Impact of health warning messages on smokeless tobacco products

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Tobacco remains the leading preventable cause of death in the world, and 5 million people worldwide continue to smoke. Further adding to the problem is the fact that smoking cessation rates are very low, and there are some smokers for whom quitting smoking is extremely difficult. Many smokers find nicotine replacement therapy (NRT) products unappealing, and even when used as directed NRTs only achieve modest cessation rates. Smokeless tobacco (ST) may be more appealing than NRT and deliver nicotine in a more palatable way to cigarette smokers. ST is also far less harmful than smoking. It is for these reasons that many scientists and health professionals have suggested the use of ST as a substitute for smoking to reduce tobacco-related harm.

Although the health risk posed by ST appears to be much less than conventional cigarettes, the extent to which ST may serve as a harm reduction product is highly contentious. Furthermore, although ST products are legal and widely available, it remains unclear whether conventional cigarette smokers in Canada will use ST products as a substitute for cigarettes or as a cessation aid, if at all. And despite the strong evidence for the effectiveness of cigarette warning labels, there is little research on ST health warning labels.

The current study investigated perceptions of ST products with and without HWLs and relative health risk messages among 611 young adult Canadian smokers aged 18-30. The study sought to examine the impact of ST health warning labels (HWLs) on appeal, willingness to use, and perceived health risk and addictiveness. Participants completed a survey during which they were asked to view and provide their opinions on a series of ST packages that were digitally altered according to each of six experimental conditions: (1) "standard" packages of leading ST brands, (2) "standard" packages + a relative risk message about the harm of cigarettes compared to ST added, (3) "Standard" packages + text HWL, (4) "Standard" packages + text HWL and relative risk message, (5) "Standard" packages + picture HWL, and (6) "Standard" packages + picture HWL and relative risk message.

The findings indicate that many smokers are unaware that ST is less harmful to health compared to smoking. Despite this, approximately half of young adult Canadian smokers indicated that

they were willing to try ST as a substitute for smoking and to help quit smoking. Picture warnings increased misperceptions about the health risk of ST and decreased smokers' willingness to try ST, whereas text warnings did not. Similarly, adding a relative health risk message to the warning label that communicates the lower risk of ST compared to cigarettes increased willingness to try ST when added to text warnings, and decreased willingness to try ST even further when added to picture warnings. This study is among the first to examine ST warning labels, and is the first to examine the impact of picture warning labels on ST. Overall, the findings suggest picture warnings may make it more difficult to communicate the differences in risk between ST and cigarettes.

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1.0 INTRODUCTION & OVERVIEW

Smokeless tobacco (ST) products have received increasing attention by the tobacco industry and public health community. In May, 2007 the Swedish-style ST known as snus was introduced on the Canadian market by BAT-Imperial Tobacco Canada using the popular "*du Maurier*" name and brand imagery. Other types of ST have been widely available on the Canadian market, including *Skoal*, *Copenhagen*, *Access*, and no legal barriers to their market introduction exist (PSC, 2007).

ST comes in various forms that are either placed in the mouth or inhaled, including a finely ground or shredded tobacco known as snuff that may be sold loose or in 'spitless' pouches, in dry and moist forms; compressed twist and plug forms, and loose leaf forms known as chewing tobacco; and newer dissolvable compressed powdered tobacco tablets (Hatsukami et al., 2007). All ST products pose significant health risks; however, ST products pose less risk than cigarettes. Some types of ST products, such as the "low-nitrosamine" Swedish style of snuff known as snus, are estimated to be at least 90% less hazardous than conventional cigarettes (Hatsukami et al., 2007).

Although the health risk posed by ST appears to be much less than conventional cigarettes, the extent to which ST may serve as a harm reduction product is highly contentious (Hatsukami et al., 2007; PSC, 2007). It remains unclear whether conventional cigarette smokers in Canada will use ST products as a substitute for cigarettes or as a cessation aid. There are also concerns that the use of ST products will increase in the absence of any reduction in combustible product use. Increases in the prevalence of ST products also have the potential to serve as "starter" products from which young people may transition to cigarettes and other "higher risk" products.

The current study investigated perceptions of ST products with and without health warning labels (HWLs) and relative health risk messages among young adult smokers aged 18-30 in Canada. Participants completed a survey during which they were asked to view and provide their opinions on a series of ST packages that were purchased and digitally altered according to each of six experimental conditions: (1) "standard" packages of leading ST brands, (2) "standard"

packages of leading ST brands with a relative health risk message about the harm of cigarettes compared to ST added, (3) "Standard" packages with text HWLs added, (4) "Standard" packages with text HWLs and a relative risk message added, (5) "Standard" packages with picture HWLs added, and (6) "Standard" packages with picture HWLs and a relative health risk message added.

The study sought to examine the impact of ST HWLs on cigarette smokers: (1) ST product appeal; (2) Intentions to use ST as well as openness to trying ST for a variety of reasons including use as a cessation aid, as a long-term replacement, a product for temporary abstinence, and in response to smoke-free policies; (3) Perceptions of the relative health risk of different types of ST, conventional cigarettes, and nicotine replacement therapy, (4) Beliefs about the relative addictiveness of ST, NRT, and cigarettes, and (5) Support for each of picture HWLs and relative health risk information on ST packages.

Overall, this study sought to expand the evidence base and address research gaps in this critical area, and has the potential to inform initiatives on the development of ST health warning labels in Canada, and elsewhere. The findings also provide important information on perceptions of ST products with respect to their potential use as a cessation, substitution or replacement product among young adult cigarette smokers.

2.0 LITERATURE REVIEW

Tobacco is the leading preventable cause of death in the world (WHO, 2008). Twenty-two percent of the world's adults smoke. By 2030, tobacco-attributable deaths are estimated to increase from 5.4 million in 2004 to 8.3 million, and comprise 10% of deaths globally. Developing nations will bear 80% of these deaths (WHOWHS, 2008).

Just less than 5 million Canadians, or about 19% of the population, were current smokers in 2006 (Health Canada, 2006). In 1998, smoking accounted for 22% of all deaths in Canada (47,581 deaths per year) (Makomaski & Kaiserman, 2004). In 2003, about 26% of Canadians above 15 years of age were former smokers (Health Canada, 2003).

2.1 Smokeless Tobacco

2.1.1 Background

Smokeless tobacco (ST) is a product that is receiving increased attention by both the public health community and the tobacco industry. There is general consensus that ST use is much less harmful to health than smoking cigarettes (Stratton, Shetty, Wallace & Bondurant, 2001; Tobacco Advisory Group of the Royal College of Physicians [TAGRCP], 2002; Levy et al., 2004). The use of ST as a harm reduction tool to reduce or eliminate cigarette smoking is still highly contentious among members of the public health community, but has gained some support. So far ST has not widely been promoted as a lower risk alternative to cigarettes, or an aid to reduce smoking for those trying to quit. Often, the health risk of ST compared to cigarettes is exaggerated by public health authorities and tobacco control advocates (Phillips, Wang & Guenzel, 2005). On the other hand, the tobacco industry may use ST to support current cigarette users and even recruit new ones (Hatsukami, Ebbert, Feuer, Stepanov, & Hect, 2007). Thus while there is general consensus that ST carries much less risk than smoking, STs role in tobacco control is still disputed (Foulds & Kozlowski, 2007; Gartner et al., 2007; Britton, 2008; Macara, 2008), and there is much less consensus on how to proceed with regards to ST product regulation, marketing, and promotion (Kozlowski, 2007; Tomar, 2007).

2.1.2 Patterns of Use

The use of ST varies depending on geographic location. In Sweden, approximately 23% of men use ST (i.e., snus) (Foulds et al., 2003), whereas fewer than 1% of Canadians used ST products including chewing tobacco or snuff in 2003 (Health Canada, 2003). In 2005, 3.2% of the United States (US) population aged 12 or older used ST products in the past month (SAMHSA, 2006). In the US, certain groups are known to have higher prevalence of ST use, including men, young adults, rural dwellers, those living in southern and western states, Caucasians, American Indians/Alaska Natives, and those with low education and blue-collar occupations (Marcus et al., 1989; CDC, 1991; Nelson et al., 1996; Howard-Pitney & Winkleby, 2002; Tomar, 2002).

2.1.3 Forms and Use

ST products come in numerous forms including moist and dry snuff, chewing tobacco, tobacco mixtures, dissolvable compressed powdered tobacco lozenges, and the Swedish style of snuff known as snus. The various forms of ST may be used either orally or nasally. ST products have also been described as “non-combustible oral tobacco products” (Hatsukami et al., 2007) to be more accurate and descriptive, but will continue to be referred to as ST in this paper.

Moist snuff is used orally. It consists of finely ground or shredded tobacco and may be sold loose or in small packets known as sachets or pouches. Moist snuff is administered by placing a portion between the cheek and gum. Dry snuff is used orally or nasally, and is sold as a fine tobacco powder. Chewing tobacco is sold in three main forms: twist, plug, and loose. It is used orally by placing a portion in the cheek. Moist snuff and chewing tobacco are commonly called “spit tobacco” after the method for ending product use. Tobacco may be mixed as well; Alaskan natives add the ash from a birch tree fungus to the tobacco leaves; spices and flavourings, areca nut, or lime may be mixed with tobacco leaves in India, Southeast Asia, and the United Kingdom (Hatsukami et al., 2007).

Newer forms of “spitless” moist snuff contained in pouches and tobacco lozenges are being marketed towards current cigarette smokers. Swedish snus is a smokeless form of tobacco contained in pouches that is made by heat treating the tobacco rather than fermenting, which

tends to decrease the amount of tobacco-specific nitrosamines (TSNAs) and moisture level in snus compared to other ST products, making it a low nitrosamine ST (LN-ST) (Hatsukami et al., 2007).

2.1.4 Toxicants

Smokeless tobacco is known to contain 28 carcinogens, including some TSNAs (Stepanov et al., 2006). The TSNAs arise from the tobacco curing, processing, and aging process, and are known to cause cancers of the oral cavity, esophagus, pancreas, and lung in laboratory animals. There are two TSNAs that have been linked to cancer most consistently and strongly: NNK [4-methylnitrosamino-1-(3-pyridyl)-1-Butanone] and NNN (N-nitrosonornicotine) (Hecht, 1988; Hecht, 1998).

There is a large range of TSNAs present in oral forms of ST in the United States (US), Sweden, and India. Within the US there are notable differences in TSNA levels between brands of oral ST and even among the same brands purchased at different locations (Hoffmann et al., 1994; CDC, 1999). Overall though, Swedish ST products have uniformly lower TSNA levels than their counterparts in the US, which may result to some extent from the GothiaTek® standards set and followed by Swedish snus manufacturers (Hatsukami et al., 2007).

Since the public health community is generally concerned with reducing the harm caused by smoking when considering LN-ST products, it is important to know whether the lower levels of TSNAs in these products result in lower uptake of these carcinogens in the human body than cigarettes, and whether switching from cigarettes to ST would result in decreased exposure to carcinogens. Only a handful of studies have explored this question.

The concentrations of total NNAL [4-methylnitrosamino-1-(3-pyridyl)-butanol] and NNAL glucuronides (NNAL-Glucs), which are NNK metabolites, are used as a biomarker for human levels of carcinogens. There was enormous variability in a synthesis of studies comparing concentrations of urine total NNAL in users of various ST products, cigarettes (Marlboro), and nicotine replacement therapy (Commit). Some ST products resulted in higher urine total NNAL

than cigarettes, while some were lower than cigarettes and comparable to the nicotine replacement therapy (which is considered relatively innocuous) (Hatsukami et al., 2007). Caution should be taken in switching to ST products from cigarettes, as not all products reduce TSNA exposure. The data is limited by the fact that some participants were regular ST users, while some switched to ST from cigarettes; only a few of the 28 known carcinogens in ST were measured; and the data are more than 20 years old and need updating.

Of the studies examining switching to a LN-ST, there can be significant decreases in exposure to carcinogens (Hatsukami et al., 2004; Hatsukami et al., 2007). Similarly, studies examining switching from cigarettes to lower nitrosamine ST show that there can be drastic reductions in exposure to carcinogens, including NNAL (Mendoza-Baumgart et al., 2007). Whether these reductions would translate into decreased risk for negative health outcomes is uncertain.

2.1.5 Health Effects

As with toxicant concentrations, the negative health effects of ST may depend on product type which in turn may be associated with the products country of origin (Foulds et al., 2003; Critchley & Unal, 2003). The potential adverse health effects associated with ST include cardiovascular diseases, metabolic disorders, reproductive deficits, and oral and extra-oral cancers. However, the evidence is mixed on the degree to which these diseases are attributable to ST, if at all in some cases.

In the 52-country INTERHEART study, an association was found between chewing tobacco and acute myocardial infarction (Teo et al., 2006). Two large US prospective cohort studies in the Cancer Prevention Study, CPS-I and CPS-II, found that chewing tobacco and snuff use were associated with and increased risk of coronary heart disease and cerebrovascular disease deaths (Henley et al., 2005). In a study of construction workers in Sweden, snus use was associated with increased all-kind cardiovascular mortality (Bolinder et al., 1994). In contrast, three population case-control studies (Huhtasaari et al., 1992; Huhtasaari et al., 1999; Hergens et al., 2005) and one nested case-control study (Asplund et al., 2003) of men in Sweden have found no association between snuff use and risk of myocardial infarction and stroke, respectively.

ST use has also been implicated in the development of metabolic disorders, though not consistently. In a population-based cohort study of the Västerbotten Intervention Programme in Northern Sweden, heavy Swedish snus use was found to be associated with increased risk for developing metabolic syndrome (Norberg et al., 2006). A study of glucose intolerance and tobacco use of men in Stockholm, Sweden found that heavy moist snuff use was associated with an increase risk of type 2 diabetes (Persson et al., 2000), whereas in a population-based sample of healthy men in Sweden moist snuff use was not found to be associated with diabetes or the metabolic syndrome (Wallenfeldt et al., 2001). Similarly, the large US Cancer Prevention studies, CPS-I and CPS-II, found no increased risk of type 2 diabetes associated with ST use (Henley et al., 2005).

ST use has been linked to negative health effects for mothers and their infants, as well as for reproductive health in the US, Sweden, and India. In a study of Swedish women who delivered singleton infants snuff use was found to be associated with increased risk of low birthweight, preterm delivery, and pre-eclampsia (England et al., 2003). Similary, in a study of Alaska Native pregnant mothers the use of Iqmik (a tobacco leaf and ash mixture) was found to be associated with indicators of neurobehavioural effects on infants (Hurt et al., 2005). For women in Mumbai (Bombay), India ST use during pregnancy was found to be associated with low gestational age and low birthweight of infant independent of gestational age (Gupta & Sreevidya, 2004), as well as increased risk of still-birth (Gupta & Subramoney, 2006). And for male patients undergoing infertility evaluations, chewing tobacco use was found to be associated with lower fertility (Said et al, 2005).

The data show some associations between ST use and extra-oral cancers. For example, in a study of men and women diagnosed with esophageal cancer in Assam, India, betel-quid chewing was found to be associated with increased risk for esophageal cancer (Phukan et al., 2001). The large US cancer prevention study (CPS-II) found that current use of snuff and chewing tobacco was associated with increased risk for all cancers combined, lung cancer, and liver cirrhosis (Henley et al., 2005). And two US case-control studies suggested an association for men but not women between chewing tobacco use and pancreatic cancer (Muscat et al., 1997) as well as renal cell

cancer (Goodman et al., 1986). Interestingly, a study of Norwegian men found an increased risk of pancreatic cancer for both current and former ST users (Boffetta et al., 2005). In contrast, two Swedish population-based case-control studies found no association between history of ST use and any type of gastric cancer (Ye et al., 1999), gastric cardia and esophageal cancers (Lagergren et al., 2000).

In October, 2004 the WHO's International Agency for Research on Cancer (IARC) working group gathered to discuss the risk of ST and related TSNAs. After reviewing the available evidence the IARC working group concluded that ST is "carcinogenic to humans" (Cogliano et al., 2004).

