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Relationship between constituent labelling and reporting of tar yields among smokers in four countries

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ABSTRACT

Countries have adopted different approaches to disseminating cigarette tar, nicotine, and carbon monoxide (CO) levels to consumers, with some (e.g. EU member states, Canada, Australia, but not the United States) requiring disclosure of results from the International Organization for Standardization (ISO) test method on packs. Cross-country comparisons can provide insight into how smokers use yields when information is presented differently. We examined whether smokers in four different countries could recall the tar yield of their brand of cigarettes, using data from the third wave of the International Tobacco Control Four Country Survey (ITC-4). Of current smokers in the United States, Canada, Australia and the United Kingdom, 33.6% gave a numeric response when asked to report the tar yield of their brand, whereas 66.4% responded 'I don't know.' American participants (9.2%) were less likely than Canadian (28.0%), UK (36.5%) or Australian (68.2%) smokers to give an answer, even after controlling for sociodemographic and smoking behaviour factors. Constituent labelling policies can affect whether smokers report a tar yield for their cigarette brand. Pack labelling appears to be useful for conveying information about cigarettes to smokers; however, there is an urgent need to develop more meaningful information on toxic constituents of cigarette smoke.

Keywords cigarette, labeling, tar, tobacco

Introduction

In 1964, the US Federal Trade Commission (FTC) began testing cigarettes for levels of tar and nicotine in cigarette smoke and reporting the results to the public.[1] Cigarettes were machine smoked according to a standard puffing regime—the FTC or Organization for Standardization (ISO) method (the major difference between the two being the stopping butt length)—to measure tar and nicotine levels present in the mainstream smoke. Carbon monoxide (CO) was added to the list of emissions in 1979. Unfortunately, it has been known for several years that FTC/ISO regimes do not mimic human behaviors, and the FTC cigarette yields not representative of human exposures.[2,3]

Different countries have adopted different approaches to disseminating cigarette yields. In the United States, tar yields are not required by law to appear on cigarette packs, and manufacturers have displayed them by choice for very few brands (e.g. Now, Carlton);[4] however, the tar, nicotine and CO (TNCO) yields are required to be displayed in all print cigarette advertisements. In contrast, TNCO yields are required to appear on packages in the EU, Canada, Australia, New Zealand, China and other countries. The EU requires TNCO numbers to be displayed in a box on the side of the pack, whereas Canada requires the yields for TNCO and three other constituents (benzene, hydrogen cyanide and formaldehyde) from both the ISO regime and a more intensive machine-smoking protocol to be printed on the side of the pack. The yields are displayed in Canada as a range from the ISO value to the more intensive value (e.g. 4–12 mg of tar). In Australia, at the time of this study, cigarettes bore a side label describing that the brand contains 'X mg or less' of TNCO, typically divided into tar 'bands' (16, 12, 10, 8, 6, 2 and 1 mg), along with a short description of each constituent. Figure 1 illustrates the display formats for the United Kingdom, Canada and Australia. In addition, some manufacturers promote some

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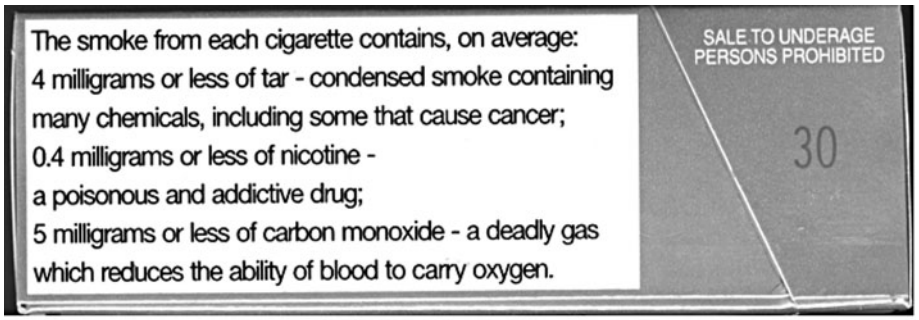

