

Original Investigation

The Appeal of Smokeless Tobacco Products Among Young Canadian Smokers: The Impact of Pictorial Health Warnings and Relative Risk Messages

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Abstract

Introduction: Although the health risks from smokeless tobacco (ST) are lower than cigarettes, it remains unclear how smokers might use ST products, including as a substitute, a cessation aid, or concurrently with cigarette use, if at all. Additionally, there is little evidence examining the impact of health warning labels (HWL) on ST use and perceptions.

Methods: The current study investigated perceptions of ST products with and without HWL and a relative health risk (RHR) message. The study consisted of a full-factorial “between-subjects” experiment in which 3 HWL and a RHR message were systematically varied. Canadian smokers aged 18–30 years ($N = 611$) completed an online survey where they viewed four brands of ST packages altered according to the experimental conditions.

Results: Approximately half of the smokers indicated that they were willing to try ST as a substitute and to help quit smoking. More than one quarter (28%) of smokers were unaware that using ST is less harmful than smoking. Pictorial HWL increased false beliefs about the RHR of ST and decreased smokers’ willingness to try ST, whereas text warnings did not. Adding a RHR message communicating the lower risk of ST compared with cigarettes increased willingness to try ST when added to text HWL but decreased willingness to try ST even further when added to pictorial HWL.

Conclusions: The findings indicate relatively high levels of appeal for ST among young adult Canadian cigarette smokers. Pictorial HWL reduced the appeal of ST products and increased perceived risks, including the false belief that ST is equally harmful as cigarettes. Further research could consider evaluating designs of HWL on ST products that better balance absolute and RHR.

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Introduction

Conventional cigarettes remain the dominant tobacco product in North America and are responsible for the vast majority of the tobacco-related health burden. However, most of the recent product innovation in the tobacco industry has focused on non combustible or “smokeless” tobacco (ST) products. Traditional “spit” chewing tobacco still claims the largest market share, but newer forms of “spitless” ST contained in pouches and compressed tobacco lozenges are being introduced to market. These products are being marketed mostly toward current cigarette smokers either as an alternative to cigarettes or for the purposes of dual smokeless and cigarette use (Hatsukami, Ebbert, Feuer, Stepanov, & Hecht, 2007; Polito, 2004).

Newer forms of smokeless products have been positioned by the tobacco industry as potentially less harmful alternatives to smoking, including the heat-pasteurized, teabag-like Swedish-style snuff known as “snus.” Although all smokeless products present a serious risk to users, they are significantly less harmful than combustible products, which release dozens of toxins during combustion (Levy et al., 2004; Stratton, Shetty, Wallace, & Bondurant, 2001; Tobacco Advisory Group of the Royal College of Physicians, 2002). For example, newer smokeless products that have undergone heat pasteurization to reduce formation of carcinogenic nitrosamines are estimated to be more than 90% less hazardous than conventional cigarettes (Hatsukami et al., 2007). Indeed, Star Scientific recently filed applications with the U.S. Food & Drug Administration for approval to market the Ariva and Stonewall tobacco lozenges as “modified risk” tobacco products under the Family Smoking Prevention and Tobacco Control Act of 2009 on the basis of very low nitrosamine (Star Scientific Inc., 2010).

Some within the public health community have endorsed the use of ST products for the purpose of harm reduction.

According to harm-reduction proponents, established smokers who are unable to achieve tobacco abstinence could be encouraged to switch to smokeless products on the basis of reduced risk. Smokeless products may also be more acceptable to smokers for the purposes of long-term use compared with nicotine replacement therapy (NRT), such as the nicotine patch or gum. Compared with NRT, ST typically delivers nicotine to the bloodstream more rapidly than pharmaceutical NRTs (Bates et al., 2003). Smokeless products may also have promise as a cessation aid to help transition cigarette smokers into tobacco abstinence (Fagerström & Ramström, 1998; Ramström, 2002; Rodu & Phillips, 2008; TEMO, 2001). For example, a recent clinical trial found that snus was preferred over, reduced cravings more, and had fewer side effects than nicotine gum (Caldwell, Burgess, & Crane, 2010).