A narrative systematic review of the literature examining the health risks associated with ST use concluded that in India betel-quid chewing was associated with a large risk of oral cancers, with approximately 10,000 deaths per year attributable to ST (Critchley & Unal, 2003). Similarly, in a US study ST users had an increased risk of cancer of the mouth and gums, pharynx, and salivary glands (Stockwell & Lyman, 1986). In another study of women in North Carolina, heavy snuff users were at much increased risk of death from oral cancers (Winn, Blot, & Shy, 1981). But in two Swedish case-control studies snuff users had no increased risk of oral cancers (Lewin et al., 1998; Schildt et al., 1998).

ST is found to be associated with several diseases of the teeth and gums, including gingival recession (Robertson et al., 1992; Robertson, Walsh & Greene, 1997) and soft tissue lesions (Grasser & Childers, 1997; Tomar et al., 1997; Martin et al., 1999). ST might also be associated with increased risk of tooth wear (Magnussen, 1991; Bowles et al., 1995), periodontal disease (Fisher, Taylor & Tilashalski, 2005) and dental caries (Hart, Brown & Mincer, 1995; Tomar & Winn, 1995; Robertson, Walsh & Greene, 1997).

Addictiveness may also be considered a tobacco-related harm. The addictiveness of tobacco is proportional to the amount and speed of nicotine delivered. The amount and speed of nicotine delivery depends on the products nicotine content, pH, and method of use. The more free non-ionized nicotine, the higher the pH, and use by smoking compared to other methods results in the

greatest addictive potential of a tobacco product (Hatsukami et al., 2007).

ST products tend to exhibit large variation in pH and nicotine content (Hatsukami et al., 2007). In the US the ST products with the most nicotine are used most prevalently, and those with the least nicotine are used least prevalently (SAMHSA, 2006). ST products such as Ariva and Revel administer lower amounts of nicotine, and other products such as Stonewall administer nicotine in doses similar to pharmacotherapeutic 4-mg nicotine lozenges (Kotlyar et al., 2007). Copenhagen ST has the fastest and highest nicotine delivery properties, similar to that of cigarettes (Benowitz et al., 1988).

There are advantages and disadvantages to both lower and higher nicotine ST products. Low nicotine ST products may be less addictive, but also less likely to replace cigarettes for current smokers. On the other hand higher nicotine products with low TSNAs may be addictive, but they are more likely to replace the more toxic cigarette and other smoked tobacco (Hatsukami et al., 2007).

2.1.6 Conclusion

There is general consensus that STs are much less harmful to health than cigarettes. The Royal College of Physicians (RCP) Tobacco Advisory Group report states that ST is “10-1000 times less hazardous than smoking depending on the product”, and supports evidence-based regulation of ST and harm reduction practices in tobacco control (Royal College of Physicians Tobacco Advisory Group [RCPTAG], 2002). And a panel of nine experts assembled to estimate the mortality risks of LN-ST concluded that the average relative risk compared to cigarettes for users of LN-ST aged 25-49 and 50+ are 9% and 5%, respectively (Levy et al., 2004). Bates et al. (2003) conclude based on the available evidence that STs, “are a very substantially less dangerous way to use tobacco than cigarettes.” In support of this view they highlight the fact that STs are not associated with increased risk of chronic lung diseases or lung cancer; diseases for which over half of smoking-related deaths in Europe are attributed. They also point out that the evidence is unclear with regards to risk of cardiovascular disease (CVD), but that if CVD risk exists it appears to be much less than that associated with smoking. Futhermore, they note that

ST eliminates environmental tobacco smoke, which removes a significant disease risk factor for non-smokers including children (Bates et al., 2003).

2.2 Harm Reduction

2.2.1 Smokeless Tobacco & Harm Reduction

Given the consensus that ST poses much less risk to health than cigarettes (Stratton, Shetty, Wallace & Bondurant, 2001; TAGRCP, 2002), the use of ST as a harm reduction tool in tobacco control has been suggested (Bates et al., 2003; Kozlowski, O'Connor & Edwards, 2003; Kozlowski, 2007). The Institute of Medicine (IOM) Report on the scientific basis of tobacco harm reduction states: "…a product is harm reducing if it lowers total tobacco related mortality and morbidity even though use of that product may involve continued exposure to tobacco related toxicants." (Stratton et al., 2001).

The IOM report, Clearing the Smoke, discusses the history of tobacco harm reduction initiatives and concludes that none of the many efforts to produce safer cigarettes have been successful. The report highlights the case of the "low yield" cigarette, an initiative to reduce tar, carbon monoxide, and nicotine delivery. In practice, the "low yield" cigarette failed to reduce harm because users compensated for lower yields by modifying the way they smoked - inhaling deeper and smoking further towards the filter, for example - in order to receive higher yield (Stratton et al., 2001). The failure resulted also, Kozlowski (2001) argues, because many users mistakenly believed that "low yield" cigarettes were safer than other cigarettes, and many still do (Kozlowski, 2001).

Moreover, population harm was exacerbated for users who would have quit, would have remained abstinent after quitting, or would never have started smoking in the first place did not do so under the mistaken belief that "low yield" cigarettes were safer (Stratton et al., 2001). The question of how to proceed with ST involves much the same risk of population harm.

2.2.2 Potential Outcomes

Tomar (2007) outlines three ways that overall population harm might be reduced with the use of ST, by: (1) preventing cigarette smoking uptake, (2) allowing complete abstinence from cigarettes with continued use of a tobacco product, or (3) providing an alternative product to partially replace cigarette smoking for smokers who continue to smoke. He discusses each of the three ways harm could be reduced, in turn, by reviewing the research.

(1)Preventing cigarette smoking uptake

Tomar discusses two outcomes that would emerge if the use of ST as a harm reduction tool actually prevented the uptake of cigarette smoking. The first is that for the people who take up ST, the likelihood of cigarette smoking uptake would be less than those who did not take up ST in prospective cohort studies, after accounting statistically for known risk factors for smoking uptake. The second is that if the prevalence of ST use grew in young adults under age 25, there would be a corresponding decrease in the same groups smoking prevalence.

Tomar concludes that there is insufficient evidence from US prospective cohort studies for ST use providing either a protective or preventive effect against the uptake of cigarettes. On the contrary, he cites evidence of increased odds of cigarette smoking uptake in those that use ST. Tomar argues also that the cross-sectional evidence from Sweden of such a preventive effect is biased in excluding certain cohorts that are most likely to use ST, or ignoring the large number of current smokers who do not smoke every day. Tomar also looks at secular trends in the US, Norway, and Sweden and concludes that there is no evidence of a preventive effect on the uptake of cigarette smoking, although he notes that in Sweden snus might have been used by men to partially replace smoking.

Concerns about ST acting as a gateway to smoking uptake are valid, especially for youth given the tobacco industry's history of aggressive marketing to youth (Gartner et al., 2007; Tobacco Free Kids, 2008). On the other hand, the evidence from youth snus use in Sweden indicates the opposite of a gateway from ST to cigarettes (Foulds et al., 2003; Ramstrom & Foulds, 2006), a US study found that ST use did not predict later uptake of smoking when other psychosocial

factors were considered (O'Connor et al., 2003), and a US national survey found only a small association, if any, between ST use and smoking (O'Connor et al., 2005). Kozlowski (2007) argues that fears about ST as a gateway to cigarettes are not validated by the evidence (Haddock et al., 2001; O'Connor et al., 2003; Kozlowski et al., 2003; Furberg et al., 2005), that the evidence suggests that much of the ST-smoking link is not causal, and that ST may actually offer a preventive effect for youth at highest risk of smoking.

(2) Allowing complete abstinence from cigarettes with continued use of a tobacco product

One argument made in favour of harm reduction strategies in tobacco control is the low rate of smoking cessation maintenance. Just over half of ever-smokers in Canada in 2003 had quit smoking (Health Canada, 2003) and about half (50.2%) of ever-smokers in the US in 2006 were currently former smokers (CDC, 2007). Though in 2000, 70% of US smokers say they want to quit smoking altogether, but only 4.7% of smokers who smoked most days managed to quit and remain abstinent for 3-12 months (CDC, 2002).

Tomar's analysis discusses four outcomes that would emerge if the use of ST as a harm reduction tool were an effective tool for reducing or abstaining from cigarette smoking. The first is that if the prevalence of ST use grew in adults aged 35 and above, there would be corresponding increase in the same groups smoking cessation rates. Second, the prevalence of smoking and ST use in US states (or Canadian provinces) would be inversely related. Third, a greater smoking cessation success rate would be found for users of ST than controls in randomised control trials (RCTs). And finally, a higher smoking cessation rate would be found in observational studies where known predictors of quitting are adjusted for statistically.

Upon reviewing the evidence, Tomar finds that no RCTs exist that test ST as a cessation method, and of the one study that specifically examined snus as a cessation method in US adults a quarter had quit smoking using snus at one year follow-up (Tilashalski, Rodu & Cole, 1998) and 45% had quit at seven year follow-up, about half of whom reported using snus (Tilashalski, Rodu & Cole, 2005), though the study did not include a control group.

Tomar looks also to the evidence from Sweden, where snus might have been used by some men to partially replace smoking, and concludes that snus might have a “modest” role in successful smoking cessation. There are large gender gaps in ST use in Sweden and Norway, which Tomar concludes do not coincide with differences in rates of successful smoking cessation. Tomar also looks to US research to determine what proportion of successful smoking cessation is attributable to switching to ST, and finds that switching to ST accounts for a small fraction of successful smoking cessation.

Smokeless tobacco prevalence in the US varies from less than 1% to 10% in some states, according to data Tomar cites from the 2003 Current Population Survey Tobacco Use Supplement. He finds that the prevalence of smoking and ST is not inversely related, but significantly positively related in the US.

Although STs are proven to be less harmful than smoked forms of tobacco, in public health terms nicotine replacement therapies (NRT) are even less harmful (Kozlowski, 2001). NRTs come in various forms including nicotine-containing gum, trans-dermal patch, and nasal sprays and inhalers. The only toxicant the consumer is exposed to is nicotine. NRTs are generally regarded as safe, and as such are offered over-the-counter without prescription throughout most of the world (ASH, 2007). Their efficacy as an aid to smoking cessation is well-established (Silagy, 2002).

Bates et al. (2003) point out the viability of ST as an alternative to smoking by comparing ST to currently available nicotine replacement therapy (NRT). They claim that ST delivers an adequate nicotine dose to smokers; delivering a greater arterial nicotine dose or “spike” than all currently available NRT products, including nicotine nasal spray, but not quite the dose delivered by smoking. So although they say that the addictive properties of nicotine products are in general a bad quality, they note that the nicotine delivery characteristics of ST may be why users might find it to be a more useful alternative to smoking than current pharmaceutical NRTs.

The possibility that the nicotine delivery characteristics of ST might make it preferable as a cessation aid and thereby increasing the success of smoking cessation is reflected in Sweden,

where in a study of 25-55 year old former smokers done by The Swedish Cancer Society and the Pharmacia Corporation 33% of former smokers reported using snus and 17% reported using NRTs during a quit attempt (TEMO, 2001). It is also reflected in more recent data which indicates that during a previous quit attempt 55% and 15% of males and females, respectively, reported using snus (Ramström, 2002). The same trend of higher use of ST than NRT seen in cessation attempts holds in former smokers. The cessation success rate of former smokers is 65% for males and 52% for females after using snus, compared to 46% and 32% for males and 37% and 30% for females after using nicotine gum and patch, respectively (Ramström, 2002). It seems that snus has been especially helpful to smokers who are more nicotine dependant; in a study of former smokers the mean score on the Fagerström Test for Nicotine Dependance was 2.8 for those who had not used ST and 3.4 for those who had used ST (Fagerström & Ramström, 1998).

Kozlowski (2007) brings up perhaps the most essential point about smoking cessation products, which is that consumer preference often matters more than product effectiveness; some people prefer ST, some people prefer NRT (whether it be the patch, gum, etc.), and some people prefer no help whatsoever in quitting smoking (Kotlyar et al., 2007).

(3) Providing an alternative product to partially replace cigarette smoking for smokers who continue to smoke

The partial replacement of cigarettes by ST, or dual-use of the two products by smokers might result in a decrease in the overall number of cigarettes smoked. Tomar cites the findings from the data of two US national surveys (Tomar, 2002; Hatsukami, Lemmonds & Tomar, 2004) which show that compared to exclusive cigarette smokers, dual-users smoke fewer cigarettes. No difference in cigarette consumption was evident in occasional ST users compared to non-users of ST, but daily ST users smoked less cigarettes than non-users of ST (Tomar, 2002). Overall, Tomar concludes that patterns of use indicate that current smokers consume a significant fraction of the ST used in the US as an alternate nicotine source.

To put the health risk of the various scenarios ST use into perspective, the risk/use equilibrium can be employed. The risk/use equilibrium of tobacco harm refers to public health harm caused

by the increased use of a product. Public health suffers if use rates increase faster than risk is lowered. But public health benefits if risk is lowered faster than use rates increase. Kozlowski (2007) provides an illustrative example, which is that 400% of the population would have to use a ST product that is 95% less harmful than cigarettes to equal the harm caused by 20% of the population smoking – an impossible scenario. A study comparing smokers who quit tobacco use altogether to smokers who switched to using snus exclusively is also illustrative. The study found that the health-adjusted life expectancy of the two groups was not significantly different. Again, to put the low risk of snus into perspective the study estimated that 14-25 never-smokers would have to take up snus use to cancel the health gain derived from a new tobacco user taking up snus instead of cigarette smoking (Kozlowski, 2007).

2.2.3 Conclusion

It remains unclear whether conventional cigarette smokers in Canada will use ST products as a substitute for cigarettes or as a cessation aid. There are also concerns that the use of ST products will increase in the absence of any reduction in combustible product use. Increases in the prevalence of ST products also have the potential to serve as "starter" products from which young people may transition to cigarettes and other "higher risk" products.

2.3 What Determines Use?

2.3.1 Factors to Consider

Whether ST will prevent or promote cigarette smoking, serve as a cessation tool or complete replacement for smoking, or be used in conjunction with cigarettes depends on a number of factors, including individual stakeholder interests, consumer preferences, socio-cultural context, product price, promotion, age, market availability, and product regulation.

The tobacco industry's role is to produce and market ST. They are likely to derive a broader range of benefits from creating harm reduced products such as LN-ST than the sales of the product itself. Developing harm reduced products projects the image of corporate social responsibility which benefits public relations, and a tobacco company with a reduced harm

product is more competitive. Tobacco companies are reported to be aggressively funding research and development of harm reduced products (ASH, 2007).

The pharmaceutical industry's NRTs may present a counter-market to cigarettes. Kozlowski (2007) says that NRT and ST can be considered in competition for the counter-market to cigarettes because they are both "effective, non-combustible nicotine-delivery systems". In Canada and a number of other countries, NRT is approved for "temporary abstinence" from cigarettes, which Kozlowski points out is a direct parallel to US tobacco industry marketing of ST "for when you can't smoke" (Polito, 2004) as an alternative to smoking (Hatsukami et al., 2007).

An important factor to be considered in predictions with regards to ST uptake and public health impact is consumer preferences. Kozlowski (2007) states that the most popular tobacco products provide sufficient quantities of nicotine, appeal to the user's sense of taste and smell, and can be used conveniently. When considering whether NRT would be chosen over ST or cigarettes, he extends this list to include health risks, image, effectiveness, addictiveness, cost and the ratio of cost to nicotine delivery (Kozlowski, 2007).

The socio-cultural context represents an important aspect of a product's appeal. Kozlowski (2007) reviewed the past few centuries of tobacco history, noting that ST was much more popular than cigarettes in the US during the 19th century, but prohibitions on public spitting in the late 1800s (and likely other factors) decreased STs popularity and, by the 1920s, cigarette consumption overtook ST. Whether people will use ST depends on social norms, appeal, and individual openness to trying. Social norms around ST use in Canada are likely to be different than norms in the US, mainly because a lower prevalence rate of ST use. In Canada, ST use is below 1% (CTUMS, 2003), compared to 3.2% in the US (SAMHSA, 2006). To date, there are no published data on norms or attitudes related to ST products in Canada.

