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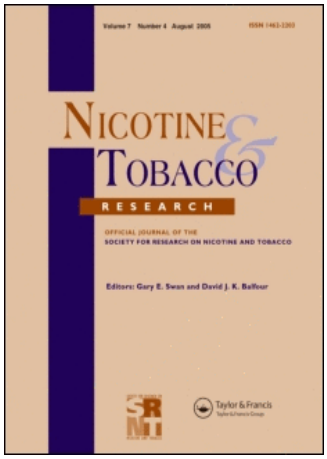

Nicotine & Tobacco Research
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713439766

Smokers' beliefs about the relative safety of other tobacco products: Findings from the ITC Collaboration

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Online Publication Date: 01 October 2007
To cite this Article: O'Connor, Richard J., McNeill, Ann, Borland, Ron, Hammond, David, King, Bill, Boudreau, Christian and Cummings, K. Michael (2007) 'Smokers' beliefs about the relative safety of other tobacco products: Findings from the ITC Collaboration', Nicotine & Tobacco Research, 9:10, 1033 - 1042
To link to this article: DOI: 10.1080/14622200701591583
URL: http://dx.doi.org/10.1080/14622200701591583

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Nicotine & Tobacco Research Volume 9, Number 10 (October 2007) 1033–1042

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Smokers' beliefs about the relative safety of other tobacco products: Findings from the ITC Collaboration

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Received 19 May 2006; accepted 26 November 2006

Most tobacco control efforts in western countries focus on the factory-made, mass-produced (FM) cigarette, whereas other tobacco products receive relatively little attention. Noncombusted tobacco products (i.e., referred to as smokeless tobacco), particularly Swedish-style snus, carry lower disease risks, compared with combusted tobacco products such as cigarettes. In this context, it is important to know what tobacco users believe about the relative harmfulness of various types of tobacco products. Data for this study came from random-digit-dialed telephone surveys of current smokers aged 18 or older in Australia, Canada, the United Kingdom, and the United States. Three waves of data, totaling 13,322 individuals, were assessed. Items assessed use of and beliefs about the relative harms of cigars, pipes, smokeless tobacco, and FM and roll-your-own cigarettes, as well as sociodemographics and smoking behaviors. Cigars (2.8%–12.7%) were the other tobacco products most commonly used by current cigarette smokers, followed by pipes (0.3%–2.1%) and smokeless tobacco (0.0%–2.3%). A significant minority of smokers (12%–21%) used roll-your-own cigarettes at least some of the time. About one-quarter of smokers believed that pipes, cigars, or roll-your-own cigarettes were safer than FM cigarettes, whereas only about 13% responded correctly that smokeless tobacco was less hazardous than cigarettes. Multivariate analyses showed that use of other tobacco products was most strongly related to beliefs about the reduced harm of these other products. Use of other tobacco products was low but may be growing among smokers in the four countries studied. Smokers are confused about the relative harms of tobacco products. Health education efforts are needed to correct smoker misperceptions.

Introduction

Most tobacco control efforts in western countries focus on the factory-made (FM) cigarette, whereas other tobacco products receive relatively little attention. These other forms of tobacco include roll-your-own (RYO) cigarettes, pipes, cigars, and smokeless tobacco (SLT; dry snuff, moist snuff, and chewing tobacco). Before the mid-20th century, such products accounted for the vast majority of tobacco use in Europe and North America, but currently they account for a much smaller proportion of tobacco use (Capehart, 2005; Euromonitor, 2006; Tobacco Advisory Group, 2000). Population-based surveys bear out this observation (Table 1): Prevalence of noncigarette tobacco product use is less than 6% in all countries (Australian Institute of Health and Welfare, 2005; Health Canada, 2004; Office for National Statistics, 2005; Substance Abuse and Mental Health Services Administration, 2005). The prevalence of other tobacco use is based partly on cultural preferences. For example, the prevalence of SLT use is high among South Asians in the United

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ISSN 1462-2203 print/ISSN 1469-994X online © 2007 Society for Research on Nicotine and Tobacco

DOI: 10.1080/14622200701591583

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Table 1. Prevalence of other tobacco product use from national surveys (United States, Canada, United Kingdom, and Australia, 2003–2004).

	Prevalence (percent)		
Country	Smokeless tobacco	Cigars	Pipes
United States[a]	3.1	5.8	<1
Canada[b]	<1	3.0	<1
United Kingdom[c]	—[e]	4.0	1.0
Australia[d]	—[e]	1.5	

Note. [a]Data from 2004 National Survey on Drug Use and Health, age 18 or over. [b]Data from 2003 Canadian Tobacco Use Monitoring Survey, age 15 or over. [c]Data from 2004 General Household Survey, age 18 or over, males only. [d]Data from 2004 National Drug Strategy Household Survey, age 18 or over. [e]Data not available.

Kingdom (27%–98%; Bedi & Gilthorpe, 1995). In some cases, legal restrictions determine product use, as with the ban on moist snuff in Australia and the European Union (excluding Sweden).

Concurrent use of tobacco products has received little attention as well. Between 2.5% and 5.0% of U.S. cigarette smokers also use SLT, and 3%–4% concurrently smoke cigarettes and cigars (National Cancer Institute, 1998; Wetter et al., 2002). In Great Britain in 2004, 7% of male cigarette smokers concurrently used cigars or pipes (Office for National Statistics, 2005). Among Australian cigarette smokers, 7.9% smoked cigars and pipes at least occasionally (Australian Institute of Health and Welfare, 2005).