However, the extent to which smokeless products might serve as an effective harm-reduction product is highly contentious (Britton, 2008; Foulds & Kozlowski, 2007; Gartner et al., 2007; Hatsukami et al., 2007; Macara, 2008; Meija, Ling, & Glantz, 2010; Physicians for a Smoke-free Canada, 2007). First, it is not clear whether established smokers would actually switch to smokeless products. This is particularly pertinent to countries, such as Canada, where the use of smokeless products is very low: Fewer than 1% of Canadians report current use of ST (Health Canada, 2003), and less than 1% use ST and cigarettes concurrently (O'Connor et al., 2007). Even if this was the case, increases in youth uptake, along with the potential for smokeless users to transition to cigarettes, have the potential to offset the public health benefit from smokers switching to smokeless products. Finally, use of smokeless products by smokers may actually sustain long-term cigarette use among smokers by making nicotine available to smokers during periods of forced abstinence, such as workplace smoking restrictions, which might otherwise result in cessation. Thus far, smokeless products have not widely been promoted by the public health community as a lower risk alternative to cigarettes or an aid to reduce smoking for those trying to quit.

The extent to which smokers perceive smokeless products as less harmful is likely to influence their willingness to use ST products (Romer & Jamieson, 2001; Weinstein, 1999). However, the health risk posed by smokeless products is consistently overestimated relative to the risk of smoking cigarettes (Haddock, Lando, Klesges, Peterson, & Scarinci, 2004; O'Connor, Hyland, & Giovino, 2005; O'Connor et al., 2007; Smith, Curbow, & Stillman, 2007; Tomar & Hatsukami, 2007), and studies have shown that misperceptions about health risk are commonly cited by smokers as reasons for not considering switching to ST (Geertsema, Phillips, & Heavner, under review; Heavner, Rosenberg, & Phillips, 2009).

Product health warning labels (HWL) are among the most direct and cost-effective means of communicating the risk of tobacco products. Evidence on the effectiveness of health warnings on cigarette packages indicates that prominent health warnings increase perceptions of risk, promote smoking cessation, and may lower brand appeal; picture warnings on cigarettes are consistently found to be more effective than text warnings (Fong, Hammond, & Hitchman, 2009). In contrast to the vast body of evidence on the effectiveness of HWL for cigarettes (Hammond, 2009), there is little evidence on the impact and

effectiveness of ST HWL. Given that smokeless products have different constituents, patterns of use, and health effects, it is largely unknown whether pictorial warnings on smokeless products would have a greater or lesser impact than pictorial warnings on cigarette products.

Several studies commissioned by Health Canada have examined the impact and effectiveness of ST HWL (Health Canada Tobacco Control Programme [HCTCP], 2007; Les Études de Marché Créatec + [Créatec], 2003). The existing research on ST HWL has been largely limited to examining the actual message in terms of attitudes about the message, awareness and understanding, and credibility (HCTCP, 2007; Les Études de Marché Créatec + [Créatec], 2003). One relatively old study examined the impact of ST text HWL on ratings of intentions to use the product and found that they had no impact (Brubaker & Mitby, 1990). In a study of college-aged smokers and nonsmokers that examined the effect of including pictorial HWL on three reduced-exposure products, including a ST, picture HWL resulted in lower ratings of product appeal and safety (Stark, Kim, Miller, & Borgida, 2008).

At present, there is a lack of even basic information about smokeless products in Canada, including how current smokers perceive ST products, whether Canadian consumers are interested in trying ST, and if so, for what purpose. A survey of U.S. adult smokers found that three quarters of smokers were not at all interested in completely replacing cigarettes with an ST thought to be less harmful than cigarettes (Timberlake, 2009). In contrast, in a survey of a national sample of smokers in New Zealand, one third were interested in trying smokeless products when asked to assume that they were far less harmful than cigarettes (Wilson, Borland, Weerasekera, Edwards, & Russell, 2009).

The current study examined perceptions and appeal of ST products among young adult Canadian smokers. The study also examined the impact of adding text and pictorial HWL as well as a relative health risk (RHR) message to the HWL. To our knowledge, this research is the first to examine perceptions of ST products among young adult Canadian smokers and the first published study to examine the impact of pictorial HWL on ST products.

Methods

The study consisted of a 2 × 3 factorial “between-subjects” experiment in which four HWL and a RHR message were systematically varied. Participants completed an online survey where they viewed a series of four standard ST packages that had been photographed and digitally altered according to six randomly assigned conditions: (a) no HWL, (b) RHR message, (c) text HWL, (d) text HWL and RHR message, (e) picture HWL, and (f) picture HWL and RHR message—see Figure 1.

Smokeless Tobacco Products

Four photographed ST packages were displayed: *duMaurier* snus, *Marlboro* snus, *Copenhagen* snuff, and *Ariva* lozenge—see Figure 2a. The *duMaurier* and *Copenhagen* products were available in Canada at the time of the study, whereas *Marlboro* snus and *Ariva* were unavailable and were purchased in the United



Figure 1. Sample package conditions assigned randomly to participants.