Price is also an important factor in ST use, as with most consumer products. Kozlowski (2007) cites econometric evidence of the cross-elasticity of cigarettes, ST, and NRT, indicating that when cigarette prices increase so do rates of ST and NRT use (Tauras & Chaloupka, 2003;

Gartner et al., 2007). Similarly, data from the US Current Population Survey Tobacco Use Supplement (CPS-TUS) show that during the 1980s and early 1990s every 1% increase in cigarette price was accompanied by a 10% or more increase in the rate of ST substitution for cigarettes (Ohsfeldt et al., 1997; Ohsfeldt et al., 1998).

In Ontario, the average retail price of a pack-a-day cigarette habit is about $52 per week (NSRA, 2007). The cost of the relatively lower-risk ST snus product currently being test-marketed by Imperial Tobacco in Edmonton and Ottawa is expected to be about 80% the cost of a pack of premium cigarettes for a tin of 20 sachets (Srikanthan, 2008), or about $33 per week based on the average 16 sachet per day use (PSC, 2007). The cost of the NRT is about $53 per week for a 21 mg (strongest) dose trans-dermal patch, and about $40 per week for 4 mg (strongest) dose nicotine gum based on average use of 10 pieces per day.

Promotion is also crucial. ST has been promoted by US tobacco companies "for when you can't smoke" (Polito, 2004). Kozlowski (2007) notes that STs have not yet been promoted as products to help quit smoking, and states that the tobacco companies are unlikely to make such a claim because ST is not regulated by the FDA. Such a claim would position ST in competition with NRT, which is approved under FDA regulation, which might position ST products within the jurisdiction of FDA regulatory authority. Although restrictions on tobacco advertising and marketing in Canada are far more comprehensive, ST continues to be promoted through several marketing channels, most notably in print advertisements in magazines and in retail displays in provinces where displays continue to be allowed.

Age is a key factor determining tobacco use. Young adults between the ages of 18 and 30 represent a critical group with respect to potential changes in the patterns of ST products. Young adulthood is a critical period during which tobacco use behaviour is established (Hammond, 2005), the age group with the highest smoking prevalence in Canada at 15% for 15-19 year olds and 25% for 20-24 year olds, and the group at greatest risk for taking up smoking (CTUMS, 2007). Industry marketing initiatives—for both cigarettes and ST products—also appear to be targeting the workplaces and social settings of young adults (Anon, *n.d.*; Teague, 1973; Katz & Lavack, 2002; Ling & Glantz, 2002; Hammond, Costello & Fong, 2004). The dramatic social

changes experienced by young adults during this time in their life may further increase their susceptibility to tobacco industry marketing strategies (Hammond, 2005).

2.3.2 Canadian Context

There are currently three tobacco companies operating in Canada: Imperial Tobacco Ltd, JTI-Macdonald Inc, and Rothmans, Benson & Hedges, Inc. (now owned by Philip Morris International) (PSC, 2003). STs have been widely available on the Canadian market, including brands such as *Skoal*, *Copenhagen*, and *Access*, and no legal barriers to their market introduction exist. Adult Canadian consumers may freely buy ST just as they may freely buy cigarettes where they are legally sold.

In May, 2007 the Swedish-style ST known as snus was introduced on the Canadian market by BAT-Imperial Tobacco Canada using the popular "*du Maurier*" name and brand imagery (PSC, 2007). In september 2007, Imperial began to test market snus, under its leading du Maurier brand at 230 retailers across Edmonton (Doyle, 2007). Then in early 2008, Imperial announced Ottawa as its second Canadian test market for the introduction of snus as part of the company's "harm reduction" program (Srikanthan, 2008).

Overall, there is very little evidence from Canada to indicate which of the outcomes discussed above by Tomar (2007) and Kozlowski (2007) are most likely. Their discussion is also with regards to the US context, where in 2005, 3.2% of the population aged 12 or older used ST products in the past month (SAMHSA, 2006). Currently, less than 1% of Canadians report current use of ST (CTUMS, 2003), and less than 1% use ST and cigarettes concurrently (O'Connor et al., 2007).

Other than prevalence estimates, there is a lack of even basic information about ST in Canada, including how current smokers perceive ST products, whether Canadian consumers are interested in trying ST and if so, for what purpose. In fact, the literature on ST calls for consumer testing to determine how features such as labelling and messages affect perceptions of ST, how perceptions might affect patterns of uptake and use of ST, and how methods of labelling and

health messages can be used to minimise the harm ST products pose to public health (Hatsukami et al., 2007).

2.4 Perceptions of Smokeless Tobacco

Perceptions of risk are an important predictor of tobacco use (Weinstein,1999; Romer & Jamieson, 2001). If switching to a product such as ST is believed by smokers to offer reduced health risk, they may be more likely to do so. Despite scientific consensus that ST poses much less risk to health than cigarettes (Stratton et al., 2001; TAGRCP, 2002), the Canadian public as well as others appear to be confused about the risks posed by ST. Moreover, it remains unclear what consumers think about ST, including perceptions of risk, product appeal, intentions to use these products and for what purpose.

Approximately 68% of Canadian smokers are aware of ST products, and of those only 14% believe they are less harmful than conventional cigarettes (O'Connor et al., 2007). The risk of ST compared to cigarettes was overestimated in data from adult smokers in Canada, Australia, the US, and the UK (O'Connor et al., 2005; O'Connor et al., 2007). In a cross-sectional survey of US college freshmen, nearly 90% of smoking and non-smoking respondents rated ST to be at least as harmful, or more harmful, than conventional cigarettes (Smith, Curbow & Stillman, 2007). Similarly, a nationally representative sample of US high school seniors found that nearly 60% of smoking and non-smoking students perceived ST to be of equal or greater risk than cigarettes (Tomar & Hatsukami, 2007). And switching from cigarettes to ST was thought to offer no risk reduction in about 75% in a large sample of young adults entering the US military, regardless of current of past smoking status (Haddock et al., 2004). The aforementioned studies come from regions where ST is relatively uncommon. However, data from Swedish men and women suggest the same overestimation of the harm of ST relative to smoking (Anon, *n.d.*). And in a recent study of Norwegian adolescents, for whom the LN-ST snus is also commonplace, 41% still rated ST to be at least as harmful, or more harmful, than conventional cigarettes (Overland, Hetland & Aaro, 2008). These findings suggest that people's perceptions about the relative risk of tobacco products are inaccurate, and may need to be changed.

2.5 Communicating Risk: Product Health Warning Labels

2.5.1 Effectiveness

Product health warning labels are among the most direct and cost-effective means of communicating the risk of tobacco products. Evidence on the effectiveness of health warnings on cigarettes packs indicates that prominent health warnings increase perceptions of risk, promote smoking cessation and may lower brand appeal. (Hammond et al., 2003; Hammond et al., 2004; Hammond et al., 2007; Thrasher et al., 2007; White, Webster & Wakefield, 2008).

Picture warnings appear to be most effective. Picture warnings may be particularly effective for communicating health information to those with lower levels of literacy (Millar, 1996; Createc, 2003; Siahpush, 2006). Moreover, picture warnings are rated as more effective than text warnings for encouraging current smokers to quit and deterring non-smokers from starting (O'Hegarty et al., 2006). Picture warnings also appear to have an impact on Canadian youth, with over 90% reporting that picture warnings provided them with health risk information that was accurate and made smoking less appealing (Health Canada, 2005). In fact, the health warnings on cigarettes packages are looked at and read by young smokers (80%) more than they are by adult smokers (66%), the health information on the back and side of cigarette packages is read by young smokers (31%) more than adult smokers (20%), and stop smoking tips on the back and side of cigarette packages are remembered more by young smokers (31%) than adult smokers (11%) (Environics 2004a; Environics 2004b). Overall though, both adults and youth report that in response to large graphic warnings they reduced their smoking, and had increased motivation to quit (Borland & Hill, 1997; Willemson, 2005; Cavalcante, *n.d.*).

2.5.2 Current Standards: Packaging and Labeling Regulations

In Canada at the federal level, the *Tobacco Act* (Health Canada, 1997) contains the regulations governing tobacco. Although Canada's tobacco regulations require that 50% of the main surface of the cigarette package display one of 16 colour graphic and text health warnings prescribed by Health Canada, ST products are required to have one of four text health warnings displayed on their packaging: 1) "This product is highly addictive", 2) "This product causes mouth diseases", 3) "This product is not a safe alternative to cigarettes", and 4) "Use of this product can cause

cancer" (Createc, 2003).

2.5.3 Health Canada Proposed Changes

Smokeless tobacco products pose unique challenges for existing tobacco control policies, such as those regulating health warnings labels (HWLs). In contrast to the vast body of evidence on HWLs for cigarettes (Hammond et al., 2003; Hammond et al., 2004; Hammond et al., 2006; Hammond et al., 2007), there is little evidence on the impact and effectiveness of ST HWLs. Health Canada`s Tobacco Control Programme has recently begun to address this gap in research by commissioning studies to assess the impact and effectiveness of ST HWLs (Createc, 2003; HCTCP, 2007).

In Health Canada commissioned focus groups on toxic emissions information displayed on packages smokers said they preferred brief, clear statements on one toxicant and its impact on health (Envronics, 2003b). Results in a similar Canadian focus group study that looks specifically at user perceptions of ST products showed that users had plenty of health risk information, but their recall and comprehension of the warnings could be improved. It was also found that messages about addiction and diseases of the mouth were viewed as most credible. Interestingly, users of ST thought it was addictive but that it carried less risk than combustible forms of tobacco for themselves and others because there is no smoke, and more harmful for mouth diseases such as lip, mouth and throat cancer because the product is in direct contact with those surfaces (Createc, 2003). In the same focus group study, ST users expressed low personal impact from the HWLs for various reasons. Some did not want to accept to health risks, since they had already switched from cigarettes to ST because of the health risks associated with smoking. Some were repulsed by the graphic nature of the images. Some found that the existing text-only HWLs on ST did not get their attention and were not convincing (Createc, 2003).

Health Canada is currently in the process of developing new HWLs for all tobacco products, including all types of STs, which seek to ensure that tobacco product labelling remains useful and appropriate for its intended audiences (Health Canada, 2008). Part of the proposed changes for ST include expanding to 30% the portion of the principal display surface of the package

covered by a health warning, adding a series of statements with information on the constituent and health effects for three classes of toxic constituents (nicotine, lead, nitrosamines), and including information about carbohydrate levels to inform users of the large amount of sugar added to some STs (HCTCP, 2004). The proposed changes would affect the *Tobacco Products Information Regulations* section of the *Tobacco Act* (Health Canada, 1997).

2.5.4 Public Support

Along with proposing changes to the health information displayed on tobacco product labels in their paper, *Building on Success: A Proposal for New Health-Related Information on Tobacco Product Labels* (HCTCP, 2004), Health Canada solicited comments from stakeholders in governmental and non-governmental organisations, the tobacco industry, and the public. Despite holding different opinions with regards to the proposed options, most respondents (21 of 25) expressed support for the regulatory proposals and specific proposals on health and toxic emission/constituent information (HCTCP, 2006).

In addition, the Canadian public seems to support health warning messages on tobacco products, find them to be informative, and find them to encourage cessation efforts. In an assessment of the graphic health warnings on cigarettes 1.5 years after their implementation over 70% of adult smokers and over 90% of youth smokers reported that the warnings effectively informed them about the health effects associated with tobacco; over half of adults and youth reported that the health warnings discouraged them from smoking around others; and over 40% of adults said the warnings have encouraged them to try to quit (WHO TFI, 2005). In a Health Canada commissioned focus group study participants expressed support for HWLs; interestingly, to prevent others and particularly young people from using ST.

2.5.5 Challenges

However, the existing research on ST HWLs has been largely limited to examining the actual message in terms of attitudes about the message, awareness and understanding, and credibility (Createc, 2003; HCTCP, 2007). One relatively old study examined the impact of ST health warnings 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 non-smokers that examined the effect of including picture warning labels on three reduced-exposure products including ST, nicotine lozenge, and reduced-harm cigarettes, advertisements with picture warning labels resulted in lower ratings of product appeal and safety. Overall, smokers expressed more interest than non-smokers in purchasing and using the reduced-exposure products (Stark et al., 2008).

There are a number of challenges and questions remaining with regards to ST HWLs, including the following: (1) What portion of the principal display surface to require be covered by the warning?, (2) How to design the shape and size of HWLs for STs, which come in a variety of package shapes and sizes and make a 'one-size-fits-all' HWL difficult, and (3) Message content, including for example, whether to include health risk reduction messages about the relative risk of ST compared to cigarettes?

2.6 Summary

Smokeless tobacco (ST) products have received increasing attention by the tobacco industry and public health community. Recently, Imperial Tobacco Canada began marketing the Swedish-style ST known as snus in Canada using the popular "*du Maurier*" name and brand imagery. Other types of ST have been widely available on the Canadian market, and no legal barriers to their market introduction exist (PSC, 2007). Currently, less than 1% of Canadians report current use of ST (CTUMS, 2003), and less than 1% use ST and cigarettes concurrently (O'Connor et al., 2007).

There are three ways that overall population harm might be reduced with the use of ST, by: (1) preventing cigarette smoking uptake, (2) allowing complete abstinence from cigarettes with continued use of a tobacco product, or (3) providing an alternative product to partially replace cigarette smoking for smokers who continue to smoke. Whether ST will prevent or promote cigarette smoking and how it might be used is a complex question that depends on a number of factors. There is very little evidence from Canada to indicate which of the outcomes are most likely.

Although the health risk posed by ST appears to be much less than conventional cigarettes, the extent to which ST may serve as a harm reduction product is highly contentious (PSC, 2007; Hatsukami et al., 2007). Other than prevalence estimates, there is a lack of even basic information about ST in Canada. It remains unclear how large text or picture warnings on ST products would affect consumer perceptions not only with respect to risk, but also with respect to whether or not ST products are regarded by cigarette smokers as cessation aids, less hazardous alternatives, or products for temporary abstinence from cigarettes. There are also concerns that the use of ST products will increase in the absence of any reduction in combustible product use. Increases in the prevalence of ST products also have the potential to serve as "starter" products from which young people may transition to cigarettes and other "higher risk" products.

Tobacco product warning labels seem to exert a substantial influence on product appeal, perceptions of health risk, health risk knowledge, and ultimately tobacco use behaviour. ST products pose unique challenges for existing tobacco control policies, such as those regulating HWLs. In contrast to the vast body of evidence on HWLs for cigarettes (Hammond et al., 2003; Hammond et al., 2004; Hammond et al., 2006; Hammond et al., 2007), there is little evidence on the impact and effectiveness of ST HWLs. Health Canada`s Tobacco Control Programme has recently begun to address this gap in research by commissioning studies to assess the impact and effectiveness of ST HWLs (Createc, 2003; HCTCP, 2007). Health Canada is currently in the process of developing new HWLs for all tobacco products, including all types of STs.

Overall, the study sought to expand the evidence base and address research gaps in this critical area, and has the potential to inform initiatives on the development of ST health warning labels in Canada, and elsewhere. The findings provide important information on perceptions of ST products with respect to their potential use as a cessation, substitution or replacement product among young adult cigarette smokers.

3.0 STUDY RATIONALE & RESEARCH OBJECTIVES

3.2 Rationale

Other than prevalence estimates, there is a lack of even basic information about smokeless tobacco (ST) in Canada. It remains unclear how large text or picture warnings on ST products would affect consumer perceptions not only with respect to risk, but also with respect to whether or not ST products are regarded by cigarette smokers as cessation aids, less hazardous alternatives, or products for temporary abstinence from cigarettes. There are also concerns that the use of ST products will increase in the absence of any reduction in combustible product use. Increases in the prevalence of ST products also have the potential to serve as "starter" products from which young people may transition to cigarettes and other "higher risk" products.