Other tobacco products have varying health risks, and these risks can differ depending on whether the person in question is a smoker or nonsmoker. RYO cigarettes, filtered and unfiltered, present health risks that are similar to those of FM cigarettes (Benhamou, Benhamou, Tirmarche, & Flamant, 1985; Hawthorne & Fry, 1978; Kaiserman & Rickert, 1992; Tuyns & Esteve, 1983). Cigar use is linked to lung, lip, oral cavity, stomach, and pancreatic cancers, and to chronic obstructive pulmonary disease and heart disease (National Cancer Institute, 1997, 1998), whereas pipe use is related to cancers of the lung, oral cavity, and colon (Henley, Thun, Chao, & Calle, 2004; National Cancer Institute, 1997). Primary cigar and pipe users (i.e., exclusive, never used cigarettes) rarely inhale and appear to have lower health risks compared with current cigarette smokers, whereas secondary cigar and pipe users (i.e., those who use pipes or cigars with cigarettes concurrently, or former cigarette smokers who switch to pipes or cigars) typically inhale to a greater extent (National Cancer Institute, 1998). Dual users of cigarettes and cigars appear to be at particularly high risk of cancers (National Cancer Institute, 1997, 1998). Thus, cigars and pipes are not likely to be reduced-harm alternatives for cigarette smokers.

Most forms of SLT use carry health risks that are markedly lower than those of combusted forms of tobacco (Foulds, Ramstrom, Burke, & Fagerström, 2003; Tobacco Advisory Group, 2002). The magnitude of the risk is still controversial, but a recent expert panel estimated that SLT was 90% less harmful than cigarettes (Levy et al., 2004). The extent of harm reduction is particularly true for Swedish snus, for which levels of toxicants have been reduced in recent years (Osterdahl, Jansson, & Paccou, 2004). However, as recently as 2003, the U.S. surgeon general claimed that "no significant scientific evidence…suggests smokeless tobacco is a safer alternative to cigarettes" (Carmona, 2003).

There is no such thing as a completely safe tobacco product. However, compared with continuing to smoke conventional FM cigarettes, switching to some types of tobacco products provides little or no reduction in risk for current smokers (e.g., cigars, pipe tobacco, RYO, bidi, kretek), whereas switching to other types of products (e.g., SLT) may lower risk of disease. In this context, knowing what tobacco users believe about the relative harmfulness of various products becomes important. In the United States at least, the predominant public health message is, "No tobacco product is safe." However, believing tobacco is harmful overall does not preclude one from believing that various forms of tobacco use (low-tar cigarettes, RYO cigarettes, cigars, pipes, SLT) might be associated with different levels of risk (Kozlowski & Edwards, 2005). If cigarette smokers perceive some other tobacco products to be less hazardous, they may consider switching as a harm reduction measure, which may or may not be effective, depending on the product they perceive as less hazardous.

We examined cigarette smokers' use of and beliefs about the harmfulness of FM cigarettes, RYO cigarettes, pipes, cigars, and SLT in four countries (Australia, Canada, the United Kingdom, and the United States) across three waves of data collection (2002–2004) from the International Tobacco Control Four-Country Survey (ITC-4). The ITC-4 includes nationally representative cohorts of adult smokers drawn from Australia, Canada, the United Kingdom, and the United States using parallel survey designs and measures. The ITC-4 provides a comprehensive assessment of product use and beliefs about different tobacco products. Furthermore, it allows for the evaluation of tobacco control policies implemented in each country during the 8-year study.

Method

The ITC-4 survey is a prospective study conducted yearly in Australia, Canada, the United Kingdom, and the United States, with 2,000 longitudinal respondents per country with yearly replenishments (Figure 1). A total of 13,322 eligible adult (i.e., aged

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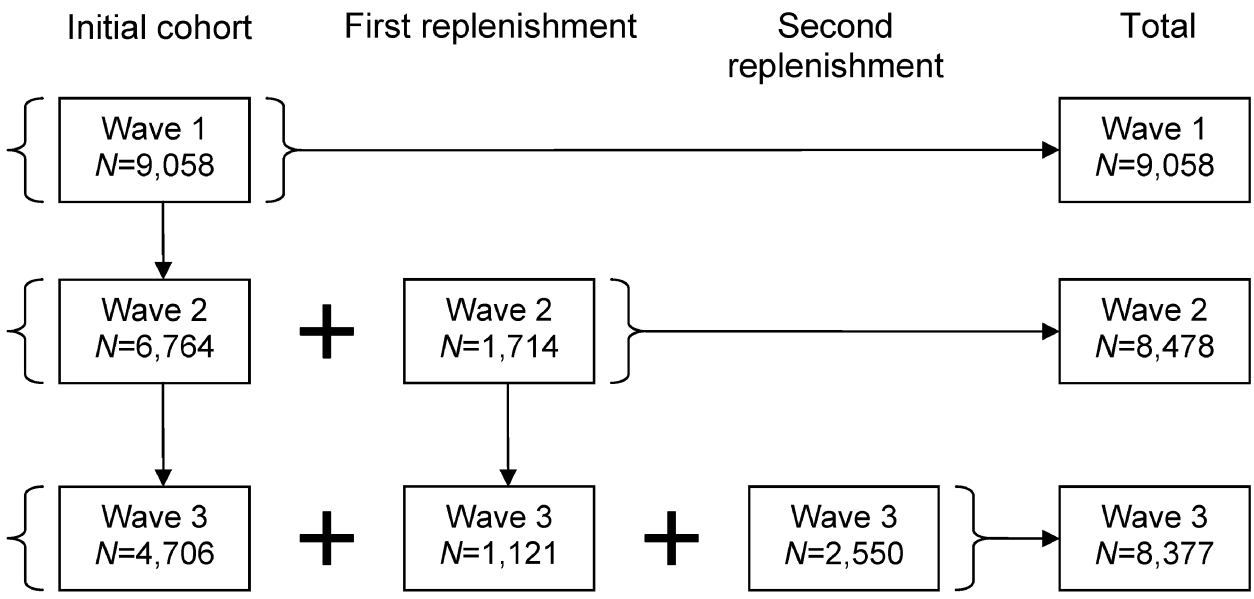