States. *Marlboro* was selected given its globally recognized brand, while *Ariva* was selected based on its unique character as a dissolvable lozenge and its potential appeal to smokers. Any existing health warnings and health information were digitally removed. The packages were then digitally modified by adding the HWL and RHR message according to experimental condition. The display order of the ST products was counterbalanced across respondents within each condition so that the ordering of product brand viewed was random.

Health Warnings

Four distinct pictorial HWL were selected and modified according to condition from a Health Canada commissioned study to test ST HWL (HCTCP, 2007)—see Figure 2b. The display order of the warnings was counterbalanced across respondents within each condition so that the order of warning message viewed was random.

Relative Health Risk Message

The RHR message read, “Using ST is less harmful than smoking cigarettes.” Given that the current study was being conducted with cigarette smokers, the RHR message focused

upon known differences in health risk between ST products and cigarettes. No claims were included regarding the magnitude of difference in risk, given that the health risks posed by different ST products vary considerably. Furthermore, no specific references were made to the health risks of ST products on their own, given that this information was communicated in the “main” health warnings that were systematically varied across conditions.

Participants

Participants consisted of 611 Canadians aged 18–30 years who were current cigarette smokers at the time of recruitment. Current smokers fulfilled two criteria: (a) smoking at least once per month and (b) smoking at least 100 cigarettes in their lifetime. Participants were recruited from the market panel of Global Market Insite, Inc. (GMI) (www.gmi-mr.com), a market research service that maintains a representative panel of more than 400,000 Canadians. GMI panel members were offered the opportunity to participate in the survey via E-mail containing a link to the online survey. Participants received an equivalent of at least \$2.50 Canadian from GMI depending on the length of time taken to complete the survey.