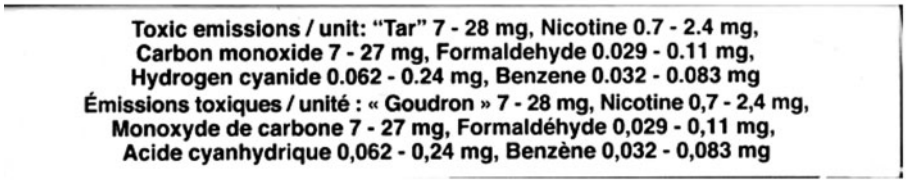

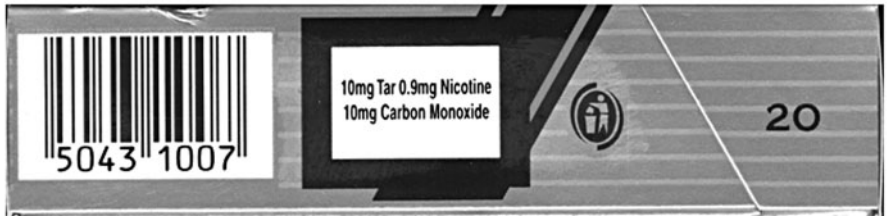

Fig. 1 Tar, nicotine and carbon monoxide pack information formats used in Australia, Canada and the United Kingdom, 2004.

brands with the tar number as a key differentiating feature of brands, with the tar number prominently displayed on the front of the pack, either accompanied by a light/mild descriptor or, in some cases, this is the only differentiation, except for pack colour.

Although smokers are generally aware of brand descriptors such as Light, Mild, UltraLight,[5] there is evidence that smokers are generally unaware of the actual tar yields of their cigarettes.[6–10] For example, Cohen[6] found that 79% of 1005 US smokers could not give the tar yield of their cigarette, with even lower knowledge among smokers with low education, older smokers and African-American smokers. In the context of the introduction of the third wave of Australian warnings in 1997, Borland and Hill showed that 52% of Australian smokers knew their tar levels, and lower numbers the nicotine and CO levels. (At this time, use of tar numbers on the front of packs was not as much used as it was at the time of the current study, but actual levels are not known.) However, given that TNCO yields as measured using the FTC/ISO method are a poor reflection of human exposure,[2,3,11–14] there is debatable value in smokers knowing and using the current numbers. Indeed, these labels have been removed on all cigarettes manufactured or imported into Australia as of 1 March 2006 and replaced with an informational message on the health effects of chemicals in tobacco smoke.

Because emission labelling policies differ across countries, cross-country comparisons can be provide insight into how smokers make use of this information when the yields are presented in different forms and help inform labelling of new information on packs. The aim of this article is to examine whether smokers can recall a tar yield for their brand of cigarettes and whether this differs across countries with different labelling policies.

Methods

Data came from the third wave of the International Tobacco Control Four Country Survey (ITC-4).[15] Briefly, ITC-4 is a prospective cohort study designed to evaluate the psychosocial and behavioural impacts of key national level tobacco-control policies enacted in the Australia, Canada, United Kingdom and United States. All aspects of the study protocol

and survey measures are standardized across the four countries. Respondents are recruited with a 15 min initial call that determines eligibility, followed after 7–10 days by a second call to complete the main survey. At each wave, a replenishment survey is conducted to replace respondents lost to follow-up. Sampling procedures and calling protocol for replenishments are identical to those at Wave 1 recruitment. Table 1 summarizes the American Association for Public Opinion Research (AAPOR-4) response rates, recruitment-to-main survey follow-up rates and Wave 3 follow-up rates by country and by recruitment cohort. The AAPOR-4 is a conservative estimate of overall response rate. The recruitment-to-main follow-up rate expresses the percentage of those who agreed to complete the main survey at recruitment that actually did so. The Wave 3 follow-up rate shows the percentage of cohort members who completed the Wave 3 survey (for Cohort 3, this is by default 100%). Further details on the survey can be found elsewhere.[15]

The Wave 3 survey was conducted between June and December 2004. In all four countries, 5827 subjects completed the follow-up surveys and 2550 subjects completed the replenishment survey, for a total of 8377. Because the perceived tar-level item was added at Wave 3, there was no reason to suspect whether cohort or replenishment participants would respond differently (i.e. because of previous experience with the items among the cohort participants), and so, they are analysed together, but multivariate analyses adjusted for cohort. The protocol was approved by the Institutional Review or Ethics boards of Roswell Park Cancer Institute, University of Waterloo, Cancer Council Victoria and University of Stirling/Open University.