Figure 1. Flowchart of International Tobacco Control Four-Country survey recruitment, 2002–2004.

18 years or older) smokers (defined as having smoked at least 100 cigarettes in their lifetime and currently smoking at least once a month) agreed to be interviewed in the first three waves (2002–2004). The survey field work was conducted using computer-assisted telephone interview (CATI) techniques, with households sampled using stratified random digit dialing, and adult smokers within each household selected via the "next birthday" method. These participants were asked to respond to questions related to tobacco control policies, smoking behavior, and psychosocial correlates of smoking behavior and policy beliefs. Further details about the conceptual framework, survey methodology, response, cooperation and attrition rates, sampling plan, and protocols are available elsewhere (Fong et al., 2006; Thompson et al., 2006).

Measures

Sociodemographics. For all participants, data were available on country of residence, age, sex, race/ethnicity (dichotomized as White vs. not White), income, and level of education.

Use of tobacco products. To determine RYO use, smokers were asked, "Do you smoke factory-made cigarettes, roll-your-own cigarettes, or both?" Smokers were categorized as exclusive RYO, exclusive FM, or "mixed" users. Use of additional tobacco products was assessed by one item: "In the past month, have you used any other kind of tobacco product besides cigarettes? Please don't include products intended to help you quit smoking." Response choices were cigars, cigarillos, bidis, pipes, chewing tobacco, snuff, or other products, and participants could nominate multiple products. We report results for cigarettes (both RYO and FM), cigars, pipes, and SLT (snuff and/or chewing tobacco).

Dependence. We examined participants' nicotine dependence using the Heaviness of Smoking Index—the sum of categorized cigarettes smoked per day (<10, 11–20, 21–30, 31+) and time in minutes to the first cigarette of the day (<5, 6–30, 31–60, 61+; Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989).

Beliefs about products. All participants were asked, "Thinking about different types of tobacco products that are smoked—that is, factory-made cigarettes, roll-your-own cigarettes, pipes, and cigars—are any of these less harmful than the others or are they all equally harmful?" We did not try to distinguish between primary or secondary use, or between dual use of products. Those who replied that some products were less harmful than others were asked two questions: "What kind of tobacco product do you think is *least* harmful?" and "What kind of tobacco product do you think is *most* harmful?" For each product, a three-level classification was created: [FM/RYO/pipe/cigar] is least harmful; [FM/RYO/pipe/cigar] is most harmful; no difference among smoked products. If a participant nominated the same product as both least and most harmful, he or she was reclassified as believing no difference existed.

Beliefs about SLT were assessed as follows: "Are you aware of any smokeless tobacco products, such as snuff or chewing tobacco, which are not burned or smoked, but instead are usually put in the mouth?"

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Those who stated they were aware of SLT were then asked, ''As far as you know, are any smokeless tobacco products less harmful than ordinary cigarettes?''

Data analyses

We assessed the prevalence of use of FM and RYO cigarettes, cigars, pipes, and SLT among participants at each wave of the survey. Similarly, we assessed the prevalence of beliefs about the relative harms of these products. We report prevalence rates weighted to each country's smoker population (Thompson et al., 2006). Changes across the three waves for each country were computed on unweighted data using generalized estimating equations (GEEs) in SAS version 9.1. GEE models are useful for analysis of longitudinal data, to account for the correlation of repeated observations in the same individuals over time. They also allow all data to be used, including subjects lost to follow-up, rather than simply subjects with complete data (Liang & Zeger, 1986). The *p* values for change over time are derived from the two-degrees-of-freedom Wald test. We examined relationships between beliefs about which product was least harmful and sociodemographic and smoking behavior variables across all three survey waves using GEE. Here, we report odds ratio estimates and their 95% confidence intervals. For GEE models featuring dichotomous outcomes, we used binomial distributions, logit link functions, and autoregressive working correlation matrices. For multinomial responses, we used multinomial distributions, cumulative logit link functions, and independent working correlation matrices. Multivariate models controlled for time effects and recruitment wave.