Appeal of smokeless tobacco products

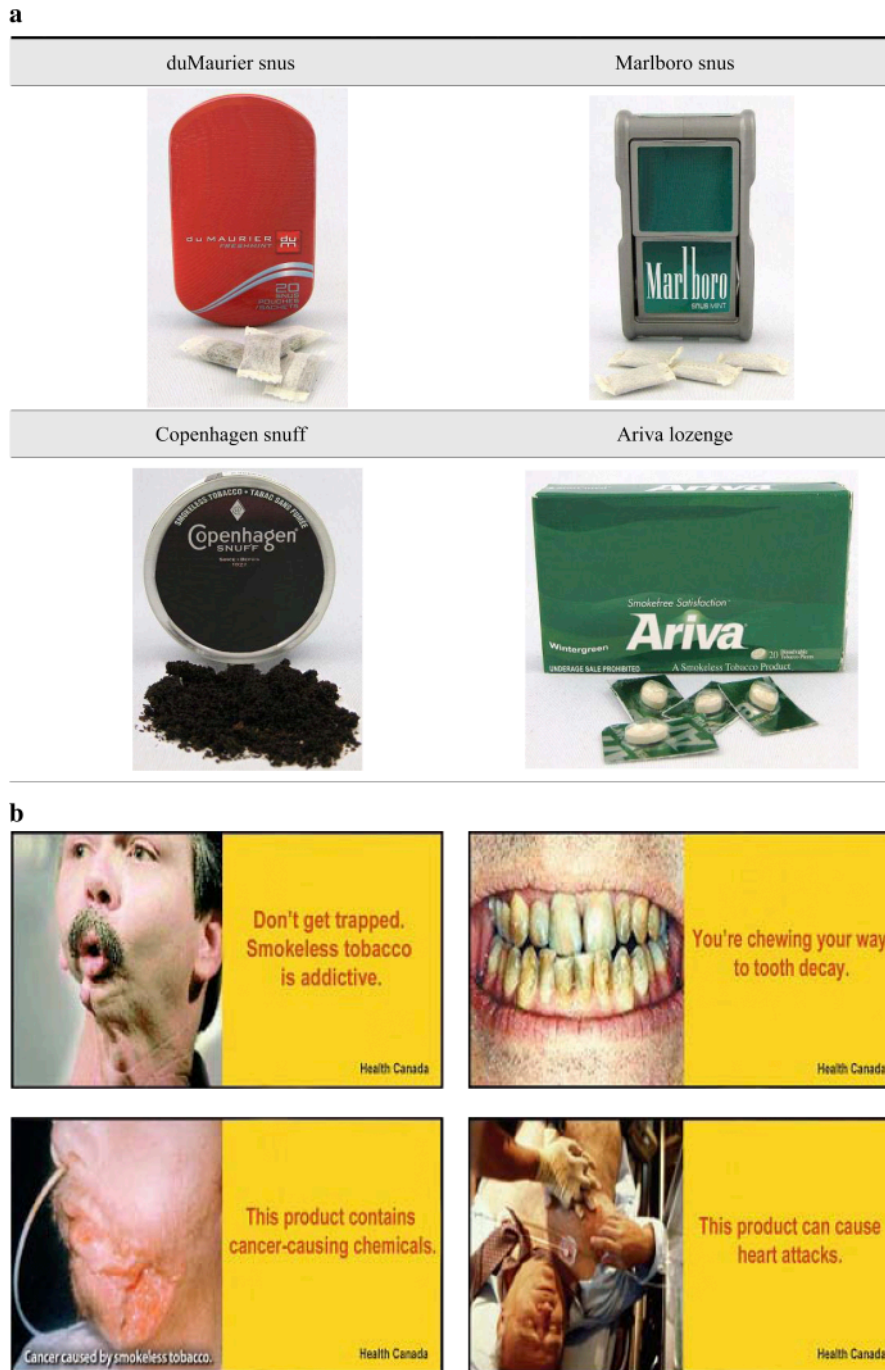


Figure 2. (a) “Standard” smokeless tobacco products displayed to respondents. (b) Pictorial health warnings.

Measures

Participants specified their gender and were asked to identify their ethnicity, education and income levels, smoking status (daily/weekly/monthly), and quit intentions according to the methodology of the International Tobacco Control Policy Evaluation (Four-Country) Survey (Thompson et al., 2006). The Heaviness of Smoking Index (HSI), an accurate measure of level of nicotine dependence (Chabrol, Niezborala Chastan, & de Leon, 2005), was calculated by summing the scores of two categorical variables: number of cigarettes smoked per day and

the time in minutes between waking and the first cigarette of the day.

Product appeal was assessed by the question “Would this product appeal to people your age?” Responses were dichotomized to “Yes” (somewhat/a lot) and “Other” (not at all/unlikely/undecided). *Likelihood of future use* was assessed by the question “Overall, how likely would you be to try this product in the future?” Responses were dichotomized to “Yes” (probably/definitely) and “Other” (definitely not/probably not/undecided). Index measures for *product appeal* and *likelihood of*

future use were calculated where 1 = yes to at least one of the four products and 0 = other for all four products.

The five outcomes related to *willingness to try ST* were assessed by the responses (yes, no, and maybe) to the question “Would you be willing to try this product . . .” for five different reasons: (a) “In places where you can’t smoke cigarettes,” (b) “For the times when you don’t want to smoke around others,” (c) “To help quit smoking cigarettes,” (d) “As a long-term replacement for conventional cigarettes,” and (e) “To help you cut back the amount you smoke.” Responses were dichotomized to “Yes” (yes) and “Other” (no/maybe). Three indexes were then generated for reasons for use: (a) a product-specific index for answering “yes” to at least one of the five reasons for a specific product (e.g., Marlboro Snus), (b) a reason-specific index for answering “yes” for at least one of the four products for a particular type of use (e.g., “to help quit smoking cigarettes”), and (c) an overall index for answering “yes” to at least one of the five reasons for any of the four products.

Relative health risk beliefs were assessed by the responses to the question “In your opinion, how HARMFUL TO HEALTH is this product compared to regular cigarettes?” Responses were dichotomized to “less harmful” (a lot less harmful/somewhat less harmful) and “the same or more harmful” (no difference/somewhat more harmful/a lot more harmful). A dichotomous index measure was generated for answering “less harmful” to all four products.

Statistical Analyses

Regression models were used to test for differences between experimental conditions (HWL type and RHR message) as well as to examine the influence of covariates. Separate logistic regression models were constructed for *product appeal*, *likelihood of future use*, *willingness to try ST* (five outcomes), and *RHR beliefs*. Models were built in three steps. First, the main effects model was run with RHR message and WL type as the independent variables for each of the outcome variables listed above. In Step 2, the two-way interaction between WL type and RHR message was added to the main effects model and was retained in Step 3 if statistically significant at $p < .05$. In Step 3, the following covariates were added to the model: *gender*, *age*, *smoking status*, *ethnicity*, *income*, *education*, *HSI*, and *quit intentions*. All analyses were conducted using SPSS version 16.0.

Results

Table 1 shows participant characteristics by condition and overall. No significant differences were found between conditions, except in the case of age ($F = 3.47$, $p = .004$); mean age varied by <1.5 years between conditions.

Product Appeal

Overall, 53.0% of respondents indicated that at least one of the ST products would appeal to people their age. As Figure 3 shows, respondents reported that *duMaurier* would appeal most and *Copenhagen* would appeal least to those their age.