In contrast to the vast body of evidence on health warning labels (HWL) for cigarettes (Hammond et al., 2003; Hammond et al., 2004; Hammond et al., 2006; Hammond et al., 2007), there is little evidence on the impact and effectiveness of ST HWLs. Health Canada`s Tobacco Control Programme has recently begun to address this gap in research by commissioning studies to assess the impact and effectiveness of ST HWLs (Createc, 2003; HCTCP, 2007). Health Canada is currently in the process of developing new HWLs for all tobacco products, including all types of STs.

Overall, the study sought to expand the evidence base and address research gaps in this critical area, and has the potential to inform initiatives on the development of ST health warning labels in Canada, and elsewhere. The findings also provide important information on perceptions of ST products with respect to their potential use as a cessation, substitution or replacement product among young adult cigarette smokers.

3.2 Research Questions

The current study sought to examine perceptions of ST among young adult cigarette smokers and the impact of HWLs on ST products. More specifically, this study examined the following:

1. How do young adult cigarette smokers in Canada perceive ST products with regards to:
    a. Product appeal
    b. Intentions to use
    c. Reasons for use (i.e., potential for use as a cessation aid, in places where they cannot smoke, as a less harmful alternative to smoking, etc.)
    d. Health risk and addiction

2. How do young adult cigarette smokers in Canada perceive the health risk and addiction of ST products compared to cigarettes and nicotine replacement therapies (e.g., gum, patch, etc.)?

3. How are young adult cigarette smokers' perceptions about ST products impacted by the form of health warning label (HWL) displayed on the products package (i.e., no HWL, text HWL, picture HWL)?
    a. Which form of HWL elicits the most accurate perceptions of health risk and addiction?
    b. What is the impact of adding a relative health risk message about the health risk of ST compared to smoking cigarettes?

4. The extent to which young adult cigarette smokers in Canada support picture HWLs and relative health risk messages about the health risk of ST compared to smoking cigarettes?

These questions were examined through the Smokeless Labels Study, a cohort study of 611 young adult Canadian smokers as described in the following section.

4.0 METHODS

4.1 Design Overview

The Smokeless Labels Study consisted of a full-factorial, 'between-subjects' experiment in which smokeless tobacco (ST) packages, health warning labels (HWLs) and relative health risk messages were systematically varied. Participants completed an online survey where they were asked to view a series of ST packages that had been purchased, photographed and digitally altered according to six experimental conditions: (1) "Standard" packages, (2) "Standard" packages with a relative health risk message added, (3) "Standard" packages with a text HWL added, (4) "Standard" packages with a text HWL and a relative health risk message added, (5) "Standard" packages with a picture HWL added, and (6) "Standard" packages with a picture HWL and a relative health risk message added. The relative health risk message compared the health risk of using ST to the health risk of smoking cigarettes (see Figure 1).

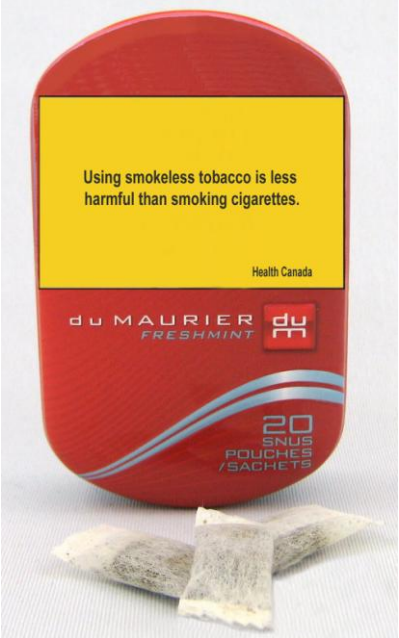
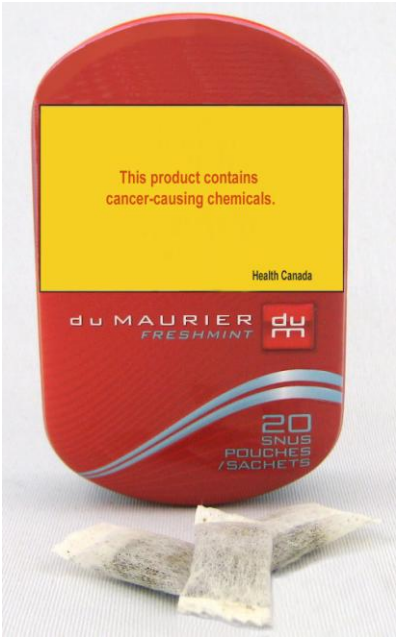
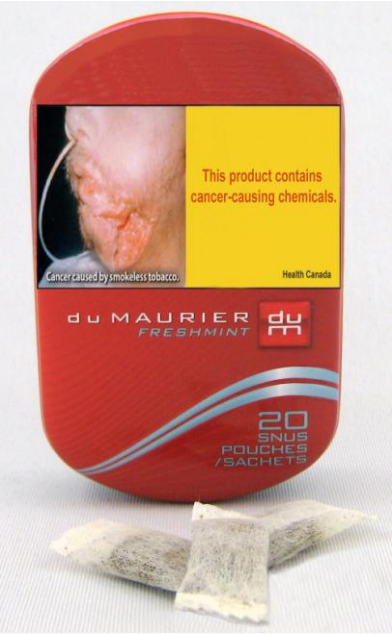
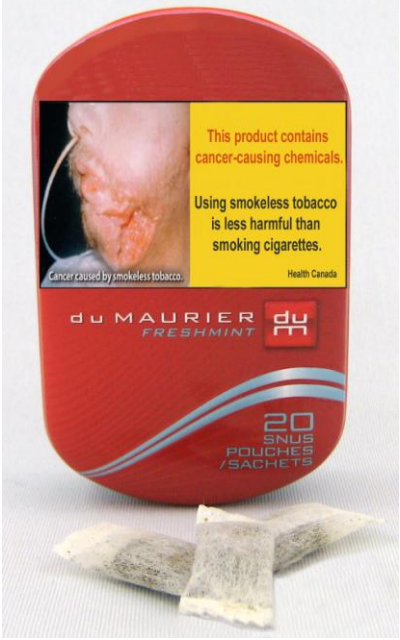
Condition 1: Standard	**Condition 2:** Standard + RR message	**Condition 3:** Text HWL
		
Condition 4: Text HWL + RR message	**Condition 5:** Picture HWL	**Condition 6:** Picture HWL + RR message
		

Figure 1. Sample package conditions assigned randomly to participants

Note: HWLs are mock-ups tested by Health Canada (HCTCP, 2007).

4.2 Participants & Recruitment

4.2.1 Participants

Participants consisted of 611 young adult male and female Canadians, between 18-30 years of age, who were current cigarette smokers at the time of recruitment. Current smokers included those who smoked at least once per month, and who smoked at least 100 cigarettes in their lifetime. History of ST use was also assessed. Ever-users (current and former) were included because they were likely to be a small proportion, though being a ST ever-user may be associated with lower ratings of the harm of ST (Overland, Hetland & Aaro, 2008).

The age group of young adults aged 18-30 is important because this age group is more likely to take up tobacco use during this time (Hammond, 2005), and industry marketing initiatives aggressively target this age group (Anon, *n.d.*; Katz & Lavack, 2002; Ling & Glantz, 2002; Hammond, Costello & Fong, 2004; Teague, 1973). Furthermore, previous studies have chosen the age group of 18-34 (Ramstrom, 1990; Ramstrom 2001; Kozlowski et al., 2003).

4.2.2 Recruitment & Remuneration

Participants were recruited from the participant panel of GMI (www.gmi-mr.com), a market research service. GMI maintains a panel of participants from over 200 countries, including a representative panel of over 400,000 Canadians. To register with GMI, participants first provided their contact information and agreed to GMI's privacy policy and user agreement. Next, they were prompted to check their e-mail for a confirmation notice. Participants were required to click on a link contained in a registration e-mail to activate their membership. Additional information is available online regarding on GMI's registration process (http://www.globaltestmarket.com/join.php), privacy policy (http://www.globaltestmarket.com/gtm_recruiting/privacypolicy.php), and user agreement (http://www.globaltestmarket.com/gtm_recruiting/termsofuse.php).

Respondents in GMI's participant pool were invited to participate in the online web survey by e-mail communication from GMI which included a link to the externally hosted online survey. The online survey was hosted by the Survey Research Centre at the University of Waterloo

(www.src.uwaterloo.ca). After opening the link to the survey, respondents completed screener eligibility and demographic information, and were then shown the study information and consent form on their computer screen. Respondents had the option to “agree” and continue to the survey, or to “disagree” and end the survey.

Upon survey completion, respondents received minimum remuneration from GMI of $2.50, depending on the length of time taken to complete the survey. If, after beginning the survey, the survey was ended early or otherwise not completed, the respondents still received partial remuneration from GMI.

4.2.3 Effect Size

Samples sizes of 65 respondents in each of the six conditions would provide 80% power to detect a "medium" effect size equal to one half the standard deviation of each outcome measure, where α=.05, 2-tailed (i.e., 0.5) (Cohen, 1998). Given the lack of historical data using similar measures and protocols, more accurate estimates of the effect size associated with the various outcomes were not available. A total of 600 respondents, or 100 respondents per condition, should therefore provide sufficient power to detect at least a “medium” effect size.

4.3 Survey Protocols

4.3.1 Screener and Demographic survey, Consent

A screener and demographic survey (see APPENDIX A: Screener & Demographic Information, Consent) was completed first. The screener survey included key socio-demographic variables, as well as validated measures of tobacco dependence, and prior ST use (CTUMS, 2005). Respondents were then shown the study information and consent form. After agreeing to the consent form, respondents began the online survey.

4.3.2 Background Survey

The background survey assessed smoking behaviour and smoking cessation, nicotine replacement therapy (NRT) knowledge and use, and cigarette warning label impact and

awareness (see APPENDIX B: Background). The background survey drew heavily from the International Tobacco Control Policy Evaluation Survey (ITC Project, 2008), a telephone-administered survey of smokers in Canada, the US, the UK, and Australia.

4.3.3 Main Survey

Respondents were then randomly assigned to one of the six experimental conditions (see Figure 1) and asked to view images of four ST products followed by four NRT products (see Figure 2 and Figure 3 for a list of products). The presentation order of ST and NRT products was randomised. Respondents completed the main survey in two steps. In step 1, respondents viewed the images sequentially and completed product-specific ratings for each product they viewed. They answered questions regarding their familiarity with the product, how appealing it was, whether they would be willing to try to product for a variety of reasons, how likely they would be to try it in the future, and how harmful to health they believed it was compared to both cigarettes and NRT or ST (see Table 1 and

APPENDIX C: Product-Specific Ratings).

Table 1. Product-specific rating measures

Familiarity	1. Have you ever heard of or seen this product? 01 – Yes 02 – No 03 – Don't know
Appeal	2. Would THIS product appeal to people your age? 01 – Not at all 02 – Unlikely 03 – Undecided 04 – Somewhat 05 – Very
Reasons for Use	3. Would you be willing to try this product for any of the following reasons: a. In places where you can't smoke cigarettes? (01-YES, 02-NO, 03-MAYBE) b. For the times when you don't want to smoke around others? (01-YES, 02-NO, 03-MAYBE) c. To help you cut back the amount you smoke? (01-YES, 02-NO, 03-MAYBE) d. To help you while you are trying to quit smoking? (01-YES, 02-NO, 03-MAYBE) e. As a long-term replacement instead of cigarettes? (01-YES, 02-NO, 03-MAYBE)
Likelihood of Future Use	4. Overall, how likely would you be to try THIS product in the future? 01 – Definitely not 02 – Probably not 03 – Undecided 04 – Probably try 05 – Definitely try
Relative Risk Beliefs	5. In your opinion, how HARMFUL TO HEALTH is this product… a. Compared to regular cigarettes b. Compared to smokeless tobaccos c. Compared to nicotine replacement therapy 01 – A lot less harmful 02 – Somewhat less harmful 03 – No difference 04 – Somewhat more harmful 05 – A lot more harmful

In step 2 after the respondents had seen all the products they completed general ratings of ST and NRT products regarding how addictive they believe the products are, and answered questions regarding their support for picture HWLs on smokeless products and relative health risk information about the harm of using smokeless compared to smoking cigarettes (see Table 2 and APPENDIX D: General Ratings).

Table 2. General rating measures

Relative Addictiveness Beliefs (Bansai et al., 2004)	1. OVERALL, How addictive are smokeless tobacco products compared to cigarettes? 2. OVERALL, How addictive are smokeless tobacco products compared to NRT? 3. OVERALL, How addictive are NRTs compared to cigarettes? 01 – A lot less addictive 02 – A little less addictive 03 – No difference 04 – A little more addictive 05 – A lot more addictive
Support for Pictorial HWMs, Support for Relative Risk Information	4. Do you think smokeless tobacco products should have picture health warnings similar to cigarette packages? 01 – Disapprove Strongly 02 – Disapprove 03 – Undecided 04 – Approve 05 – Approve Strongly 5. Are you interested in more information that compares the health risks of using smokeless tobacco to the health risks of smoking cigarettes? 01 – Not at all 02 – Probably not 03 – Undecided 04 – Somewhat 05 – A lot

Lastly, respondents viewed a study feedback letter that thanked them for participating, reminded them of the purpose of the study and the confidentiality of their responses, and provided contact information should they have any questions (see APPENDIX E: Feedback).

4.4 STs and NRTs Presented

Each respondent was shown a total of four ST package/HWL combinations according to their experimental condition, followed by four unmodified NRT packages. Figure 2 and Figure 3 contain the brands (packages) of STs and NRTs selected for use in this study, respectively. The order in which the first four ST packages and HWLs, and the second four NRT packages were displayed was counterbalanced across respondents.

duMaurier snus	Marlboro snus
	
Copenhagen snuff	Ariva lozenge

Figure 2. "Standard" smokeless tobacco products displayed to respondents

Nicorette® Fresh Mint (4mg) gum	NicoDerm® (21mg) trans-dermal patch
	

Nicorette® Mint (4mg) lozenge	Nicorette® inhaler
	

Figure 3. NRT products displayed to respondents

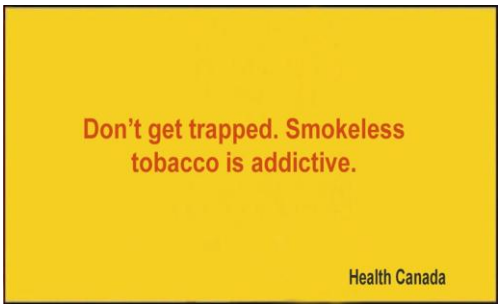
A variety of classes of ST were selected. The products in Figure 2 and Figure 3 include leading brands sold in the Canadian and United States markets. In Canada, ST is marketed most commonly as oral snuff and chewing tobacco (OTRU, 2006). Du Maurier, produced by Imperial Tobacco Ltd. is the only snus marketed in Canada. Marlboro is a popular brand of snus in the United States (US), and a well-known brand globally. Copenhagen is a popular brand of snuff in US. Ariva is a unique form of ST, being one of the only dissolvable compressed powdered tobacco lozenges sold on the US market. Nicorette® and NicoDerm® are popular brands of nicotine gum and patch, respectively, sold in Canada.