Results

Prevalence of tobacco product use among current smokers

Table 2 shows the prevalence of use of FM and RYO cigarettes, cigars, pipes, and SLT by wave and country. Among smokers in this sample, use of RYO cigarettes varied by country. The United States had the lowest prevalence; Canadian (OR=4.6, p<.001), U.K. (OR=10.6, p<.001), and Australian (OR=6.1, p<.001) smokers were significantly more likely to report RYO use. Analysis of changes in the distribution of FM-RYO cigarette use showed that RYO use is increasing in the United Kingdom (p<.01), whereas no significant changes over time were noted in the United States, Canada, or Australia.

Concurrent use of cigars was relatively high (e.g., 2.8%–11.4% in the United States across the three waves) among smokers in this sample, compared with use of pipes or SLT products. Compared with U.S. smokers, Canadians were 1.3 times more likely to report cigar use (p<.01), whereas smokers from the United Kingdom (OR=0.6, p<.001) and Australia (OR=0.7, p<.01) were less likely to report cigar use. Cigar use increased significantly in Canada and the United States from Wave 1 to Wave 3 (p<.001) and also increased somewhat in Australia (p<.05) but showed no significant change in the United Kingdom. Concurrent use of pipes, by contrast, was lower than that of cigars (highest estimate=4.1% in the United States in 2004) and showed neither significant difference between countries nor significant change across time within countries.

Concurrent SLT use was quite rare. The rate was highest in the United States but dropped from 2.3% at Wave 1 to 0.7% at Wave 3. The prevalence of concurrent SLT use was less than 0.6% of smokers in each of the other three countries (ORs<0.3, all p<.001). Use of SLT among U.S. smokers dropped significantly across time (p<.001) and also showed some fluctuation in the United Kingdom (p=.02), though this may be an artifact attributable to a few individuals.

Beliefs about tobacco products

Table 3 shows the prevalence of believing that some tobacco products are less harmful than others by

Table 2. Prevalence of tobacco product use among smokers, ITC Survey Waves 1–3 (W1–W3).[a]

	Canada			United States			United Kingdom			Australia		
Product	W1	W2	W3	W1	W2	W3	W1	W2	W3	W1	W2	W3
Cigarettes												
FM only	84.8	85.5	86.7	96.3	96.3	96.3	72.7	70.6	71.0	79.5	80.1	81.3
Mixed	7.6	6.3	6.7	2.5	2.1	2.3	8.9	9.6	8.0	10.1	8.7	7.9
RYO only	7.5	8.2	6.7	1.2	1.6	1.5	18.3	19.9	21.0	10.4	11.2	10.8
Cigars	3.5	9.4	12.7	2.8	6.1	11.4	2.9	3.2	7.3	3.0	4.6	6.0
Pipes	0.6	1.1	2.0	0.5	1.0	4.1	0.4	0.3	3.7	0.4	0.7	1.5
Smokeless tobacco	0.5	0.1	0.4	2.3	0.9	0.7	0.6	<0.1	0.2	0.3	<0.1	0.1

Note. FM, factory-made cigarettes; RYO, roll-your-own cigarettes. [a]Percentages weighted to respective national smoker populations.

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Table 3. Beliefs about harm from various tobacco products among current cigarette smokers, by country, ITC Survey Waves 1–3 (W1–W3) cross-sectional prevalence rates (includes cohort and replenishment participants).[a]

	Canada			United States			United Kingdom			Australia		
	W1	W2	W3	W1	W2	W3	W1	W2	W3	W1	W2	W3
Thinking about different types of tobacco products that are smoked—that is, factory-made cigarettes, roll-your-own cigarettes, pipes, and cigars—are any of these less harmful than the others or are they all equally harmful? (% saying some less harmful than others)	18.7	18.4	21.0	16.8	16.0	22.2	29.1	27.8	25.5	33.1	34.6	35.5
Factory-made cigarettes												
Least harmful	6.6	6.2	9.5	5.8	6.2	9.1	7.9	9.0	9.5	6.2	7.0	8.8
Most harmful	6.5	6.9	6.3	5.8	4.7	6.5	11.9	11.2	9.3	19.4	20.5	20.2
Neither least nor most harmful	86.9	86.9	84.3	88.4	89.1	84.4	80.2	79.8	81.2	74.4	72.6	71.1
Roll-your-own cigarettes												
Least harmful	2.6	2.2	3.0	2.8	2.4	4.7	9.3	9.4	8.4	16.2	15.6	17.1
Most harmful	5.9	5.1	6.3	5.9	5.9	8.9	9.8	7.9	6.7	5.2	5.7	7.1
Neither least nor most harmful	91.4	92.7	90.7	91.3	91.7	86.4	80.9	82.7	84.9	78.6	78.7	75.8
Pipes												
Least harmful	5.6	6.5	5.4	5.0	4.5	6.7	8.8	8.5	5.4	7.2	9.8	10.2
Most harmful	2.4	2.7	3.3	1.3	1.8	2.6	3.6	3.7	4.4	4.4	5.3	5.5
Neither least nor most harmful	92.0	90.8	91.3	93.8	93.7	90.7	87.7	87.9	90.2	88.4	84.9	84.3
Cigars												
Least harmful	5.0	4.1	4.8	3.6	3.1	4.2	6.3	4.4	5.3	8.1	8.3	7.6
Most harmful	4.6	4.5	6.2	4.1	3.7	6.3	6.5	8.2	8.5	7.3	7.3	9.1
Neither least nor most harmful	90.4	91.4	88.9	92.4	93.2	89.5	87.2	87.4	86.2	84.6	84.5	83.3
Are you aware of any smokeless tobacco products, such as snuff or chewing tobacco, which are not burned or smoked but instead are usually put in the mouth? (% aware)	67.9	70.7	77.2	85.2	81.7	82.8	57.3	51.1	49.5	60.3	62.8	56.3
As far as you know, are any smokeless tobacco products less harmful than ordinary cigarettes? (% Yes, of those aware)	13.7	10.7	9.7	12.9	9.2	7.6	20.7	15.6	11.7	19.7	16.7	11.6