Figure 4 shows appeal ratings by experimental conditions for all four products together. The presence of a RHR message had no effect on the appeal of the ST products, but those who saw a picture HWL on the ST products had lower odds of rating

the products as appealing compared with those who viewed products with either a text (odds ratio [OR] = 0.33, 95% CI = 0.21–0.53) or no HWL (OR = 0.26, 95% CI = 0.16–0.41). Those who smoked weekly compared with daily (OR = 2.29, 95% CI = 1.20–4.36), ethnic minorities (OR = 2.04, 95% CI = 1.23–3.38), and those with high income (OR = 2.28, 95% CI = 1.35–3.83) were more likely to rate the ST products as appealing.

Likelihood of Future Use

Overall, 43.6% of respondents indicated that they were likely to try at least one of the ST products. Respondents said they would be most likely to try *Ariva* and least likely to try *Copenhagen*—see Figure 3. Both the RHR message and the HWL had an effect on the future likelihood that participants would use the ST products—see Figure 4. Participants who saw a RHR message on products had higher odds of reporting future use (OR = 2.04, 95% CI = 1.40–2.98), while those who saw a picture HWL had lower odds of reporting future use compared with those who viewed either a text (OR = 0.39, 95% CI = 0.24–0.62) or no HWL (OR = 0.27, 95% CI = 0.17–0.43). Ethnic minorities also had higher odds of reporting future use (OR = 1.66, 95% CI = 1.04–2.64). There was no significant interaction effect between RHR message and HWL type for future likelihood that participants would use the ST products.

Relative Health Risk Beliefs

Overall, 27.9% of respondents answered incorrectly that all four ST products were equally or more harmful to health than cigarettes. Depending on the product, between 30% and 47% of respondents incorrectly believed that ST and cigarettes are equally harmful, and a small proportion incorrectly believed that ST is more harmful than cigarettes. Respondents said *Ariva* was least harmful and *Copenhagen* was most harmful compared with cigarettes—see Figure 3.

Both the RHR message and the HWL had an effect on the odds of correctly reporting that ST products are less harmful than cigarettes—see Figure 4. Participants who saw a RHR message had higher odds of reporting correct beliefs about the health risk of ST compared with cigarettes (OR = 2.40, 95% CI = 1.47–3.92). Those who saw a picture HWL had lower odds of reporting correct beliefs compared with those who did not see a HWL (OR = 0.51, 95% CI = 0.29–0.92). Males (OR = 1.95, 95% CI = 1.19–3.17), those with moderate education (OR = 1.99, 95% CI = 1.07–3.68), and those with high income (OR = 2.13, 95% CI = 1.09–4.15) had higher odds of reporting correct beliefs. There was no significant interaction effect between RHR message and HWL type for odds of correctly reporting that ST products are less harmful than cigarettes.

Willingness to Try Smokeless Tobacco

Respondents were asked whether they would be willing to try each of the four ST products for five different reasons. Table 2 shows that in general *Ariva* was most preferred by respondents, followed by *duMaurier* and *Marlboro*, whereas *Copenhagen* was least preferred. Overall, at least 95% of respondents answered “yes” or “maybe” to at least one of the five questions about willingness to try any of the four ST products.

About half of the respondents were willing to try at least one of the four STs for the times when they cannot smoke (48.9%),

Table 1. Characteristics of Young Adult Smokers Sample by Experimental Condition and Overall (n = 611)

