, research is only beginning on how to best design HWL content to promote smoking cessation. This study suggests that using HWLs to provide information on where to find help with quitting is effective. Indeed, HWLs that raise anxiety without also providing advice on how to avoid those risks potentially violates basic principles of public health communication.²⁷ HWLs should not only provide smokers with risk information, but also with reasonable opportunities to pursue recommended behaviour changes needed to avoid risks. The US court system may not allow HWLs to include the kind of cessation resource information used in Australia, Canada and Mexico, since this information includes calls to action that even go beyond the “1800 QUIT-NOW” telephone number that the US courts deemed unconstitutional for not being purely informational. Future research should focus on the specific HWL message and design features that most effectively promote cessation behaviour, including the impact of cessation information that legal systems in the USA and other countries will accept as constitutional.

What this paper adds

- ▶ Health warnings on tobacco packaging are recognised as a credible source of information on the health risks associated with smoking, but little is known about awareness and use of cessation information (quitlines and websites) included on these health warning labels.
- ▶ We explored awareness of cessation information (quitlines and websites) because of health warning labels among adult smokers in three countries (Canada, Australia and Mexico) which have introduced new warnings.
- ▶ Awareness of cessation information on warnings was highest in Canada, the only country to display this information on both the front and back of tobacco packaging, but increased in Australia with the introduction of new, larger health warnings and plain packaging. Awareness of quitlines and websites due to health warning labels was associated with utilisation of these resources.

Contributors JFT designed the study and data collection tools, conceptualised the research idea and helped draft the paper. JFT is the guarantor. AO conducted the analysis and helped draft the paper. CM helped draft the paper. DH, MB-T, RB, H-HY and KMC contributed to the study design and conceptualisation, and they helped draft the paper. JH contributed to the study design advised the data analyses and helped draft the paper. All authors helped revise the paper, and read and approved the final manuscript. All authors had access to and take responsibility for the data and analyses.

Funding Funding for data collection, analysis and manuscript writing for this study were provided by the US National Cancer Institute (R01 CA167067).

Competing interests None.

Ethics approval Institutional review board at the University of South Carolina, USA and at the University of Waterloo, Canada.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Davis RM, Gilpin EA, Loken B, *et al.* *The role of the media in promoting and reducing tobacco use.* Bethesda, MD: U.S.: Department of Health and Human Services, National Institutes of Health, National Cancer Institute, 2008; Contract No.: NIH Pub. No. 07-6242.
- 2 United States Court of Appeals. The District of Columbia Circuit. R.J. Reynolds Tobacco Company, *et al.* v Food & Drug Administration, *et al.*, Case number 1:2011cv01482. 29 February 2012. [http://www.cadc.uscourts.gov/internet/opinions.nsf/4C0311C78EB11C5785257A64004EBF5/\\$file/11-5332-1391191.pdf](http://www.cadc.uscourts.gov/internet/opinions.nsf/4C0311C78EB11C5785257A64004EBF5/$file/11-5332-1391191.pdf)
- 3 Centers for Disease Control (CDC). *Best practices for comprehensive tobacco control programs.* Atlanta, GA: US Department of Health and Human Services CDC, 2014.
- 4 Durkin S, Brennan E, Wakefield M. Mass media campaigns to promote smoking cessation among adults: an integrative review. *Tob Control* 2012;21:127–38.
- 5 Augustson E, Bright MA, Babb S, *et al.* Increases in quitline calls and smoking cessation website visitors during a national tobacco education campaign. *MMWR Morb Mortal Wkly Rep* 2012;61:667–70.
- 6 Durkin S, Wakefield MA, Spittal MJ. Which types of televised anti-tobacco campaigns prompt more quitline calls from disadvantaged groups? *Health Educ Res* 2011;26:998–1009.
- 7 Cahill K, Stevens S, Perera R, *et al.* Pharmacological interventions for smoking cessation: an overview and network meta-analysis. *Cochrane Database Syst Rev* 2013(5):CD009329.
- 8 Anderson CM, Zhu SH. Tobacco quitlines: looking back and looking ahead. *Tob Control* 2007;16(Suppl 1):i81–6.
- 9 Ossip-Klein DJ, Giovino GA, Megahed N, *et al.* Effects of smokers' hotline: results of a 10-county self-help trial. *J Consult Clin Psychol* 1991;59:325.
- 10 Centers for Disease Control (CDC). *Telephone quitlines: a resource for development, implementation, and evaluation.* Atlanta, GA: US Department of Health and Human Services, CDC, 2004.
- 11 World Health Organization (WHO). Guidelines for implementation of Article 11 of the WHO Framework Convention on Tobacco Control: Packaging and labelling of tobacco products. 2008.
- 12 Thrasher JF, Pérez-Hernández R, Arillo-Santillán E, *et al.* Hacia el consumo informado de tabaco en México: efecto de las advertencias con pictogramas en población fumadora [Towards informed consumption of tobacco in Mexico: evaluation of pictorial warnings in a longitudinal survey of smokers]. *Salud Publica Mex* 2012;54:242–53.
- 13 Cavalcante TM. *Labelling and packaging in Brazil.* Ginebra, Suiza: World Health Organization, 2003.
- 14 Miller CL, Hill DJ, Quester PG, *et al.* Impact on the Australian quitline of new graphic cigarette pack warnings including the quitline number. *Tob Control* 2009;18:235–7.
- 15 Wilson N, Weerasekera D, Hoek J, *et al.* Increased smoker recognition of a national quitline number following introduction of improved pack warnings: ITC Project New Zealand. *Nicotine Tob Res* 2010;12(Suppl 1):S72–7.
- 16 Hammond D. Health warning messages on tobacco products: a review. *Tob Control* 2011;20:327–37.
- 17 Cantrell J, Vallone DM, Thrasher JF, *et al.* Impact of tobacco-related health warning labels across socioeconomic, race and ethnic groups: results from a randomized web-based experiment. *PLoS ONE* 2013;8:e52206.
- 18 Harkness JA. Questionnaire translation. In: Harkness JA, Van de Vijver FJ, Mohler PP, eds. *Cross-cultural survey methods.* Hoboken, NJ: Wiley, 2003, 35–56.
- 19 Thrasher JF, Quah ACK, Dominick G, *et al.* Using cognitive interviewing and behavioral coding to determine measurement equivalence across linguistic and cultural groups: an example from the International Tobacco Control Policy Evaluation Project. *Field Methods* 2011;23:439–60.
- 20 Borland R, Yong HH, O'Connor RJ, *et al.* The reliability and predictive validity of the Heaviness of Smoking Index and its two components: findings from the International Tobacco Control Four Country study. *Nicotine Tob Res* 2010;12(Suppl 1):S45–50.