Note. Due to rounding, percentages may not sum to 100%. [a] Percentages are weighted to respective national smoker populations.

country and wave. Overall (i.e., collapsing across waves), one-quarter of smokers believed that some smoked tobacco products are less harmful, but significant differences were found between countries. U.S. smokers were least likely to believe that some smoked products are less harmful than others, Canadian smokers showed no overall difference from U.S. smokers (OR=1.1, p=.28), and U.K. (OR=1.7, p<.001) and Australian (OR=2.5, p<.001) smokers were more likely to believe that some smoked products are less harmful than others. Over time, these beliefs increased significantly in Canada (p=.009) and the United States (p<.001) and decreased significantly in the United Kingdom (p<.001), with no significant change in Australia. The higher rates of Australian smokers believing FM cigarettes to be most harmful come from beliefs that RYO and to a lesser extent pipes are less harmful.

We found overall differences between countries in awareness of SLT; Canadian (OR=0.5, p<.001), U.K. (OR=0.2, p<.001), and Australian (OR=0.03, p<.001) smokers were less likely than U.S. smokers to report awareness of SLT. Only around 13% of those aware of smokeless products thought they were less harmful than cigarettes. We examined relative-risk beliefs for SLT compared with cigarettes, among those who were aware of these products. Compared with U.S. smokers, Canadian (OR=1.3, p<.001), U.K. (OR=3.2, p<.001), and Australian (OR=3.2, p<.001) smokers were all *more* likely to believe SLT to be less harmful than cigarettes. We found significant decreases in reports of such beliefs within countries across waves (all p<.02).

To assess correlates of these relative-risk beliefs across products, we ran GEE models for five possible beliefs: (a) FM cigarettes are least harmful, (b) RYO cigarettes are least harmful, (c) pipes are least harmful, (d) cigars are least harmful, and (e) SLT is less harmful than cigarettes (Table 4). The following factors were found to increase the odds of believing that FM cigarettes are least harmful among smoked products: being less than 25 years old, White (OR=1.4, 95% CI 1.1–1.7), male (OR=1.3, 95% CI=1.2–1.5), residing in the United Kingdom, having a high income, having a medium or high education, and smoking only FM cigarettes. For RYO, we found that young (age <25 years) White male smokers in the United Kingdom and Australia, with high education, using RYO sometimes or exclusively were most likely to see RYO as the least harmful. For pipes, older (age ⩾25 years) White male smokers in the United Kingdom or Australia with high income and medium or high education, who used FM cigarettes and who used pipes concurrently

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Table 4. Covariates related to belief in relative harmfulness of various tobacco products among current cigarette smokers.[a]