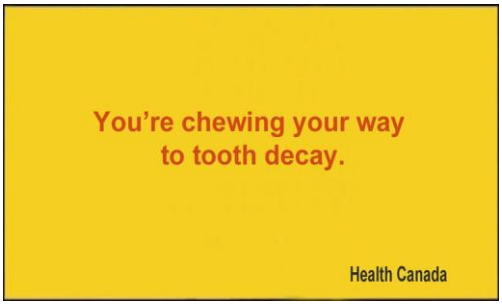
4.5 Health Warning Labels

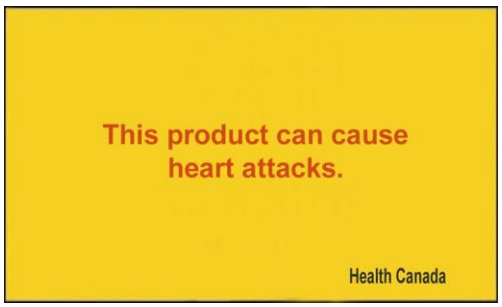
Four picture HWLs were selected from a Health Canada commissioned study to test ST HWLs (HCTCP, 2007), and digitally modified according to experimental condition. The original large-font main messages on the Health Canada warnings were retained, but a smaller font narrative below each main message was digitally removed because it was too small to be clearly read. The text HWLs were identical to the picture HWLs, containing the same text main message with the picture digitally removed (see Figure 4). In conditions 2, 4, and 6 a relative health risk message

regarding the health risk of smoking cigarettes compared to using ST was added to the "standard" package, text HWL, and picture HWL respectively, which read, "Using smokeless tobacco is less harmful than smoking cigarettes." The display order of the four text and four picture HWLs on individual ST products was counter-balanced across respondents within each condition so that each possible combination of package and HWL was displayed and the display order was randomised. The four NRT packages contained the standard health and safety information required on over-the-counter medication packages.

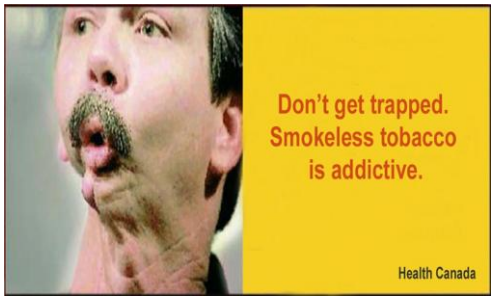
Text Warnings







Picture Warnings



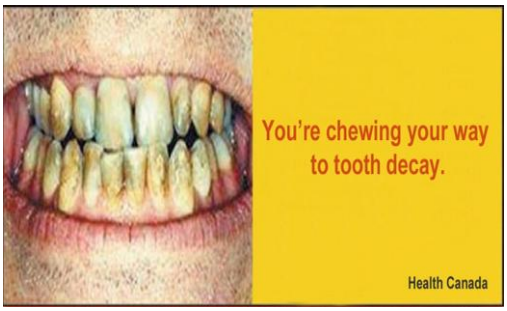


Figure 4. Text and picture health warning messages appearing on packages

Note: Warnings obtained from Health Canada report (HCTCP, 2007).

The inclusion of a relative health risk message about the health risk of using ST compared to smoking cigarettes addresses concerns that it has not been clearly communicated to the public that ST is substantially less harmful to health than cigarette smoking, in light of consistently inaccurate beliefs about the relative risk of ST compared to cigarettes and the reduction in risk that can be achieved by switching to ST (Anon, *n.d.*; Haddock et al., 2004; O'Connor et al., 2005; O'Connor et al., 2007; Smith, Curbow & Stillman, 2007; Tomar & Hatsukami, 2007; Overland, Hetland & Aaro, 2008).

4.6 Measures

4.6.1 Screener and Demographic survey, Consent

Eligibility

The first questions in the background survey on age and history of cigarette and ST use assessed eligibility to participate in the survey. The eligibility criteria were: being a current smoker between ages 18-30. Survey eligibility was assessed by the questions "Do you smoke at least once a month" and "Have you smoked 100 cigarettes or more in your lifetime?" Participants who answered "yes" to each question were eligible to complete the survey. Smokeless use was assessed using the question "Have you ever used smokeless tobacco, including chewing tobacco, oral snuff, snus, etc.?" **Age** was determined by asking age in years at the time of the survey.

Socio-Demographics

Participants specified their **gender**. They were asked to identify their **Ethnicity** as white, Chinese, South Asian, black, Filipino, Latin American, Southeast Asian, Arab, West Asian, Japanese, Korean, Aboriginal, Another group. Ethnicity was dichotomised to "Caucasian" and "minority". **Education** was assessed by asking respondents highest level of formal education completed [grade school or some high school, completed high school, technical or trade school or community college (some or completed), some university (no degree), completed university degree, post-graduate degree]. Education was re-coded to three categories: Low (grade school or some high school, completed high school), moderate [technical or trade school or community college (some or completed), some university (no degree)], and high (completed university degree, post-graduate degree). **Income** was assessed by asking respondents total annual

household income (Under $14,999, $15,000-$29,999, $30,000-$44,999, $45,000-$59,999, $60,000-$74,999, $75,000-$99,999, $100,000-$149,999, $150,000 and over). Income was re-coded into four categories: Low (Under $14,999, $15,000-$29,999), moderate ($30,000-$44,999, $45,000-$59,999), high ($60,000-$74,999, $75,000-$99,999, $100,000-$149,999, $150,000 and over), and not given (don't know, refuse).

4.6.2 Background Survey

Smoking Behaviour & Smoking Cessation

Several survey items assessed level of nicotine dependence, quit smoking attempts, and quit smoking plans. The heaviness of smoking index (**HSI**), an accurate measure of level of nicotine dependence (Chabrol et al., 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. Cigarettes per day (CPD) was assigned a value of 0 for 0-10 CPD, 1 for 11-20 CPD, 2 for 21-30 CPD, and 3 for 31+ CPD. Time to first cigarette was assigned a value of 0 for <60 minutes, 1 for 31-60 minutes, 2 for 6-30 minutes, and 3 for less than 5 minutes.

The categorical variable **quit intention** was created from the responses (within the next month, within the next 6 months, sometime in the future, beyond 6 months, not planning to quit) to the question "Are you planning to quit smoking?" Quit plan has five categories: Within the next month, within the next 6 months, sometime in the future, beyond 6 months, not planning to quit, not given (don't know, refuse).

4.6.3 Main Survey

Product-Specific Ratings

In step 1 of the main survey while viewing the product on-screen, participants were asked to rate each of the four ST package/HWL combinations and four nicotine replacement therapy packages on familiarity and four health-related outcomes: 1) Familiarity, 2) Appeal, 3) Likelihood of future use, 4) Reasons for use, and 5) Relative health risk beliefs.

Familiarity was assessed by asking the question, "Have you ever heard of or seen this brand?" The variable **familiarity** was created from the responses (yes, no) to this question for ST and NRT separately. An index measure of **overall familiarity** was generated separately for ST and NRT for answering 'yes' to at least one of the four products.

Appeal was assessed by the question "Would this product appeal to people your age?" The variable **appeal** was created from the responses, dichotomised to 'Yes' (somewhat, a lot) and 'Other' (not at all, unlikely, undecided) for ST and NRT separately. An index measure of **overall appeal** was generated separately for ST and NRT for answering 'yes' to at least one of the four products.

Intentions to use the particular product being shown was assessed by the question "Overall, how likely would you be to try this product in the future?" The variable **likelihood of future use** was created from the responses, dichotomised to 'Yes' (probably, definitely) and 'Other' (definitely not, probably not, undecided) for ST and NRT separately. An index measure of **overall likelihood of future use** was generated separately for ST and NRT for answering 'yes' to any of the four products.

Reasons for using the particular product being shown were assessed by the responses (yes, no, maybe) to the question "Would you be willing to try this product..." for five different reasons: (1) In places where you <u>can't smoke</u> cigarettes, (2) For the times when you <u>don't want to smoke</u> around others, (3) To help <u>quit</u> smoking cigarettes, (4) As a long-term <u>replacement</u> for conventional cigarettes, and (5) To help you <u>cut back</u> the amount you smoke. The responses were dichotomised to 'Yes' (yes) and 'Other' (no, maybe). Three indexes were then generated for reasons for use: i) a product-specific index for answering 'yes' to at least one of the five reasons, ii) a reason-specific index for answering 'yes' for at least one of the four products, and iii) an overall index for answering 'yes' to at least one of the five reasons, for at least one 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?" The variables **ST-**

cigarette relative risk and **NRT-cigarette relative risk** were generated separately for ST and NRT from the responses, dichotomised 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). An index measure of **overall (ST/NRT)-cigarette relative risk** was generated separately for ST and NRT for answering 'less harmful' to all four products.

General Ratings

In step 2 of the main survey, following the presentation and rating of all four ST package/HWL combinations and four NRT packages, participants will rate: (1) ST and NRT in general on relative addictiveness, (2) Support for picture HWLs on ST, and (3) Support for relative health risk information on ST. These ratings differ from the product-specific ratings in that the participants were not viewing any product and were therefore rating ST, cigarettes, and NRT in general.

Beliefs about the relative addictiveness of the three classes of products were assessed by the questions "OVERALL, How addictive are smokeless tobacco products compared to cigarettes?", "OVERALL, How addictive are smokeless tobacco products compared to NRT?", and "OVERALL, How addictive are NRT compared to cigarettes?". There are five response categories (A lot less addictive than..., a little less addictive, no difference, a little more addictive, a lot more addictive than...), dichotomized to "less addictive" (A lot less addictive than..., a little less addictive) and "the same or more addictive" (no difference, a little more addictive, a lot more addictive than...). The variables **ST-cigarette relative addictiveness, ST-NRT relative addictiveness**, and **NRT-cigarette relative addictiveness** were created from dichotomised responses.

Questions about perceptions of the addictiveness of ST, cigarettes, and NRT offer additional information not obtained by asking the more general question about perceived risk of ST, cigarettes, and NRT. This is because in the responses to the more general question about perceived risk, an aggregate of many factors, the perceived harm related to addiction and/or nicotine may play a role. Thus a participant might reasonably justify a belief that because of equivalent levels of nicotine, for example, there is no difference in harm between each product,

or that each product places the user at risk for a particular disease such as cancer (Overland, Hetland & Aaro, 2008).

Finally, questions regarding level of support for each of picture health warnings and package information on relative health risks of smoking cigarettes and using ST were asked. Support for each was assessed by the questions, “Do you think smokeless tobacco products should have picture health warnings similar to cigarettes?)”, and, “Are you interested in more information that compares the health risks of using smokeless tobacco to the health risks of smoking cigarettes?”, respectively. The variables **support for picture HWL** was created from the responses, dichotomised to “yes” (approve, approve strongly) and “no” (disapprove strongly, disapprove, undecided). The variable **support for RR info** was created from the responses, dichotomised to “yes” (somewhat, a lot) and “no” (not at all, probably not, undecided).

The complete study protocol was first piloted with 60 respondents, to identify any design or survey issues prior to running the full study. No major changes were needed.

5.0 ANALYSIS

5.1 Statistical Analyses

5.1.1 Descriptive Statistics

All analyses were conducted using SPSS version 16.0. Univariate statistics were generated for all variables to assess missing values, confirm accurate coding, and examine response distributions. Descriptive statistics (means for continuous data and proportions for binary data, standard deviation and frequency where applicable) were generated for all independent and outcome variables.

ANOVA and chi-square analyses were run to check for differences across conditions for continuous and categorical moderators, respectively. Tukey's honestly significant difference (HSD) test, which is a conservative post-hoc test, was used to test the significance of contrasts.

5.1.2 Regression Analyses

Regression models were used to test for differences between experimental conditions (warning label type and relative health risk message) as well as to examine the influence of the independent variables of **gender**, **age**, **smoking status**, **ethnicity**, **education**, **income**, **HSI**, and **quit intentions**. Separate logistic regression models were conducted for binary outcomes, for each product individually and overall, including: **familiarity**; **appeal**; **likelihood of future use**; **reasons for use index**; Willing to try **when you can't smoke**, **when you don't want to smoke**, **to help cut back**, **to help quit**, **as a long-term replacement**; **ST-cigarette relative addictiveness**; **ST-NRT relative addictiveness**; **NRT-cigarette relative addictiveness**; **support for picture HWL**, **support for relative risk information**. Models were run for the overall outcome across the four ST products and four NRT products, and then separately for each individual product.

Model building proceeded in three steps. First, the main effects model was run with relative health risk message (**RR message**) and warning label type (**WL Type**) as the independent variable for each of the outcome variables listed above. The three-level WL type variable was

run as a “contrast indicator” variable, to compare the differences between each type of warning label. In step 2, the two-way interaction between WL type and RR message was added to the main effects model, and was retained in step 3 if statistically significant at the p=.05 level. In step 3, the independent variables were added

5.1.4 Summary Comparisons between ST and NRT

McNemar symmetry chi-square test was performed to examine differences between ST and NRT response proportions for the following outcomes measures: **appeal**; **likelihood of future use**; **reasons for use index**; willing to try **when you can’t smoke**, **when you don’t want to smoke**, **to help cut back**, **to help quit**, **as a long-term replacement**; **ST/NRT-cigarette relative risk**; **ST/NRT-cigarette relative addictiveness**.

6.0 RESULTS

Table 3 displays the sample characteristics of the young adult smokers by experimental condition. The sample was a little over half male, with a mean age of 24.8 years. About three-quarters of respondents were daily smokers, and the mean number of cigarettes smoked per day was 10.05. Only 17.3% of participants had ever used smokeless tobacco (ST) and, of those, only 8.8% had used it in the past month. Nearly a quarter of respondents were of minority ethnicity. The income distribution of the respondents was skewed towards higher income level, and 3.5% of respondents did not report any income information. Around a quarter of respondents fell into each of the low and high categories of education level, whereas around half fell into the moderate category of education level. Just over three-quarters (75.3%) of respondents reported being employed outside the home. About half of respondents reported that they were planning to quit within six months, and about half reported they were planning to quit beyond six months or not planning to quit. Just over two-thirds (68.8%) reported making a quit attempt in the past two years.

Almost all respondents were aware of nicotine replacement therapy (NRT) (94.4%), and just under half (47.5%) had ever used NRT and 2% could not remember if they had used it. Of those respondents who had ever used NRT, many had used gum (45.7%) and patch (31.3%); and relatively few had used lozenges (6.9%), tablets (2.3%), inhaler (6.9%), nasal spray (1.1%), prescription Zyban (8.5%) or Wellbutrin (4.6%), and other NRT (9.0%). Respondents reported using NRT “to stop smoking completely” (59.4%), “to reduce the amount you smoke” (21.6%), “to cope with times when you could not smoke or were not allowed to smoke” (10.3%), and for “other reasons” (8.8%).

ANOVA and chi-square analyses were run to check for differences across conditions for continuous and categorical moderators, respectively. There was a significant effect for age [$F(5,605)=3.47$, $p=.004$], but not for any other moderator.

Table 3. Characteristics of the sample of young adult smokers (n=611), by experimental condition and overall

	Condition							
Moderator	**1 (n=100) %**	**2 (n=100) %**	**3 (n=106) %**	**4 (n=104) %**	**5 (n=99) %**	**6 (n=102) %**	**Overall (n=611) %**	**(*n*)**
Gender								
Women	49.0%	60.0%	61.3%	49.0%	52.5%	49.0%	**53.5%**	**(327)**
Men	51.0%	40.0%	38.7%	51.0%	47.5%	51.0%	**46.5%**	**(284)**
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%**	**(457)**
Weekly	19.0%	12.0%	21.7%	14.4%	15.2%	10.8%	**15.5%**	**(95)**
Monthly	7.0%	7.0%	9.4%	7.7%	12.1%	14.7%	**9.7%**	**(59)**
Ethnicity								
White	79.0%	75.0%	72.6%	77.9%	78.4%	77.5%	**76.7%**	**(467)**
Minority	21.0%	25.0%	27.4%	22.1%	21.6%	22.5%	**23.3%**	**(142)**
Income								
Low	22.4%	26.8%	27.5%	19.8%	21.9%	29.0%	**24.6%**	**(146)**
Mod	37.8%	33.0%	29.4%	44.6%	29.2%	33.0%	**34.5%**	**(205)**
High	36.7%	40.2%	36.3%	30.7%	44.8%	36.0%	**37.4%**	**(222)**
Not Given	3.1%	0%	6.9%	5.0%	4.2%	2.0%	**3.5%**	**(21)**
Education								
Low	29.3%	27.0%	28.3%	26.9%	31.3%	28.4%	**28.5%**	**(174)**
Mod	51.5%	55.0%	38.7%	48.1%	43.4%	46.1%	**47.0%**	**(287)**
High	19.2%	18.0%	33.0%	25.0%	25.3%	25.5%	**24.4%**	**(149)**
HSI								
0	33.7%	20.2%	34.0%	21.7%	29.3%	25.0%	**27.4%**	**(153)**
1	10.5%	11.7%	11.7%	18.5%	12.0%	14.1%	**13.1%**	**(73)**
2	22.1%	13.8%	23.4%	27.2%	21.7%	21.7%	**21.6%**	**(121)**
3	13.7%	31.9%	19.1%	13.0%	19.6%	22.8%	**20.0%**	**(112)**
4	16.8%	16.0%	7.4%	14.1%	12.0%	10.9%	**12.9%**	**(72)**
5	3.2%	6.4%	4.3%	5.4%	5.4%	5.4%	**5.0%**	**(28)**
6	0%	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%**	**(127)**
Within 6 months	29.0%	30.0%	25.5%	28.8%	20.2%	23.5%	**26.2%**	**(160)**
Beyond 6 months	38.0%	39.0%	34.9%	32.7%	37.4%	36.3%	**36.3%**	**(222)**
Not planning to quit	9.0%	9.0%	17.0%	16.3%	9.1%	12.7%	**12.3%**	**(75)**
Not given	5.0%	5.0%	5.7%	3.8%	3.0%	3.9%	**4.4%**	**(27)**

6.1 Smokeless Tobacco

6.1.1 Familiarity

Respondents were asked if they had seen or heard of four ST products. Table 4 indicates that overall, 49.2% indicated that they were familiar with at least one of the ST products. Respondents were most familiar with Copenhagen and least familiar with Ariva.