- 21 Thrasher JF, Rousu MC, Hammond D, *et al*. Estimating the impact of pictorial health warnings and "plain" cigarette packaging: evidence from experimental auctions among adult smokers in the United States. *Health Policy* 2011;102:41–8.
- 22 Thrasher JF, Murukutla N, Pérez-Hernández R, *et al*. Linking mass media campaigns to pictorial warning labels on cigarette packages: a cross-sectional study to evaluate effects among Mexican smokers. *Tob Control* 2013;22:e57–65.
- 23 Miller CL, Hill DJ, Quester PG, *et al*. Response of mass media, tobacco industry and smokers to the introduction of graphic cigarette pack warnings in Australia. *Eur J Public Health* 2009;19:644–9.
- 24 Borland R, Wilson N, Fong GT, *et al*. Impact of graphic and text warnings on cigarette packs: findings from four countries over five years. *Tob Control* 2009;18:358–64.
- 25 Moodie C, Mackintosh AM, Hastings G. Adolescents' response to pictorial warnings on the reverse panel of cigarette packs: a repeat cross-sectional study. *Tob Control* 2015; 24:e93–7.
- 26 GMI. *GMI global panel book*. Bellevue, WA: Global Market Insight, Inc, 2013.
- 27 Witte K, Allen M. A meta-analysis of fear appeals: implications for effective public health campaigns. *Health Educ Behav* 2000;27:591–615.

TC

Promoting cessation resources through cigarette package warning labels: a longitudinal survey with adult smokers in Canada, Australia and Mexico

James F Thrasher, Amira Osman, Crawford Moodie, David Hammond, Maansi Bansal-Travers, K Michael Cummings, Ron Borland, Hua-Hie Yong and James Hardin

Tob Control 2015 24: e23-e31 originally published online July 22, 2014
doi: 10.1136/tobaccocontrol-2014-051589

Updated information and services can be found at:
<http://tobaccocontrol.bmj.com/content/24/e1/e23>

These include:

References

This article cites 17 articles, 12 of which you can access for free at:
<http://tobaccocontrol.bmj.com/content/24/e1/e23#BIBL>

Email alerting service

Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Notes

To request permissions go to:
<http://group.bmj.com/group/rights-licensing/permissions>

To order reprints go to:
<http://journals.bmj.com/cgi/reprintform>

To subscribe to BMJ go to:
<http://group.bmj.com/subscribe/>