	FM cigarettes least harmful		RYO cigarettes least harmful		Pipes least harmful		Cigars least harmful		Smokeless tobacco less harmful than cigarettes	
Number of observations used in GEE	20,506		19,564		18,740		18,911		13,613	
	OR	95% *CI*	*OR*	95% *CI*	*OR*	95% *CI*	*OR*	95% *CI*	*OR*	95% *CI*
Country (ref=United States)	χ^2 (3)=18.2, $p<.001$		χ^2 (3)=353.7, $p<.001$		χ^2 (3)=82.7, $p<.001$		χ^2 (3)=91.4, $p<.001$		χ^2 (3)=461.7, $p<.001$	
Canada	1.1	1.0, 1.3	0.8	0.6, 1.0	1.2	0.9, 1.4	1.3	1.0, 1.6	**1.3**	1.2, 1.5
United Kingdom	**1.5**	1.2, 1.7	**2.3**	1.8, 2.8	**1.8**	1.5, 2.2	**1.7**	1.3, 2.1	**3.6**	3.1, 4.2
Australia	1.2	1.0, 1.4	**4.5**	3.6, 5.5	**2.3**	1.9, 2.9	**2.8**	2.2, 3.5	**3.5**	3.0, 4.0
Sex (ref=Female)	χ^2 (1)=19.5, $p<.001$		χ^2 (1)=6.3, $p<.01$		χ^2 (1)=30.4, $p<.001$		χ^2 (1)=19.9, $p<.001$		χ^2 (1)=19.7, $p<.001$	
Male	**1.3**	1.2, 1.5	1.2	1.0, 1.4	**1.5**	1.3, 1.7	**1.4**	1.2, 1.7	**1.3**	1.1, 1.4
Age group (ref=18–24 years)	χ^2 (3)=20.3, $p<.001$		χ^2 (3)=42.9, $p<.001$		χ^2 (3)=73.0, $p<.001$		χ^2 (3)=31.8, $p<.001$		χ^2 (3)=7.8, $p=0.05$	
25–39	**0.8**	0.6, 0.9	0.8	0.7, 1.0	**1.4**	1.0, 1.9	1.1	0.8, 1.4	0.8	0.7, 1.0
40–54	**0.7**	0.6, 0.8	**0.6**	0.5, 0.7	**2.4**	1.8, 3.2	**1.5**	1.1, 1.9	0.8	0.7, 1.0
55+	**0.6**	0.5, 0.8	**0.6**	0.4, 0.7	**2.4**	1.8, 3.2	**1.8**	1.4, 2.5	0.9	0.7, 1.0
Race/ethnicity (ref=White)	χ^2 (1)=10.2, $p<.001$		χ^2 (1)=0.17, $p=0.68$		χ^2 (1)=10.8, $p<.001$		χ^2 (1)=0.6, $p=0.46$		χ^2 (1)=0.7, $p=0.40$	
Non-White	**0.7**	0.6, 0.9	1.0	0.8, 1.2	**0.7**	0.5, 0.9	0.9	0.7, 1.2	1.1	0.9, 1.2
Income (ref=Low)	χ^2 (3)=10.6, $p<.01$		χ^2 (3)=7.9, $p<.05$		χ^2 (3)=12.1, $p<.01$		χ^2 (3)=14.1, $p<.01$		χ^2 (3)=2.9, $p=0.40$	
Medium	1.1	1.0, 1.3	0.9	0.8, 1.1	1.1	0.9, 1.3	1.2	1.0, 1.5	0.9	0.8, 1.0
High	**1.3**	1.1, 1.5	1.1	1.0, 1.4	**1.3**	1.1, 1.6	**1.4**	1.2, 1.7	1.0	1.0, 1.1
Refused	1.3	1.0, 1.6	1.1	0.9, 1.4	0.9	0.7, 1.3	0.9	0.6, 1.2	0.9	0.8, 1.2
Education (ref=Low)	χ^2 (2)=21.8, $p<.001$		χ^2 (2)=9.0, $p<.01$		χ^2 (2)=96.9, $p<.001$		χ^2 (2)=43.2, $p<.001$		χ^2 (2)=20.6, $p<.001$	
Medium	**1.3**	1.1, 1.4	1.1	1.0, 1.3	**1.7**	1.5, 2.0	**1.4**	1.2, 1.7	1.1	1.0, 1.2
High	**1.6**	1.4, 2.0	**1.3**	1.1, 1.6	**2.5**	2.0, 3.0	**2.0**	1.6, 2.4	**1.5**	1.3, 1.7
Heaviness of Smoking Index (ref=0)	χ^2 (6)=7.0, $p=0.32$		χ^2 (6)=13.0, $p<.05$		χ^2 (6)=11.9, $p=0.06$		χ^2 (6)=13.9, $p<.05$		χ^2 (6)=4.2, $p=0.65$	
6	0.9	0.7, 1.3	0.9	0.6, 1.3	1.4	1.0, 2.0	1.2	0.8, 1.7	1.1	0.8, 1.5
5	1.0	0.8, 1.3	0.9	0.7, 1.2	1.1	0.8, 1.4	0.9	0.7, 1.2	0.9	0.7, 1.1
4	0.8	0.7, 1.0	**0.7**	0.6, 0.9	1.1	0.9, 1.4	0.8	0.7, 1.1	1.0	0.9, 1.2
3	0.9	0.8, 1.1	0.8	0.7, 1.0	1.1	0.9, 1.3	0.9	0.7, 1.1	0.9	0.8, 1.1
2	0.8	0.7, 1.0	0.8	0.7, 1.0	0.9	0.7, 1.1	0.8	0.6, 1.0	1.0	0.8, 1.1
1	0.9	0.7, 1.1	0.8	0.7, 1.0	1.0	0.8, 1.2	**0.7**	0.5, 0.9	1.0	0.8, 1.2
FM/RYO use (ref=FM only)	χ^2 (2)=53.4, $p<.001$		χ^2 (2)=142.6, $p<.001$		χ^2 (2)=11.4, $p<.01$		χ^2 (2)=4.0, $p=0.13$		χ^2 (2)=0.4, $p=0.84$	
Mixed	**0.6**	0.4, 0.7	**1.8**	1.4, 2.2	**0.6**	0.4, 0.8	1.0	0.7, 1.3	1.0	0.9, 1.2
RYO only	**0.4**	0.3, 0.6	**2.9**	2.4, 3.4	1.0	0.8, 1.3	1.3	1.0, 1.6	1.1	0.9, 1.2
Cigars	χ^2 (1)=0.03, $p=0.86$		χ^2 (1)=3.1, $p=0.08$		χ^2 (1)=1.3, $p<.001$		χ^2 (1)=55.7, $p<.001$		χ^2 (1)=0.3, $p=0.59$	
Used in last month	1.0	0.8, 1.3	1.3	1.0, 1.7	1.2	0.9, 1.6	**2.5**	1.9, 3.1	1.0	0.8, 1.2
Pipes	χ^2 (1)=0.7, $p=0.40$		χ^2 (1)=1.7, $p=0.19$		χ^2 (1)=5.0, $p<.05$		χ^2 (1)=0.6, $p=0.43$		χ^2 (1)=1.4, $p=0.24$	
Used in last month	0.7	0.4, 1.5	1.6	0.8, 3.1	**1.9**	1.1, 3.4	0.7	0.3, 1.7	1.4	0.8, 2.3
SLT	χ^2 (1)=0.6, $p=0.44$		χ^2 (1)=1.6, $p=0.20$		χ^2 (1)=0.3, $p=0.60$		χ^2 (1)=0.1, $p=0.75$		χ^2 (1)=16.7, $p<.001$	
Used in last month	1.3	0.7, 2.5	1.6	0.8, 3.3	1.3	0.5, 3.2	0.8	0.3, 2.6	**2.7**	1.7, 4.3

Note. CI, confidence interval; FM, factory made cigarettes; *OR*, odds ratio; RYO, roll-your-own cigarettes. [a]Odds ratios are adjusted for factors shown in table, as well as survey wave and recruitment cohort. Boldface odds ratios are statistically significant ($p<.05$). Survey wave and recruitment cohort were entered as covariates.