Table 4. Responses to the question, "Have you ever heard of or seen this product?" (n=611)

	duMaurier	**Marlboro**	**Copenhagen**	**Ariva**	
					**At least one 'yes' for all four products**
Condition	**% Yes**	**% Yes**	**% Yes**	**% Yes**	**% Yes**
1-No WL	11.1	10.2	44.9	8.2	**54.3**
2-No WL+RR	13.0	18.0	42.9	11.3	**53.7**
3-Text WL	17.1	17.9	34.0	11.3	**45.7**
4-Text WL+RR	15.4	9.6	34.6	11.7	**50.5**
5-Pic WL	15.2	8.2	38.1	8.2	**46.9**
6-Pic WL+RR	14.7	9.9	31.7	9.8	**45.0**
Overall	**14.4**	**12.4**	**37.6**	**10.1**	**49.2**

Response options: 1 - No, 2 – Yes

Table 5 displays the binary logistic regression model examining overall product familiarity. No differences were observed across experimental conditions. Males had higher odds of familiarity. Older respondents, and those who were not planning to quit compared to those planning to quit within one month had lower odds of familiarity.

Table 5. Adjusted binary logistic regression model for overall product familiarity (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	-0.88	0.92	0.64-1.32	0.639
WL Type		χ^2=3.38		0.184
Text vs. No WL	-0.177	0.84	0.54-1.31	0.436
Pic vs. No WL	-0.423	0.66	0.42-1.03	0.067
Pic vs. Text WL	-0.245	0.78	0.50-1.23	0.285
Gender (ref=female)	**0.987**	**2.68**	**1.84-3.91**	**<.001**
Age	**-0.062**	**0.94**	**0.89-1.00**	**0.040**
Smoking Status (ref=daily)		χ^2=0.397		0.820
Weekly	0.073	1.08	0.60-1.94	0.807
Monthly	0.225	1.25	0.62-2.54	0.533
Ethnicity (ref=white)	-0.172	0.84	0.53-1.33	0.463
Education (ref=low)		χ^2=0.952		0.621
Mod	0.211	1.23	0.80-1.91	0.345
High	0.086	1.09	0.63-1.88	0.758
Income (ref=low)		χ^2=3.84		0.279
Mod	0.297	1.35	0.83-2.20	0.234
High	0.443	1.56	0.95-2.56	0.080
Not given	-0.237	0.79	0.26-2.43	0.679
HSI	0.096	1.10	0.96-1.26	0.169
Quit Intention (ref=Within 1 month)		**χ^2=12.00**		**0.017**
Within 6 months	-0.209	0.81	0.48-1.38	0.440
Beyond 6 months	-0.494	0.61	0.37-1.00	0.051
Not planning to quit	**-0.698**	**0.50**	**0.25-0.98**	**0.045**
Not given	1.150	3.16	0.92-10.86	0.068
Model Adjusted R Squared		0.094		

Table 6 shows results from the adjusted binary logistic regression model examining the same familiarity outcome for each of the four ST separately. No differences were observed across experimental conditions for any of the four products.

Table 6. Adjusted binary logistic regression model for product-specific familiarity (n=611)

	duMaurier				Marlboro				Copenhagen				Ariva			
																
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	-0.073	0.92	0.56-1.54	0.777	0.167	1.18	0.69-2.03	0.543	-0.381	0.68	0.47-0.99	0.047	0.327	1.39	0.78-2.46	0.261
WL Type		χ^2=1.46		0.482		χ^2=3.98		0.137		χ^2=3.95		0.139		χ^2=1.66		0.436
Text vs. No WL	0.350	1.42	0.77-2.63	0.265	-0.160	0.85	0.46-1.58	0.612	-0.298	0.74	0.47-1.17	0.195	0.247	1.28	0.65-2.52	0.473
Pic vs. No WL	0.058	1.06	0.56-2.00	0.857	-0.695	0.50	0.25-1.00	0.050	-0.454	0.64	0.40-1.01	0.053	-0.207	0.81	0.39-1.69	0.578
Text vs. Pic WL	-0.292	0.75	0.40-1.38	0.351	-0.536	0.59	0.29-1.19	0.137	-0.156	0.86	0.54-1.37	0.516	-0.454	0.64	0.32-1.28	0.202
Model Adjusted R Squared	0.076				0.069				0.104				0.057			

6.1.2 Appeal

Respondents were asked if the ST products would appeal to people their age. Table 7 indicates that overall, 53.0% indicated that at least one of the ST products would appeal to people their age. Respondents indicated that duMaurier would appeal most and Copenhagen would appeal least to those their age.

Table 7. Responses* to the question, "Would this product appeal to people your age?" (n=611)

	duMaurier	**Marlboro**	**Copenhagen**	**Ariva**	
					**At least one 'yes' for any four products**
Condition	**% Yes**	**% Yes**	**% Yes**	**% Yes**	**%**
1-No WL	30.6	29.3	18.8	39.2	**67.0**
2-No WL+RR	45.4	29.5	16.1	38.7	**63.3**
3-Text WL	38.8	32.0	16.5	30.1	**57.3**
4-Text WL+RR	40.6	32.4	13.7	36.3	**59.0**
5-Pic WL	18.1	12.8	16.7	9.4	**31.9**
6-Pic WL+RR	22.2	21.0	16.2	20.6	**38.9**
Overall	**32.7**	**26.3**	**16.3**	**29.1**	**53.0**

Response options: 1 –Not at all, 2 –Unlikely, 3 –Undecided, 4 –Somewhat, 5 – Very
*Dichotomised to 'Yes' (4-5) and 'Other' (1-3)

Table 8 displays the binary logistic regression model examining overall product appeal. The main effect of viewing a health warning was significant. Specifically, those who viewed products with a picture warning label had lower odds of appeal compared to those who viewed products with either a text warning or no warning. Those who smoked weekly compared to daily, ethnic minorities, and those with high income had higher odds of appeal.

Table 8. Adjusted binary logistic regression model for overall product appeal (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.250	1.28	0.88-1.88	0.200
WL Type		**χ^2=34.85**		**<.001**
Text vs. No WL	-0.255	0.77	0.49-1.24	0.284
Pic vs. No WL	**-1.370**	**0.26**	**0.16-0.41**	**<.001**
Pic vs. Text WL	**-1.109**	**0.33**	**0.21-0.53**	**<.001**
Gender (ref=female)	0.322	1.38	0.93-2.04	0.105
Age	-0.044	0.96	0.90-1.02	0.160
Smoking Status (ref=daily)		**χ^2=6.38**		**0.041**
Weekly	**0.829**	**2.29**	**1.20-4.36**	**0.012**
Monthly	0.215	1.24	0.60-2.56	0.562
Ethnicity (ref=white)	**0.713**	**2.04**	**1.23-3.38**	**0.005**
Education (ref=low)		χ^2=0.537		0.764
Mod	-0.099	0.91	0.57-1.43	0.674
High	0.079	1.08	0.61-1.91	0.786
Income (ref=low)		**χ^2=13.74**		**0.003**
Mod	0.260	1.30	0.78-2.16	0.317
High	**0.822**	**2.28**	**1.35-3.83**	**0.002**
Not given	-0.643	0.53	0.16-1.71	0.284
HSI	0.039	1.04	0.90-1.20	0.598
Quit Intention (ref=Within 1 month)		χ^2=3.906		0.419
Within 6 months	-0.284	0.75	0.43-1.31	0.317
Beyond 6 months	-0.203	0.82	0.48-1.38	0.451
Not planning to quit	-0.709	0.49	0.24-1.03	0.059
Not given	0.081	1.08	0.32-3.67	0.897
Model Adjusted R Squared		0.137		

Table 9 shows results from the adjusted binary logistic regression model examining the same appeal outcome for each of the four ST products separately. For duMaurier, the main effect of viewing a relative risk message was significant, and was associated with increased odds of appeal. For duMaurier, Marlboro, and Ariva, the main effect of viewing a health warning was significant. More specifically, viewing a picture warning label increased odds of appeal compared to viewing either text or no warning.

Viewing a relative risk message was not significantly associated with appeal in the main effects model for duMaurier (χ^2=3.26, p=.071), but became significant when the predictors were added to the model (χ^2=6.00, p=.014).

Table 9. Adjusted logistic regression model for product-specific appeal (n=611)

	duMaurier				Marlboro				Copenhagen				Ariva			
																
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	**0.493**	**1.64**	**1.10-2.43**	**0.014**	0.300	1.35	0.89-2.04	0.156	-0.119	0.89	0.55-1.43	0.63	0.356	1.43	0.96-2.13	0.08
WL Type		**χ^2=20.53**		**<.001**		**χ^2=12.77**		**0.002**		χ^2=0.390		0.82		**χ^2=26.09**		**<.001**
Text vs. No WL	0.138	1.15	0.73-1.81	0.551	0.178	1.20	0.74-1.92	0.463	-0.094	0.91	0.51-1.64	0.75	-0.187	0.83	0.53-1.30	0.415
Pic vs. No WL	**-0.971**	**0.38**	**0.23-0.63**	**<.001**	**-0.760**	**0.47**	**0.28-0.80**	**0.005**	-0.186	0.83	0.46-1.49	0.53	**-1.333**	**0.26**	**0.16-0.45**	**<.001**
Text vs. Pic WL	**-1.109**	**0.33**	**0.20-0.55**	**<.001**	-0.938	0.39	0.23-0.67	0.088	-0.092	0.91	0.50-1.66	0.76	**-1.145**	**0.32**	**0.19-0.54**	**<.001**
Model Adjusted R Squared		0.107				0.105				0.050				0.096		

6.1.3 Likelihood of Future Use

Respondents were asked how likely they would be to try each product in the future. Table 10 shows that overall, 43.6% indicated that they were likely to try at least one of the ST products. Respondents indicated that they would be most likely to try Ariva and least likely to try Copenhagen.

Table 10. Responses* to the question, "Overall, how likely would you be to try this product in the future?" (n=611)

	duMaurier		**Marlboro**		**Copenhagen**		**Ariva**		
									**At least one 'yes' for any four products**
Condition	**% Undecided**	**% Yes**	**% Undecided**	**% Yes**	**% Undecided**	**% Yes**	**% Undecided**	**% Yes**	**%**
1-No WL	53.5	26.5	24.5	25.5	13.3	8.2	32.0	32.0	**49.0**
2-No WL+RR	19.2	45.5	26.3	27.3	19.6	12.4	34.0	39.2	**63.5**
3-Text WL	23.1	20.2	20.4	23.3	14.6	10.7	23.5	23.5	**35.6**
4-Text WL+RR	17.5	35.0	18.6	26.5	16.5	7.8	24.5	34.3	**55.6**
5-Pic WL	27.1	14.6	21.9	11.5	6.2	8.2	27.1	13.5	**26.6**
6-Pic WL+RR	15.7	19.6	12.7	18.6	9.8	8.8	24.2	19.2	**31.3**
Overall	**20.9**	**26.9**	**20.7**	**22.2**	**13.3**	**9.3**	**27.5**	**27.0**	**43.6**

Response options: 1 - Definitely not, 2 - Probably not, 3 - Undecided, 4 - Probably try, 5 - Definitely try
*Dichotomised to 'Yes' (4-5) and 'Other' (1-3)

Table 11 displays the logistic regression model examining overall likelihood of future use. The main effects of viewing a relative risk message and a health warning were both significant. Participants who viewed a relative health risk message on products had higher odds of reporting future use, while those who viewed a picture warning label had lower odds of reporting future use compared to those who viewed either a text warning or no warning. Minorities also had higher odds of reporting future use.

Table 11. Adjusted binary logistic regression model for overall likelihood of future product use (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	**0.713**	**2.04**	**1.40-2.98**	**<.001**
WL Type		**χ^2=30.96**		**<.001**
Text vs. No WL	-0.365	0.69	0.45-1.08	0.109
Pic vs. No WL	**-1.320**	**0.27**	**0.17-0.43**	**<.001**
Pic vs. Text WL	**-0.955**	**0.39**	**0.24-0.62**	**<.001**
Gender (ref=female)	0.201	1.22	0.83-1.79	0.303
Age	-0.050	0.95	0.90-1.01	0.104
Smoking Status (ref=daily)		χ^2=0.54		0.763
Weekly	0.117	1.12	0.62-2.04	0.699
Monthly	-0.189	0.83	0.40-1.72	0.613
Ethnicity (ref=white)	**0.504**	**1.66**	**1.04-2.64**	**0.034**
Education (ref=low)		χ^2=2.50		0.287
Mod	-0.131	0.88	0.56-1.38	0.571
High	0.260	1.30	0.74-2.27	0.361
Income (ref=low)				0.191
Mod	0.276	1.32	0.80-2.17	0.277
High	0.433	1.54	0.93-2.55	0.091
Not given	-0.603	0.55	0.16-1.88	0.338
HSI	-0.084	0.92	0.80-1.06	0.243
Quit Intention (ref=Within 1 month)		χ^2=7.77		0.101
Within 6 months	0.265	1.30	0.76-2.25	0.340
Beyond 6 months	0.507	1.66	0.99-2.79	0.054
Not planning to quit	-0.226	0.80	0.39-1.64	0.538
Not given	-0.353	0.70	0.22-2.24	0.551
Model Adjusted R Squared		0.127		

Table 12 shows results from the adjusted logistic regression model examining the same likelihood of future use outcome for each of the four ST products separately. For duMaurier and Ariva, the main effect of viewing a relative health risk message and a health warning were both significant. For Marlboro, the main effect of viewing a health warning was significant. For duMaurier, Marlboro, and Ariva, participants viewing a health warning label had lower odds of reporting future use, and participants viewing a relative risk message had higher odds of reporting future use. Specifically, participants who viewed a picture warning label had lower odds of reporting future use compared to those who viewed either a text warning or no warning.