Table 1 AAPOR-4 response rates, within wave recruitment-to-main survey follow-up rates (R2MFUR), and Wave 3 follow-up rates (W3FUR) and number of participants at Wave 3, by country and recruitment cohort, International Tobacco Control 4-Country Survey, 2002–04

Country	*Rate*	*Cohort 1 (October–December 2002)*	*Cohort 2 (May–August 2003)*	*Cohort 3 (June–December 2004)*
United States	AAPOR	25.6	33.0	34.9
	R2MFUR	85.5	80.5	46.9
	W3FUR	32.1	46.9	NA
	W3 N	800	399	889
Canada	AAPOR	49.5	35.3	50.0
	R2MFUR	88.2	85.7	83.8
	W3FUR	47.9	60.0	NA
	W3 N	1201	362	543
United Kingdom	AAPOR	37.8	38.2	41.6
	R2MFUR	87.9	83.9	85.7
	W3FUR	48.7	54.6	NA
	W3 N	1328	166	586
Australia	AAPOR	45.8	45.3	44.2
	R2MFUR	89.8	86.7	90.8
	W3FUR	53.7	65.3	NA
	W3 N	1377	194	532

AAPOR, American Association for Public Opinion Research; NA, not applicable; R2MFUR, recruitment-to-main survey follow-up rate; W3 N, wave 3 N.

Survey items

Participants were asked, 'Without looking at a pack, can you tell me the tar level of your cigarettes?' Responses were recorded verbatim and recoded into numeric answers or 'don't know.' When a range of numbers was provided, the lower number was taken as the response. Other items assessed demographic information, and another asked respondents whether cigarette smoke contains CO.

Results

Of the 8377 participants at Wave 3, 873 were excluded because they were not currently smoking, and an additional 825 were excluded from further analysis because they smoked roll-your-own cigarettes exclusively and hence would not have reportable standard TNCO yields. This left a final sample size of 6679 persons who currently smoked at least monthly.

Of current smokers across all countries, 33.6% gave a numeric response when asked to report the tar yield of their brand, whereas 66.4% responded 'I don't know.' We examined sociodemographic correlates of providing a response, outlined in Table 2. American participants were far less likely than residents of Canada, United Kingdom or Australia to give an answer, with Australian smokers most likely to provide a response. This held true when controlling for other factors, such as gender, age, ethnicity, income and education. In a multivariate model, male respondents under the age of 40, those who reported choosing their current brand on the basis of its tar or nicotine yield and those who had been smoking their brand for at least 1 year were more likely to give a numeric response to the tar yield question. We observed a small but significant cohort effect, which on further exploration showed to be confined to the US sample (data not shown).

Among Canadian respondents, 6.4% reported a 'range' of tar yields, consistent with how they are displayed on Canadian packages, as opposed to a single number. Given the range of yields printed on Canadian packs, we could not determine, among those who reported a single number, whether they reported the lower (ISO) or higher (Health Canada intensive) value.

Table 2 Factors associated with giving a numeric response to question about tar yield of cigarette brand, International Tobacco Control 4-Country Survey, 2004

	N	*% (wtd)*	*Adjusted OR*	*95% CI*	*Wald p*
Cohort					0.001
1	3490	37.0	1.0	Ref	
2	937	27.4	1.1	0.9, 1.3	
3	2220	33.4	**1.4**	**1.2, 1.7**	
Country					<0.001
United States	1880	8.9	1.0	Ref	
Canada	1711	29.0	**4.8**	**3.9, 6.0**	
United Kingdom	1431	36.5	**7.1**	**5.6, 9.0**	
Australia	1615	68.2	**26.4**	**20.7, 33.5**	
Sex					<0.001
Female	3229	31.0	**0.7**	**0.6, 0.8**	
Male	3407	37.7	1.0	Ref	
Age (years)					<0.001
18–24	995	38.9	**1.7**	**1.3, 2.1**	
25–39	2149	39.0	**1.6**	**1.4, 2.0**	
40–54	2310	32.3	1.3	1.0, 1.5	
55+	1182	26.6	1.0	Ref	
Ethnicity					0.42
White	4649	38.7	0.9	0.8, 1.3	
Non-White	1740	26.0	1.0	Ref	
Income*					0.07
<30 000	1689	25.9	1.0	0.7, 1.3	
30 000–60 000	2212	30.7	1.2	0.9, 1.5	
>60 000	1888	38.7	1.2	0.9, 1.5	
Refused	394	32.5	1.0	Ref	
Education					0.05
Low	3447	35.9	0.8	0.6, 1.0	
Medium	2236	30.1	0.9	0.7, 1.1	
High	928	38.9	1.0	Ref	
Cigarettes smoked per day					0.005
≤10	2176	32.5	1.0	0.7, 1.4	
11–20	3028	34.9	1.2	0.9, 1.7	
21–30	1060	38.8	1.3	0.9, 1.8	
31+	369	30.1	1.0	Ref	
Chose brand for TN yield					<0.001
Yes	1541	46.5	**1.7**	**1.5, 2.0**	
No	5035	30.8	1.0	Ref	
Time used brand					0.01
<12 months	1096	30.9	**0.8**	**0.7, 1.0**	
≥12 months	5540	35.1	1.0	Ref	

OR, Odds ratio; CI, confidence interval; Wtd, weighted.