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were likely to believe pipes were the least harmful smoked product. For cigars, male smokers aged 40 or older living outside the United States, with high education and who used cigars in the last month were more likely to believe cigars were least harmful. Finally, for SLT relative risks, young male smokers living outside the United States with high income or who used SLT in the last month were likely to believe SLT was less harmful than cigarettes. Nicotine dependence, as assessed with the Heaviness of Smoking Index, was not consistently related to risk beliefs for any of the products.

Discussion

Three waves of data collected on representative samples of cigarette smokers in four countries indicated low but significant concurrent use of other tobacco products (cigars, pipes, SLT) and cigarettes. Significant minorities of cigarette smokers used RYO cigarettes exclusively, and an additional percentage in each country concurrently used FM and RYO cigarettes. Some evidence indicates increases in RYO use over time in the United Kingdom, perhaps in response to differential taxation, given that RYO cigarettes are substantially less expensive than FM cigarettes (Office for National Statistics, 2005). Although some tobacco control advocates may have written off cigars as a fad of the 1990s, our data indicate that, among smokers, concurrent cigar use appears to be substantial and growing in three of the four countries examined. Given the known health risks of dual use of cigarettes and cigars, this finding should be alarming to health authorities.

The vast majority of smokers in all four countries reported that FM cigarettes and other forms of smoked tobacco were equally harmful. By contrast, relatively few smokers, among those aware of SLT products, viewed these products as less harmful than smoking. Given that no clear differences in harmfulness exist among smoked products for current smokers, but there are clear differences between smoked and smokeless tobacco, we focus our discussion on the minority who believe, without a strong scientific base, that some forms of smoked tobacco are less harmful and particularly on the very low levels of awareness that some smokeless products can be less harmful.

Beliefs about the relative harmfulness of some smoked products appear to depend significantly on whether one uses those products. For example, those who currently used cigars were 2.5 times more likely to rate cigars as the least harmful smoked tobacco product compared with those who did not use cigars. Similarly, those who used FM cigarettes exclusively were more likely to rate FM cigarettes as least harmful, RYO users were 1.8–2.9 times more likely to rate RYO as least harmful, and pipe users were 1.9 times more likely to rate pipes least harmful. These links were product specific; use of pipes was not associated with beliefs about RYO, for example. This finding might be seen as a class of self-exempting belief, but one cannot be sure whether smokers choose to use some smoked tobacco products they perceive to be safer, or whether they perceive the products as safer because they use them.

An interesting age difference was seen in beliefs about product harmfulness—younger smokers were more likely to believe cigarettes (both FM and RYO) and SLT to be the safer forms of tobacco, whereas older smokers were more likely to nominate pipes and cigars. This difference may relate to advice provided by physicians in the past for cigarette smokers to switch to pipes or cigars if they were unwilling to quit (Anonymous, 1967; Stuttaford, 2005). Country of residence appears to relate to both use of other tobacco products and beliefs about the relative harms of those products. In the United States, smokers were less likely overall to hold beliefs that some tobacco products might be less harmful, perhaps related to strong public communications to this effect from some public health agencies (e.g., Carmona, 2003). More needs to be done, especially in Australia and the United Kingdom, to inform smokers that all forms of smoked tobacco are similarly harmful. Some of this effort needs to be targeted at young smokers, as they tended to believe RYO and cigars to be less dangerous.

We now turn to the extremely low levels of awareness that some forms of SLT are less harmful than cigarettes. Here we focus our analysis on the situation in the United States and to a lesser extent Canada, given that in Australia and the United Kingdom most SLT is banned and, in this context, lack of public understanding is less concerning. (However, such public ignorance will work against efforts to lift bans on the less harmful forms of SLT in those countries.) Current SLT users were 2.7 times more likely to report SLT was less harmful than cigarette smoking. U.S. smokers were least likely to believe that some SLT is less harmful, even though it is an available option for them. Why do U.S. smokers hold such beliefs, given that the product is available? In our opinion, it demonstrates a major failing of public education about the relative harms of tobacco products.

Current public health messages, particularly in the United States, stress that no tobacco product is safe (e.g., www.cdc.gov/tobacco). Although this message is literally true, easily communicated, and may account for why U.S. smokers are more likely to see all products as equally harmful, it is misleading insofar as it implies that all products *are* equally harmful. It is notable that this message has been

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adopted by the cigarette industry (Kozlowski & Edwards, 2005). Given the low proportion of smokers who understand the real risk profiles of the various products, this approach has resulted in the systematic miseducation of smokers. Smokers are interested in relative risks, as the experience with filtered and light cigarettes has shown, even if the perceived risk reductions cannot be confirmed by epidemiological data (Kozlowski & Edwards, 2005). Often, personal experience is enough to "confirm" the difference in products. Light cigarette smokers, for example, may believe light cigarettes are safer because they "feel" lighter on their chests (Kozlowski et al., 1998).