Table 12. Adjusted binary logistic regression model for product-specific likelihood of future product use (n=611)

	duMaurier 				**Marlboro** 				**Copenhagen** 				**Ariva** 			
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	**0.843**	**2.32**	**1.53-3.53**	**<.001**	0.401	1.49	0.96-2.31	0.072	-0.012	0.99	0.54-1.83	0.971	**0.618**	**1.86**	**1.23-2.81**	**0.003**
WL Type		**χ^2=16.82**		**<.001**		**χ^2=9.97**		**0.007**		χ^2=0.45		0.798		**χ^2=25.04**		**<.001**
Text vs. No WL	-0.323	0.72	0.45-1.16	0.177	-0.078	0.92	0.56-1.52	0.757	-0.073	0.93	0.44-1.94	0.845	-0.265	0.77	0.48-1.22	0.262
Pic vs. No WL	**-1.102**	**0.33**	**0.20-0.56**	**<.001**	**-0.84**	**0.43**	**0.25-0.75**	**0.003**	-0.254	0.78	0.37-1.65	0.509	**-1.367**	**0.25**	**0.15-0.44**	**<.001**
Text vs. Pic WL	**-0.779**	**0.46**	**0.27-0.79**	**0.004**	**-0.764**	**0.47**	**0.27-0.82**	**0.008**	-0.180	0.84	0.39-1.80	0.646	**-1.102**	**0.33**	**0.19-0.58**	**<.001**
Model Adjusted R Squared		0.104				0.098				0.065				0.103		

6.1.4 Reasons for Product Use

Respondents were asked whether they would be willing to try each of the four ST products for five reasons. Three indexes were generated: i) a product-specific index for answering 'yes' to at least one of the five reasons, ii) a reason-specific index for answering 'yes' for at least one of the four products, and iii) an overall index for answering 'yes' to at least one of the five reasons, for at least one of the four products. Though the overall index takes into account only 'yes' responses, it is worth noting that at least 95% of respondents answered 'yes' or 'maybe' to at least one of the five questions about willingness to try at least one of the four ST products.

Reason #1: Willing to try ST in places where you cannot smoke.

Table 13 shows that overall, nearly half (48.9%) of the respondents answered that they were willing to use <u>at least one of the four ST products</u> *in places where they cannot smoke*. Respondents were most willing to try duMaurier and least willing to try Copenhagen.

Table 13. Responses* to the question, "Would you be willing to try this product in places where you can't smoke cigarettes?" (n=611)

	duMaurier		**Marlboro**		**Copenhagen**		**Ariva**		**At least one 'yes' for any four products**
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	47.5	32.3	52.0	29.6	82.7	10.2	40.8	34.7	**55.7**
2-No WL+RR	37.1	30.9	47.9	28.1	74.7	13.7	29.6	34.7	**54.3**
3-Text WL	52.0	27.5	58.3	18.4	76.0	14.4	53.4	22.3	**48.5**
4-Text WL+RR	44.2	34.6	51.5	30.7	82.5	11.7	40.8	28.2	**57.0**
5-Pic WL	68.0	21.6	67.7	24.7	81.6	12.2	64.9	28.9	**47.8**
6-Pic WL+RR	67.6	16.7	72.5	14.7	85.1	5.0	67.0	13.0	**30.3**
Overall	**52.7**	**27.3**	**58.3**	**24.3**	**80.5**	**11.2**	**49.4**	**26.9**	**48.9**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 14 displays the logistic regression model examining 'willingness to try where you can't smoke' index. No differences were observed across experimental conditions. Participants reporting a moderate income level had higher odds of reporting willingness to try at least one product. The interaction between warning label and relative risk message was significant in the main effects model, and was therefore included in the full model. In the full model, the interaction remained significant (χ^2=7.05, p=.030).

Table 14. Adjusted binary logistic regression model for overall 'willingness to try where you can't smoke' index (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	0.032	1.03	0.56-1.92	0.920
WL Type		χ^2=2.95		0.229
Text vs. No WL	-0.651	0.52	0.13-2.06	0.352
Pic vs. No WL	0.575	1.78	0.44-7.13	0.417
Pic vs. Text WL	1.226	3.41	0.84-13.83	0.086
RR Message (by WL Type)		**χ^2=7.05**		**0.030**
For Text WL	0.320	1.38	0.58-3.29	0.472
For Pic WL	-0.855	0.43	0.17-1.04	0.060
Gender (ref=female)	0.193	1.21	0.83-1.77	0.314
Age	-0.008	0.99	0.94-1.05	0.787
Smoking Status (ref=daily)		χ^2=0.82		0.665
Weekly	-0.243	0.78	0.44-1.40	0.411
Monthly	0.054	1.06	0.52-2.14	0.882
Ethnicity (ref=white)	0.247	1.28	0.81-2.03	0.292
Education (ref=low)		χ^2=2.06		0.357
Mod	-0.171	0.84	0.54-1.30	0.443
High	0.168	1.18	0.68-2.05	0.549
Income (ref=low)		χ^2=6.96		0.073
Mod	**0.551**	**1.73**	**1.06-2.84**	**0.028**
High	0.470	1.60	0.97-2.63	0.064
Not given	1.118	3.06	0.94-9.99	0.064
HSI	0.032	1.03	0.90-1.19	0.648
Quit Intention (ref=Within 1 month)		**χ^2=11.15**		**0.025**
Within 6 months	0.007	1.01	0.60-1.70	0.979
Beyond 6 months	0.494	1.64	0.99-2.70	0.053
Not planning to quit	-0.314	0.73	0.36-1.47	0.377
Not given	-0.689	0.50	0.16-1.59	0.242
Model Adjusted R Squared		0.080		

Reason #2: Willing to try ST when you do not want to smoke around others.

Table 15 shows that overall, nearly half (47.6%) of the respondents answered that they were willing to use at least one of the four ST products *when they don't want to smoke around others*. Respondents were most willing to try duMaurier and least willing to try Copenhagen.

Table 15. Responses* to the question, "Would you be willing to try this product for the times when you don't want to smoke around others?" (n=611)

	duMaurier		**Marlboro**		**Copenhagen**		**Ariva**		**At least one 'yes' for any four products**
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	50.5	33.0	56.1	24.5	83.7	8.2	46.9	30.6	**50.5**
2-No WL+RR	37.8	28.6	45.7	24.5	77.3	10.3	28.9	33.0	**54.3**
3-Text WL	56.9	25.5	57.3	21.4	80.8	12.5	48.1	23.1	**48.5**
4-Text WL+RR	47.6	31.1	53.4	27.2	84.3	11.8	41.7	33.0	**51.5**
5-Pic WL	63.5	25.0	64.6	25.0	83.5	10.3	62.9	27.8	**46.7**
6-Pic WL+RR	72.0	17.0	75.2	14.9	86.3	8.8	71.0	11.0	**34.0**
Overall	**54.7**	**26.7**	**58.8**	**22.9**	**82.7**	**10.3**	**49.9**	**26.4**	**47.6**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 16 displays the logistic regression model examining 'willingness to try when you don't want to smoke around others' index. No differences were observed across experimental conditions. Participants who viewed a picture warning label had lower odds of reporting willingness to try at least one product compared to those who did not view any warning label.

Warning labels were significantly associated with willingness to try in the main effects model (χ^2=6.25, p=.044), but became non-significant when the predictors were added to the model.

Table 16. Adjusted binary logistic regression model for overall 'willingness to try when you don't want to smoke around others' index (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	-0.054	0.95	0.66-1.36	0.770
WL Type		χ^2=5.65		0.059
Text vs. No WL	-0.173	0.84	0.54-1.30	0.437
Pic vs. No WL	**-0.530**	**0.59**	**0.38-0.92**	**0.019**
Pic vs. Text WL	-0.356	0.70	0.45-1.09	0.116
Gender (ref=female)	0.232	1.26	0.87-1.82	0.216
Age	-0.001	1.00	0.94-1.06	0.971
Smoking Status (ref=daily)		χ^2=0.26		0.877
Weekly	-0.097	0.91	0.51-1.62	0.742
Monthly	-0.164	0.85	0.43-1.69	0.642
Ethnicity (ref=white)	0.366	1.44	0.92-2.27	0.114
Education (ref=low)		χ^2=2.51		0.285
Mod	-0.045	0.96	0.62-1.47	0.837
High	0.332	1.39	0.81-2.40	0.230
Income (ref=low)		χ^2=2.52		0.472
Mod	0.298	1.35	0.84-2.17	0.221
High	0.196	1.22	0.75-1.98	0.429
Not given	0.713	2.04	0.67-6.17	0.207
HSI	0.026	1.03	0.90-1.17	0.710
Quit Intention (ref=Within 1 month)		χ^2=6.02		0.197
Within 6 months	-0.156	0.86	0.51-1.44	0.559
Beyond 6 months	0.294	1.34	0.82-2.19	0.239
Not planning to quit	-0.313	0.73	0.37-1.44	0.368
Not given	-0.232	0.79	0.27-2.30	0.669
Model Adjusted R Squared		0.044		

Reason #3: Willing to try ST to help cut back the amount you smoke.

Table 17 shows that overall, nearly half (48.8%) of the respondents answered that they were willing to use at least one of the four ST products *to help cut back the amount they smoke*. Respondents were most willing to try Ariva and least willing to try Copenhagen.

Table 17. Responses* to the question, "Would you be willing to try this product to help you cut back the amount you smoke?" (n=611)

	duMaurier 		**Marlboro** 		**Copenhagen** 		**Ariva** 		**At least one 'yes' for any four products**
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	54.1	26.5	54.6	20.6	80.6	8.2	36.1	34.0	**55.3**
2-No WL+RR	35.7	30.6	48.9	29.8	74.0	14.6	29.9	29.9	**56.0**
3-Text WL	54.3	27.6	60.6	18.3	84.5	7.8	51.9	25.0	**48.5**
4-Text WL+RR	43.1	32.4	53.5	27.7	79.4	16.7	43.7	30.1	**54.1**
5-Pic WL	65.6	23.7	67.3	23.5	81.8	11.1	64.3	24.5	**43.5**
6-Pic WL+RR	70.0	15.0	71.6	13.7	83.3	7.8	62.0	20.0	**35.7**
Overall	**53.7**	**26.0**	**59.6**	**22.1**	**80.7**	**11.0**	**48.1**	**27.2**	**48.8**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 18 displays the logistic regression model examining 'willingness to try to help cut back' index. The main effect of viewing a warning label was significant. Participants who viewed a picture warning label had lower odds of reporting willingness to try ST compared to those who did not view a warning label.

Table 18. Adjusted binary logistic regression model for overall 'willingness to try to help cut back' index (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	0.003	1.00	0.70-1.43	0.985
WL Type		**χ^2=8.61**		**0.013**
Text vs. No WL	-0.273	0.76	0.49-1.18	0.219
Pic vs. No WL	**-0.658**	**0.52**	**0.33-0.80**	**0.003**
Pic vs. Text WL	-0.386	0.68	0.44-1.06	0.086
Gender (ref=female)	-0.055	0.95	0.66-1.36	0.768
Age	-0.056	0.95	0.89-1.00	0.058
Smoking Status (ref=daily)		χ^2=1.63		0.444
Weekly	-0.316	0.73	0.41-1.29	0.279
Monthly	-0.332	0.72	0.35-1.46	0.358
Ethnicity (ref=white)	0.253	1.29	0.82-2.02	0.268
Education (ref=low)		χ^2=1.97		0.373
Mod	0.193	1.21	0.79-1.86	0.378
High	0.386	1.47	0.86-2.53	0.162
Income (ref=low)		χ^2=1.91		0.592
Mod	0.239	1.27	0.79-2.05	0.324
High	0.146	1.16	0.71-1.87	0.553
Not given	-0.393	0.68	0.23-2.00	0.479
HSI	0.025	1.03	0.90-1.17	0.711
Quit Intention (ref=Within 1 month)		χ^2=3.30		0.508
Within 6 months	0.270	1.31	0.78-2.20	0.308
Beyond 6 months	0.378	1.46	0.90-2.38	0.129
Not planning to quit	0.039	1.04	0.53-2.04	0.910
Not given	-0.123	0.88	0.31-2.55	0.820
Model Adjusted R Squared		0.041		

Reason #4: Willing to try ST to help while you are trying to quit smoking.

Table 19 shows that overall, nearly half (48.1%) of the respondents answered that they were willing to use at least one of the four ST products *to help while they are trying to quit smoking*. Respondents were most willing to try Ariva and least willing to try Copenhagen.

Table 19. Responses* to the question, "Would you be willing to try this product to help you while you are trying to quit smoking?" (n=611)

	duMaurier		**Marlboro**		**Copenhagen**		**Ariva**		**At least one 'yes' for any four products**
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	51.5	27.3	51.0	20.8	82.7	9.2	34.7	25.5	**48.4**
2-No WL+RR	32.3	31.3	42.3	33.0	74.5	11.2	24.0	31.2	**60.9**
3-Text WL	58.3	21.4	58.3	19.4	77.7	11.7	48.5	23.3	**44.0**
4-Text WL+RR	43.7	31.1	57.6	23.2	76.7	19.4	38.2	33.3	**58.2**
5-Pic WL	66.7	22.9	69.1	21.3	83.5	12.4	66.3	22.4	**40.0**
6-Pic WL+RR	69.7	13.1	69.3	12.9	85.3	7.8	57.0	25.0	**37.1**
Overall	**53.6**	**24.5**	**58.0**	**21.7**	**80.0**	**12.0**	**44.9**	**26.8**	**48.1**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 20 displays the logistic regression model examining 'willingness to try to help quit' index. The main effects of viewing a relative risk message and a health warning were both significant. Participants who viewed a relative health risk message had higher odds of reporting willingness to try ST, and those who viewed a picture health warning label had lower odds of reporting willingness to try ST compared to those who did not view a warning label. Participants who were planning to quit smoking beyond six months compared to those planning to quit within one month had higher odds of reporting willingness to try ST.

Viewing a relative risk message was not significantly associated with willingness to try ST to help quit in the main effects model (χ^2=3.76, p=.053), but became significant when the predictors were added to the model.

Table 20. Adjusted binary logistic regression model for overall 'willingness to try to help quit' index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	**0.388**	**1.47**	**1.03-2.12**	**0.036**
WL Type		**χ^2=7.62**		**0.022**
Text vs. No WL	-0.215	0.81	0.52-1.25	0.336
Pic vs. No WL	**-0.623**	**0.54**	**0.34-0.84**	**0.006**
Pic vs. Text WL	-0.408	0.665	0.43-1.04	0.073
Gender (ref=female)	-0.066	0.94	0.65-1.36	0.726
Age	0.001	1.00	0.94-1.06	0.984
Smoking Status (ref=daily)		χ^2=1.71		0.425
Weekly	-0.372	0.69	0.38-1.24	0.212
Monthly	0.024	1.02	0.50-2.08	0.946
Ethnicity (ref=white)	0.415	1.52	0.97-2.37	0.068
Education (ref=low)		χ^2=0.42		0.812
Mod	-0.031	0.97	0.63-1.50	0.890
High	0.125	1.13	0.66-1.95	0.652
Income (ref=low)		χ^2=0.09		0.993
Mod	0.048	1.05	0.65-1.70	0.844
High	0.030	1.03	0.63-1.68	0.902
Not given	0.155	1.17	0.38-3.64	0.789
HSI	0.042	1.04	0.91-1.19	0.539
Quit Intention (ref=Within 1 month)		χ^2=8.22		0.084
Within 6 months	0.252	1.29	0.76-2.18	0.350
Beyond 6 months	**0.637**	**1.89**	**1.15-3.11**	**0.012**
Not planning to quit	0.362	1.44	0.73-2.84	0.298
Not given	-0.242	0.78	0.26-2.37	0.668
Model Adjusted R Squared		0.053		

Reason #5: Willing to try ST as a long-term replacement instead of cigarettes.

Table 21 shows that overall, nearly a third (31.7%) of the respondents answered that they were willing to use at least one of the four ST products *as a long-term replacement instead of cigarettes*. Respondents were most willing to try duMaurier and Ariva and least willing to try Copenhagen.

Table 21. Responses* to the question, "Would you be willing to try this product as a long-term replacement instead of cigarettes?" (n=611)

	duMaurier		**Marlboro**		**Copenhagen**		**Ariva**		**At least one 'yes' for any four products**
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	71.9	14.6	71.9	15.6	85.7	8.2	66.7	19.8	**35.5**
2-No WL+RR	59.8	27.8	70.4	17.3	83.8	10.1	58.6	24.2	**42.6**
3-Text WL	70.2	16.3	71.2	15.4	89.3	4.9	66.7	20.6	**31.0**
4-Text WL+RR	60.6	25.0	68.0	20.0	80.8	16.3	65.0	21.4	**40.0**
5-Pic WL	80.4	14.4	82.1	12.6	90.5	7.4	84.5	12.4	**25.8**
6-Pic WL+RR	83.0	8.0	79.2	9.9	89.2	4.9	82.0	8.0	**15.5**
Overall	**70.9**	**17.7**	**73.7**	**15.2**	**86.5**	**8.7**	**70.5**	**17.8**	**31.7**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 22 displays the logistic regression model examining 'willingness to try as a long-term replacement' index. The main effect of viewing a warning label was significant. Participants who viewed a picture health warning lower had higher odds of reporting willingness to try ST compared to those who viewed either a text warning or no warning label. Ethnic minorities had higher odds of reporting willingness to try ST.