	Experimental condition						Overall (n = 611)
	1 (n = 100)	2 (n = 100)	3 (n = 106)	4 (n = 104)	5 (n = 99)	6 (n = 102)	
Gender							
Women (%)	49.0	60.0	61.3	49.0	52.5	49.0	53.5
Men (%)	51.0	40.0	38.7	51.0	47.5	51.0	46.5
Age, mean (SD)	24.6 (3.16)	25.6 (3.24)	24.9 (3.49)	25.5 (3.37)	24.1 (3.33)	24.3 (3.26)	24.8 (3.35)
Smoking status (%)							
Daily	74.0	81.0	68.9	77.9	72.7	74.5	74.8
Weekly	19.0	12.0	21.7	14.4	15.2	10.8	15.5
Monthly	7.0	7.0	9.4	7.7	12.1	14.7	9.7
Ethnicity (%)							
White	79.0	75.0	72.6	77.9	78.4	77.5	76.7
Minority	21.0	25.0	27.4	22.1	21.6	22.5	23.3
Income (%)							
Low	22.4	26.8	27.5	19.8	21.9	29.0	24.6
Moderate	37.8	33.0	29.4	44.6	29.2	33.0	34.5
High	36.7	40.2	36.3	30.7	44.8	36.0	37.4
Not given	3.1	0	6.9	5.0	4.2	2.0	3.5
Education (%)							
Low	29.3	27.0	28.3	26.9	31.3	28.4	28.5
Moderate	51.5	55.0	38.7	48.1	43.4	46.1	47.1
High	19.2	18.0	33.0	25.0	25.3	25.5	24.4
HSI (%)							
0	33.7	20.2	34.0	21.7	29.3	25.0	27.4
1	10.5	11.7	11.7	18.5	12.0	14.1	13.1
2	22.1	13.8	23.4	27.2	21.7	21.7	21.6
3	13.7	31.9	19.1	13.0	19.6	22.8	20.0
4	16.8	16.0	7.4	14.1	12.0	10.9	12.9
5	3.2	6.4	4.3	5.4	5.4	5.4	5.0
6	0	0	0	0	0	0	0
Quit intention (%)							
Within 1 month	19.0	17.0	17.0	18.3	30.3	23.5	20.8
Within 6 months	29.0	30.0	25.5	28.8	20.2	23.5	26.2
Beyond 6 months	38.0	39.0	34.9	32.7	37.4	36.3	36.3
Not planning to quit	9.0	9.0	17.0	16.3	9.1	12.7	12.3
Not given	5.0	5.0	5.7	3.8	3.0	3.9	4.4
Ever tried ST (%)	18.0	18.0	23.6	13.5	13.1	17.6	17.3
Ever tried NRT (of those aware, %)	41.8	59.4	47.5	46.9	50.5	50.5	49.4

Note. HSI = Heaviness of Smoking Index; NRT = nicotine replacement therapy; ST = smokeless tobacco.

when they do not want to smoke around others (47.6%), to help cut back (48.8%), and to help quit (48.1%). About one third (31.7%) of the respondents were willing to try at least one of the four STs as a long-term replacement for smoking.

Both the RHR message and the HWL had an effect on willingness to try ST. Compared with no HWL, pictorial HWL decreased willingness to try ST for four of the five reasons examined: when they do not want to smoke around others (OR = 0.59, 95% CI = 0.38–0.92), to help cut back (OR = 0.52, 95% CI = 0.33–.80), to help quit (OR = 0.54, 95% CI = 0.34–0.84), and as a long-term replacement for smoking (OR = 0.36, 95% CI = 0.21–0.59) but not for substitution where they cannot smoke. Compared with text HWL, pictorial HWL also decreased willingness to try ST as a long-term replacement (OR = 0.39, 95% CI = 0.24–0.66).

There was a consistent trend toward decreased willingness to try ST for all five reasons as the HWL severity was increased from none, to text, to pictorial. The RHR message was only associated with higher willingness to try ST as a cessation aid (OR = 1.47, 95% CI = 1.03–2.12).

There was a significant interaction between RHR message and HWL type for willingness to try ST as a substitute where they cannot smoke such that pictorial HWL with RHR were associated with the lowest willingness to try ST ($\chi^2 = 7.05, p = .03$). Ethnic minorities had higher odds of willingness to try ST as a long-term replacement for smoking (OR = 1.70, 95% CI = 1.06–2.73). Those with moderate income had higher odds of willingness to try ST as a substitute where they cannot smoke (OR = 1.73, 95% CI = 1.06–2.84). There was an overall significant effect of quit intention on willingness to try ST as a