We can see this personal experience effect in the rankings of harmfulness in the current data, where use of the product made one more likely to nominate it as less hazardous. Yet many smokers are likely to be deterred from trying SLT given the lack of accurate information about relative risks (and in other countries smokers are unable to try SLT because it is banned). Hence, smokers are systematically being prevented from making informed choices because they lack key information. This holds true independent of whether they could or would make such choices if they were adequately informed. We accept that the alternative explanation, of a self-serving bias among users, can explain some of the findings, as the effect exists for the not much, if at all, less harmful other smoked products. It would be surprising if genuine information was not driving some of the differences as a function of experience of use.

Public health officials might consider moving to a more nuanced message wherein the particularly high risks of combusted products are stressed. Nuanced health messages are difficult to construct and deliver and may be difficult for the public to comprehend, but smokers have a right to be informed about health effects of products (Kozlowski, 2002; Kozlowski & O'Connor, 2003) and that some tobacco products are less hazardous than others (e.g., smokeless versus combusted), whereas others are effectively equally hazardous (e.g., FM and RYO cigarettes, pipes, cigars). This might involve explicit acknowledgement that SLT is less harmful than cigarettes but still carries risks and is not a product to choose unless one is already a smoker.

This agenda will be threatening to some in public health who are rightly concerned that such efforts could be interpreted as approval of SLT use in general. Of course, health educators will need to ensure that their messages are not interpreted as meaning that some tobacco products are safe, or that nonusers of tobacco should feel safe in adopting SLT use. From a public health point of view, there is no doubt that zero tobacco use would be best (Levy et al., 2006; Stratton, Shetty, Wallace, & Bondurant, 2001). However, we believe that the current inaction supports the interests of the cigarette industry and that the risk of encouraging SLT use needs to be viewed in light of the (to us) far greater risk of continued smoking. Strong epidemiological evidence from Sweden has shown that snus use is associated with a reduced risk of becoming a daily smoker and an increased likelihood of stopping smoking (Furberg et al., 2005; Ramstrom & Foulds, 2006; Rodu, Nasic, & Cole, 2005). Other evidence indicates that concurrent SLT use is not increased with the implementation of workplace smoking bans (Mumford, Levy, Gitchell, & Blackman, 2005). As we noted earlier, getting the message right may be a challenge, but we believe there is no alternative but to try, if for no other reason than all citizens have the right to know the truth about issues that concern their health (Kozlowski, 2002). This is especially true as novel products are introduced that may foster misperceptions of safety (O'Connor, Hyland, Giovino, Fong, & Cummings, 2005; Stratton et al., 2001).

Our findings are subject to certain limitations. The data are a compilation of three waves collected over 3 years among both cohort and replenishment participants, which could introduce some bias in terms of representativeness (i.e., some respondents answered the items multiple times, others only once). Although we attempted to correct for this problem statistically, care should be taken in using the prevalence estimates as exact figures for the respective populations. Second, because the study was restricted to people who smoked cigarettes (of some form) at recruitment, we cannot address the views held by exclusive users of other tobacco products. Third, with respect to SLT, we asked whether some forms were less harmful—we do not know about beliefs concerning the relative risks of different forms of SLT. We also do not know if the amount of use of some products relates to beliefs, given that we assessed only last-month use of cigars, pipes, and SLT and do not have estimates of the quantities or frequency with which these smokers were using these products. However, given the lack of association between beliefs and dependence, we doubt level of use is an important feature. The question used in the present study related to harmfulness of the products in general and did not probe about harm to the respondents themselves, nor about the harmfulness of switching to, or dual use of, these other products, which might have led to different responses. This area would be a fruitful one for future investigation. However, we also have no knowledge of the strength with which smokers hold the beliefs they do, nor whether they think their beliefs are supported by scientific evidence. Finally, we have not tested

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whether beliefs lead to changes in type of tobacco used. Future work will examine whether smokers holding beliefs about reduced risks of products they do not currently use are more likely to switch to those products and how this effects quitting.

In conclusion, a small minority of smokers in these four countries concurrently use other tobacco products such as pipes, cigars, and SLT, and the use of RYO cigarettes is increasing in the United Kingdom. Some smokers believe that differences exist in the health risks of various smoked tobacco products, whereas a smaller percentage see differences in health risk between cigarettes and SLT. These beliefs were related to sociodemographics (age, sex, education, and income) and product use, but not to nicotine dependence. Health education efforts are needed to correct smokers' incorrect beliefs about consequential risk differences among smoked tobacco products, and the lack of risk difference between cigarettes and SLT.

Acknowledgments

This research was funded by National Cancer Institute grants (from the Roswell Park Transdisciplinary Tobacco Use Research Center, CA111236, and from CA100362), the Canadian Institutes for Health Research, the Australian National Health and Medical Research Council, the Australian Commonwealth Department of Health and Aging, Cancer Research UK, the Centre for Behavioural Research and Program Evaluation of the National Cancer Institute of Canada/ Canadian Cancer Society, the Canadian Tobacco Control Research Initiative, and the CIHR Strategic Tobacco Research Training Program.

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