Percentages weighted to demographics of each smoker population.

*Income is assessed in the currency of each country (US dollars, Canadian dollars, British pounds and Australian dollars).

Bolded values are statistically significant ($p < .05$).

We examined whether smokers who reported a tar yield were also more likely to know that CO was present in cigarette smoke. As CO is reported along with tar and nicotine in all countries with labelling, this would be logical. Indeed, 92.2% of tar responders, as compared with 89.9% of 'don't know's', correctly identified that CO was a component of

cigarette smoke ($P < 0.01$). This held in a multivariate model adjusting for recruitment cohort, country, age, sex, race/ethnicity, education and income (adjusted Odds Ratio [OR] = 1.4, 95% confidence interval [CI]: 1.1, 1.7).

Discussion

Main finding of this study

This study shows that constituent labelling policies can affect whether smokers are aware of the tar yield of their cigarette brand. Smokers in jurisdictions with labelling requirements were more likely to report a numerical value for the tar yield of their cigarette, whereas US smokers were far less likely to be able to report a yield.

What is already known on this topic

A series of previous studies, done separately but in the same countries, had shown that smokers in the United States, Canada and UK were in general unable to report accurately a tar yield for their cigarette. There have been some changes to the labelling requirements in the United Kingdom and Canada since the previous studies were done. The low levels for US smokers are consistent with the existing literature.

What this study adds

To our knowledge, this is the first study to compare reporting of tar yields across countries with differing labelling requirements. There did not appear to be a dose–response effect in terms of the ability to give a response related to the amount of constituent information provided. US packs typically feature no tar or nicotine information, and consequently, very few American smokers could give a response. Australian packs at the time of the survey provided both numerical and some descriptive information about constituents, and Australians were most likely to provide a response. About one-third of UK smokers, where numbers alone appear on packs, and 29% of Canadians, where ranges and additional constituents are featured, had lower response. Simply providing more numbers (as in Canada), it seems from this sample, does not improve knowledge of constituent levels. Context and descriptive information may aid recall.

The current study did not assess the meaning of the tar yields or how consumers use this information to guide their smoking behaviour or brand selection. Given that the tar yields from existing smoking regimes are unrelated to individual exposure,[2,3,11–14] it is unclear how these numbers should be used by consumers. Perhaps not surprisingly, there are calls to remove these numbers from packages and to replace the misleading quantitative values with more descriptive information on toxic smoke emissions and their effects.[16,17] Countries such as Brazil and Australia have already taken this step, with others, such as Canada, likely to follow. Should a new machine smoking regime be developed that is more representative of human smoking, simple descriptive information on the context and meaning of these numbers is likely to be equally important. But any messages should be well researched to test smokers' understanding.

These results are also generally supportive of the cigarette pack as a forum for communicating information to smokers. We have previously shown that warning labels are a primary source of information about the health risks of smoking, and recall of specific conditions caused by smoking (e.g. impotence) is greater in jurisdictions featuring warnings that communicate this information.[18]

Being able to report a tar yield for one's brand showed a slight association with knowledge of CO in cigarettes, which makes logical sense because CO is reported along with tar and nicotine, except in the United States (and US smokers were significantly less likely to know of CO, data not shown).

Limitations of this study

Our study is a cross-section of smokers in four countries. We asked smokers whether they could give the tar yield of their brand without looking at a pack, in the context of a larger survey of smoking-related issues. We might have obtained different results if we had provided response options or ranges, rather than requiring an open-ended response. We had initially intended to validate smokers' self-reports, but we were able to locate official government reports on TNCO for only about half of the participants—the remainder either smoked brands not reported or provided insufficient information to link to a listed yield. However, given the numbers have little meaning for individual consumers, one could argue that whether or not smokers' reports are correct is irrelevant.

Conclusions

Across four countries, the ability of smokers to self-report their tar yields was largely a function of the labelling policy of their home country—Australians were most likely and Americans least likely to be able to give a response, with UK and Canadian smokers in between. Pack labelling may be a useful means of conveying information about cigarettes to smokers; however, there is an urgent need to develop more effective ways to communicate the toxic constituents of cigarette smoke to smokers in a way that is more meaningful than the current FTC/ISO yields.

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