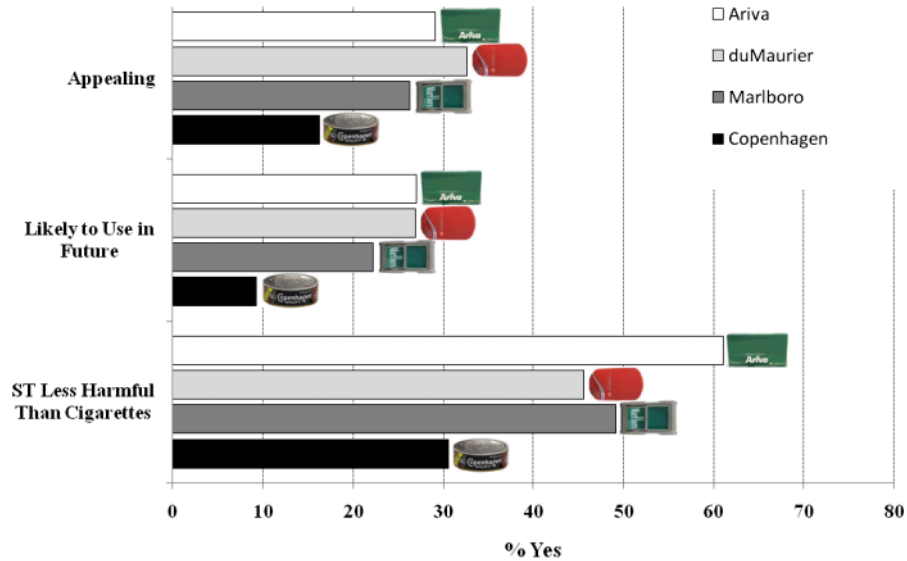


Figure 3. Proportion of young adult smokers responding “yes” to questions regarding four smokeless tobacco products across health warning label conditions.

substitute where they cannot smoke ($\chi^2 = 11.15, p = .03$) but no effect at the contrast level. Those planning to quit smoking beyond six months had higher odds of willingness to try ST as a cessation aid ($OR = 1.89, 95\% CI = 1.15-3.11$).

Discussion

To our knowledge, this research is the first to examine perceptions of ST products among Canadian smokers. The findings indicate that many smokers are unaware of the lower health risk of ST relative to smoking. Despite this, approximately half of young adult Canadian smokers were open to using ST for the times when they cannot smoke, for the times when they do not want to smoke around others, to help cut back smoking, to help quit smoking, and as a long-term replacement for cigarettes.

This study is the first published study to examine the impact of pictorial HWL on ST products. Pictorial HWL increased the false belief that ST products were equally harmful as cigarettes, whereas text HWL did not. This is not surprising, given that cigarette packages in Canada have carried similar pictorial HWL since 2000 (at time of publication). In other words, placing health warnings on smokeless products that are similar in size and appearance to those on cigarette products is likely to promote similar levels of perceived risk, particularly given the lack of accurate information from other sources on the relative risk of smokeless products compared with cigarettes.

Health warnings also reduced young adult Canadian smokers’ willingness to try ST. Pictorial warnings significantly decreased willingness to try ST, whereas the decrease resulting from text warnings was modest. This finding is consistent with research on cigarette HWL. Pictorial HWL on cigarette pack-

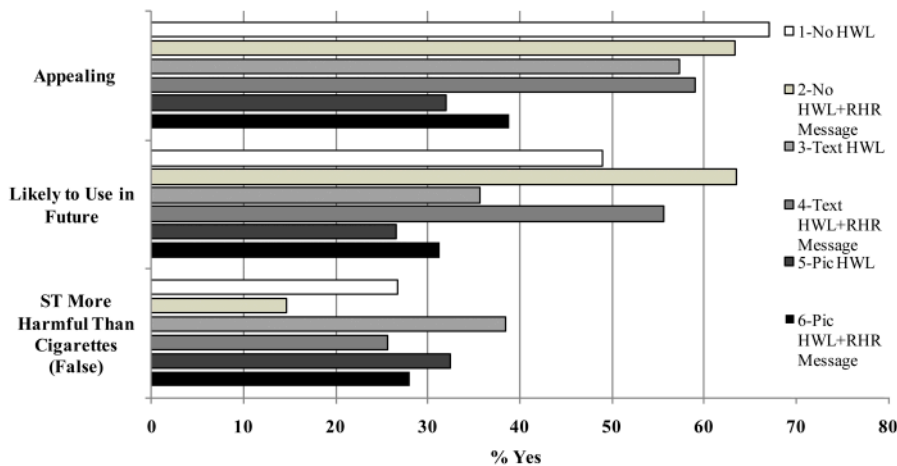


Figure 4. Proportion of young adult smokers responding “yes” to questions regarding four smokeless tobacco products between health warning label conditions.

Table 2. Proportion of “Yes” Responses to At Least One of Five Specific Questions Regarding Willingness to Try the Smokeless Product for Five Reasons^a

Condition					% at least one “yes” for all four products, for any of five reasons
	duMaurier	Marlboro	Copenhagen	Ariva	
	% yes	% yes	% yes	% yes	% yes
1-No HWL	46.8	44.8	17.3	53.7	73.3
2-No HWL + RHR	53.1	44.1	27.4	55.2	73.0
3-Text HWL	42.4	39.2	19.4	47.0	67.4
4-Text HWL + RHR	48.0	45.8	22.0	54.5	74.2
5-Pic HWL	39.6	34.1	20.4	40.4	55.4
6-Pic HWL + RHR	30.2	30.0	15.8	35.0	53.8
Overall	43.4	39.6	20.3	47.6	66.3

Note. HWL = health warning labels; RHR = relative health risk.

^aPercentage of smokers willing to try product for at least one of the following reasons: (a) “In places where you can’t smoke cigarettes,” (b) “For the times when you don’t want to smoke around others,” (c) “To help quit smoking cigarettes,” (d) “As a long-term replacement for conventional cigarettes,” or (e) “To help you cut back the amount you smoke.”

ages have been shown to increase perceptions of harm and reduce brand appeal (e.g., Thrasher et al., 2007). Previous research examining the effect of pictorial HWL on reduced-exposure products including ST found that smokers and nonsmokers rated products with pictorial HWL as more harmful (Stark et al., 2008). The notion that smokers are less willing to try a product in place of cigarettes that they perceive to be equally or more harmful is reflected in studies examining smokers’ reasons for not considering switching to ST (Geertsema et al., under review; Heavner et al., 2010).

Relative risk messages on HWL had mixed effects depending on whether the message was added to a pictorial or text HWL. Willingness to try ST products increased when the RHR message was added to packages with text warnings but decreased when placed on packages with pictorial warnings. However, for all five “reasons for trying,” the increase in willingness to try ST related to the risk message in text warnings was not statistically significant. Therefore, the RHR message appeared to “offset” the effect of text HWL in reducing willingness to try the ST products, whereas the opposite occurred with pictorial HWL: The RHR message boosted the effect of pictorial HWL in reducing willingness to try the ST products. When an ST package carried a pictorial warning, participants may have focused more on the risk of ST rather than on the lower risk of ST relative to smoking as communicated by the RHR message.

The current findings highlight the need to effectively communicate accurate information about the RHRs of ST and cigarettes. It should be noted that there are many alternative relative risk messages to the one examined in the current study. Future research should examine whether messages with different wording

have a differential impact on perceptions of smokeless products when paired with either a text or a pictorial health warning. It may, therefore, be possible to construct a HWL label that both enhances general perceptions of risk for smokeless products at the same time as reinforcing the lower relative risk compared with cigarettes. Communication of the RHRs of ST and cigarettes could also take place through public health professionals and opinion leaders and even at point of sale as has been suggested by Heavner, Rosenberg, Tenorio, and Phillips (2010).

Study Strengths and Limitations

The current study has several limitations. First, the sample of young adult smokers may not be representative of all young adult Canadian smokers. The sample was obtained from an online panel, all of whom had Internet access. As a result, the current sample may have underrepresented smokers from lower socioeconomic levels. Another limitation is that only current smokers were included in the sample. The current study was designed to examine appeal of ST among young adult smokers, given that young adult smokers may be the best candidates for switching to ST from a harm-reduction perspective (Kozlowski et al., 2003; Ramström, 1990). However, current smokers represent only one dimension of the harm-reduction equation. It is critically important to also study how nonsmokers and former smokers perceive ST before it can be regarded as a harm-reduction product. In light of this limitation, future studies should investigate former smokers’ and particularly nonsmokers’ perceptions of ST as well as how they might use these products, if at all. Previous research has called for such investigations (Hatsukami et al., 2007), including research to examine the

effect of communicating the RHR of tobacco products (Zeller, Hatsukami, & Strategic Dialogue on Tobacco Harm Reduction Group, 2009), and the potential ill effects of promoting ST in tobacco harm reduction (Kozlowski, 2007; Tomar, 2007).

Combining a strong pictorial warning with a RHR message communicating the lower risk of ST compared with cigarettes may have sent conflicting messages to participants and may have undermined the effectiveness of the RHR message. Future studies could test the credibility of the RHR message, the warning message, as well as their credibility together on ST products. Finally, the measures of appeal and likelihood of use were based only on a picture of each ST product. Although this represents a considerable improvement over responses to survey questions alone, the sensory properties and physiological feedback from actual product use are likely to be the most important predictors of appeal and future use.

Conclusions

North American tobacco companies are aggressively marketing different forms of ST. To anticipate the potential public health impact of these products, it is essential to understand consumer perceptions, including among current tobacco users. The findings from the current study show relatively high levels of appeal for ST products and openness to trying ST products among young adult cigarette smokers in Canada. Further research is needed to determine if the high level of openness to trying ST found in this study will translate into actual use and, if so, whether increased ST use might alter cigarette consumption. The current study also suggests that pictorial warnings on ST products increase overall perceptions of risk and discourage use as intended. However, pictorial warnings also exacerbated the false belief that smokeless products are equally as harmful as conventional cigarettes. Regardless whether ST products serve as a harm-reduction product at the population level, greater efforts should be undertaken to promote more accurate perceptions of RHRs between tobacco products.

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Declaration of Interests

None declared.

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