Table 22. Adjusted binary logistic regression model for overall 'willingness to try as a long-term replacement' index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.081	1.08	0.73-1.61	0.689
WL Type		**χ^2=17.83**		**<.001**
Text vs. No WL	-0.099	0.91	0.58-1.43	0.668
Pic vs. No WL	**-1.034**	**0.36**	**0.21-0.59**	**<.001**
Pic vs. Text WL	**-0.935**	**0.39**	**0.24-0.66**	**<.001**
Gender (ref=female)	0.164	1.18	0.79-1.76	0.425
Age	-0.021	0.98	0.92-1.04	0.516
Smoking Status (ref=daily)		χ^2=0.61		0.738
Weekly	-0.222	0.80	0.43-1.48	0.480
Monthly	0.056	1.06	0.49-2.26	0.886
Ethnicity (ref=white)	**0.533**	**1.70**	**1.06-2.73**	**0.027**
Education (ref=low)		χ^2=0.10		0.951
Mod	-0.072	0.93	0.58-1.50	0.769
High	-0.021	0.98	0.54-1.78	0.945
Income (ref=low)		χ^2=2.47		0.480
Mod	0.209	1.23	0.73-2.08	0.433
High	0.098	1.10	0.65-1.88	0.719
Not given	-0.963	0.38	0.08-1.84	0.230
HSI	-0.139	0.87	0.75-1.01	0.068
Quit Intention (ref=Within 1 month)		χ^2=5.40		0.248
Within 6 months	0.364	1.44	0.80-2.59	0.226
Beyond 6 months	0.508	1.66	0.95-2.90	0.073
Not planning to quit	-0.136	0.87	0.40-1.93	0.737
Not given	0.020	1.02	0.32-3.30	0.973
Model Adjusted R Squared		0.076		

Reasons for Use Index

Table 23 shows that overall, two-thirds (66.3%) of the respondents answered that they were willing to use at least one of the four ST products for at least one of the five reasons. Respondents were most willing to try Ariva and least willing to try Copenhagen.

Table 23. 'Yes' responses to at least one of five specific questions regarding willingness to try the ST product for five reasons

	duMaurier	**Marlboro**	**Copenhagen**	**Ariva**	
					**All four combined (Overall)**
Condition	**% Yes** [b]	**% Yes** [b]	**% Yes** [b]	**% Yes** [b]	**% Yes** [c]
1-No WL	46.8	44.8	17.3	53.7	**73.3**
2-No WL+RR	53.1	44.1	27.4	55.2	**73.0**
3-Text WL	42.4	39.2	19.4	47.0	**67.4**
4-Text WL+RR	48.0	45.8	22.0	54.5	**74.2**
5-Pic WL	39.6	34.1	20.4	40.4	**55.4**
6-Pic WL+RR	30.2	30.0	15.8	35.0	**53.8**
Overall	**43.4**	**39.6**	**20.3**	**47.6**	**66.3**

[b] Overall index for answering 'yes' to at least one of the five reasons, for at least one of the four products
[c] Product-specific index for answering 'yes' to at least one of the five reasons

Table 24 displays the logistic regression model examining overall reasons for use index. The main effect of viewing a warning label was significant. Participants who viewed a picture warning label had lower odds of reporting willingness to use ST (for at least one of the five reasons for at least one of the four products) compared to those who viewed either a text warning or no warning. Those reporting a high education had higher odds of reporting willingness to use ST.

Table 24. Adjusted binary logistic regression model for overall reasons for product use index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.224	1.25	0.84-1.86	0.272
WL Type		**χ^2=15.57**		**<.001**
Text vs. No WL	-0.168	0.85	0.51-1.39	0.509
Pic vs. No WL	**-0.915**	**0.40**	**0.25-0.65**	**<.001**
Pic vs. Text WL	**-0.747**	**0.47**	**0.29-0.77**	**0.003**
Gender (ref=female)	-0.011	0.99	0.66-1.49	0.956
Age	-0.046	0.95	0.90-1.05	0.147
Smoking Status (ref=daily)		χ^2=0.19		0.911
Weekly	0.118	1.13	0.59-2.15	0.720
Monthly	-0.052	0.95	0.45-2.02	0.893
Ethnicity (ref=white)	0.322	1.38	0.82-2.31	0.223
Education (ref=low)		χ^2=4.60		0.100
Mod	0.108	1.11	0.70-1.77	0.648
High	**0.634**	**1.89**	**1.02-3.48**	**0.042**
Income (ref=low)		χ^2=2.55		0.466
Mod	0.376	1.46	0.87-2.44	0.154
High	0.373	1.45	0.86-2.46	0.164
Not given	0.372	1.45	0.41-5.15	0.565
HSI	0.053	1.05	0.91-1.22	0.487
Quit Intention (ref=Within 1 month)		χ^2=9.36		0.053
Within 6 months	-0.001	1.00	0.57-1.76	0.997
Beyond 6 months	0.392	1.48	0.86-2.55	0.159
Not planning to quit	-0.456	0.63	0.31-1.31	0.216
Not given	-0.775	0.46	0.15-1.44	0.183
Model Adjusted R Squared		0.075		

Table 25 shows the results from the adjusted logistic regression model examining the same reasons for use index outcome for each of the four ST products separately. For duMaurier and Ariva, the main effect of viewing a warning label was significant. When viewing duMaurier, Marlboro, and Ariva, participants who viewed a picture warning label had lower odds of future use compared to those who viewed either a text warning or no warning.

Table 25. Adjusted binary logistic regression model for product-specific reasons for product use indexes (n=611)

	duMaurier 				**Marlboro** 				**Copenhagen** 				**Ariva** 			
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	0.036	1.04	0.72-1.49	0.846	0.049	1.05	0.72-1.52	0.798	0.220	1.25	0.81-1.93	0.324	0.120	1.13	0.79-1.61	0.511
WL Type		**χ^2=9.16**		**0.010**		**χ^2=7.43**		**0.024**		χ^2=1.30		0.521		**χ^2=10.41**		**0.005**
Text vs. No WL	-0.221	0.80	0.52-1.24	0.321	-0.089	0.91	0.59-1.43	0.694	-0.154	0.86	0.51-1.45	0.565	-0.259	0.77	0.50-1.19	0.237
Pic vs. No WL	**-0.667**	**0.50**	**0.32-0.79**	**.003**	**-0.603**	**0.55**	**0.35-0.87**	**0.010**	-0.315	0.73	0.43-1.25	0.254	**-0.717**	**0.49**	**0.31-0.76**	**0.001**
Text vs. Pic WL	**-0.466**	**0.63**	**0.40-0.99**	**0.045**	**-0.513**	**0.60**	**0.38-0.95**	**0.031**	-0.161	0.85	0.50-1.46	0.561	**-0.458**	**0.63**	**0.41-0.98**	**0.041**
Model Adjusted R Squared		0.048				0.067				0.092				0.041		

6.1.5 Relative Risk Beliefs

Respondents were asked to rate the health risk of the four ST products compared to cigarettes and NRTs.

a) **Smokeless Tobacco vs. Cigarette Relative Risk Beliefs**

Table 26 shows that overall, 27.9% of the respondents answered incorrectly that all four ST products are the same or more harmful 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 believed that ST is more harmful than cigarettes. Respondents perceived Ariva to be least harmful and Copenhagen to be most harmful compared to cigarettes.

Table 26. Responses* to the question, "In your opinion, how harmful to health is this product compared to regular cigarettes?" (n=611)

	duMaurier 		**Marlboro** 		**Copenhagen** 		**Ariva** 		**All four products 'The same or more harmful'**
Condition	**% Same**	**% Less Harm**	**% Same**	**% Less Harm**	**% Same**	**% Less Harm**	**% Same**	**% Less Harm**	**%**
1-No WL	44.9	41.6	39.1	47.1	48.8	26.7	25.0	67.9	**26.7**
2-No WL+RR	30.1	65.1	30.2	66.3	43.5	46.5	17.6	77.6	**14.7**
3-Text WL	48.3	36.0	42.4	40.2	41.3	26.1	34.4	53.8	**38.4**
4-Text WL+RR	37.5	53.1	35.1	52.6	45.3	32.6	25.0	64.6	**25.6**
5-Pic WL	50.5	34.1	48.3	37.1	47.7	23.9	42.2	45.6	**32.5**
6-Pic WL+RR	45.8	44.8	33.7	48.0	52.6	30.9	31.6	58.9	**28.1**
Overall	**43.0**	**45.6**	**38.1**	**49.2**	**46.6**	**30.6**	**29.5**	**61.1**	**27.9**

Response options: 1 – A lot less harmful, 2 – Somewhat less harmful, 3 – No difference, 4 – Somewhat more harmful, 5 – A lot more harmful
*Dichotomised to 'less harmful' (1-2) and 'the same or more harmful' (3-5)

Table 27 displays the logistic regression model examining overall ST-cigarette relative risk beliefs. The main effect of viewing a relative risk message was significant. Participants who

viewed a relative risk message had higher odds of reporting correct beliefs about the health risk of ST compared to cigarettes. Those who viewed a picture health warning label had lower odds of reporting correct beliefs compared to those who did not view a warning label. Males, those with moderate education, and those with high income had higher odds of reporting correct beliefs.

Viewing a warning label was significantly associated with ST-cigarette relative risk beliefs in the main effects model (χ^2=6.39, p=.041), but became non-significant when the predictors were added to the model.

Table 27. Adjusted binary logistic regression model for overall ST-cigarette relative risk beliefs (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	**0.877**	**2.40**	**1.47-3.92**	**<.001**
WL Type		χ^2=5.07		0.079
Text vs. No WL	-0.364	0.70	0.39-1.23	0.210
Pic vs. No WL	**-0.669**	**0.51**	**0.29-0.92**	**0.025**
Pic vs. Text WL	-0.306	0.74	0.41-1.34	0.315
Gender (ref=female)	**0.665**	**1.95**	**1.19-3.17**	**0.008**
Age	-0.071	0.93	0.86-1.01	0.070
Smoking Status (ref=daily)		χ^2=0.17		0.920
Weekly	0.072	1.07	0.51-2.27	0.851
Monthly	-0.141	0.87	0.35-2.15	0.761
Ethnicity (ref=white)	-0.289	0.75	0.41-1.38	0.353
Education (ref=low)		χ^2=5.46		0.141
Mod	**0.687**	**1.99**	**1.07-3.68**	**0.029**
High	0.703	2.02	0.96-4.27	0.066
Income (ref=low)		χ^2=5.46		0.141
Mod	0.534	1.71	0.87-3.33	0.118
High	**0.754**	**2.13**	**1.09-4.15**	**0.027**
Not given	-0.328	0.72	0.08-6.43	0.769
HSI	0.161	1.17	0.98-1.40	0.077
Quit Intention (ref=Within 1 month)		χ^2=4.36		0.359
Within 6 months	-0.448	0.64	0.32-1.26	0.197
Beyond 6 months	0.033	1.03	0.56-1.93	0.917
Not planning to quit	-0.141	0.87	0.35-2.17	0.763
Not given	0.758	2.14	0.52-8.73	0.291
Model Adjusted R Squared		0.092		

Table 28 shows results from the adjusted logistic regression model examining the same ST-cigarette relative risk beliefs outcome for each of the four ST products separately. For all four products, the main effect of viewing a relative risk message was significant. For duMaurier and Ariva, the main effect of viewing a warning label was significant. For all four products, participants who viewed a relative health risk message had higher odds of reporting correct beliefs. For duMaurier and Ariva, participants who viewed a warning label had lower odds of reporting correct beliefs. Specifically, those who viewed a picture warning label had lower odds of reporting correct beliefs compared to those who did not view a warning label for duMaurier and Marlboro, and had lower odds of reporting correct beliefs compared to those who viewed either a text warning or no warning for Ariva.

For Marlboro, viewing a warning label was significantly associated with ST-cigarette relative risk beliefs in the main effects model (χ^2=6.21, p=.045), but became non-significant when the predictors were added to the model.

Table 28. Adjusted binary logistic regression model for product-specific ST-cigarette relative risk beliefs (n=611)

	duMaurier 				**Marlboro** 				**Copenhagen** 				**Ariva** 			
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	**0.871**	**2.39**	**1.62-3.52**	**<.001**	**0.677**	**1.97**	**1.35-2.87**	**<.001**	**0.582**	**1.79**	**1.18-2.71**	**0.006**	**0.496**	**1.64**	**1.11-2.42**	**0.012**
WL Type	**χ^2=6.76**		**0.034**		χ^2=5.12		0.077		χ^2=2.31		0.315		**χ^2=13.99**		**0.001**	
Text vs. No WL	-0.377	0.69	0.43-1.10	0.117	-0.394	0.67	0.43-1.06	0.091	-0.265	0.77	0.47-1.26	0.297	**-0.620**	**0.54**	**0.33-0.88**	**0.013**
Pic vs. No WL	**-0.619**	**0.54**	**0.34-0.86**	**0.010**	**-0.503**	**0.60**	**0.38-0.96**	**0.032**	-0.375	0.69	0.42-1.13	0.142	**-0.930**	**0.39**	**0.24-0.65**	**<.001**
Text vs. Pic WL	-0.242	0.79	0.49-1.25	0.311	-0.109	0.90	0.67-1.41	0.639	-0.109	0.90	0.54-1.50	0.676	-0.310	0.73	0.46-1.16	0.187
Model Adjusted R Squared	0.092				0.068				0.082				0.077			

b) Smokeless Tobacco vs. Nicotine Replacement Therapy Relative Risk Beliefs

Table 29 shows that overall, nearly half (48.0%) of the respondents answered correctly that all four smokeless tobacco products are more harmful than NRT. Respondents perceived Ariva to be least harmful and Copenhagen to be most harmful compared to NRT.

Table 29. Responses* to the question, "In your opinion, how harmful to health is this product compared to nicotine replacement therapy (e.g., gum, patch, etc.)?" (n=611)

	duMaurier	**Marlboro**	**Copenhagen**	**Ariva**	**All four products 'The same or more harmful'**
					
Condition	**% Same/more harmful**	**% Same/more harmful**	**% Same/more harmful**	**% Same/more harmful**	**%**
1-No WL	74.7	79.1	91.9	34.6	**31.6**
2-No WL+RR	81.9	68.4	87.1	50.0	**39.2**
3-Text WL	80.9	77.3	87.8	67.8	**52.4**
4-Text WL+RR	77.6	75.8	88.4	57.5	**52.6**
5-Pic WL	86.9	87.5	93.0	73.3	**55.3**
6-Pic WL+RR	81.8	81.3	92.5	66.3	**55.4**
Overall	**80.6**	**78.4**	**90.1**	**58.6**	**48.0**

Response options: 1 – A lot less harmful, 2 – Somewhat less harmful, 3 – No difference, 4 – Somewhat more harmful, 5 – A lot more harmful
*Dichotomised to "less harmful" (1-2) and "the same or more harmful" (3-5)

Table 30 displays the logistic regression model examining overall ST-NRT relative risk beliefs, generated from the average across the four products. The main effect of viewing a warning label was significant. Participants who viewed either a picture or a text health warning label had higher odds of reporting accurate beliefs compared to those who did not view a warning label. Older participants had higher odds of reporting accurate beliefs. Males, ethnic minorities, those who smoke weekly compared to those who smoke daily, and those reporting moderate or high income had lower odds of reporting accurate beliefs.

Table 30. Adjusted binary logistic regression model for overall ST-NRT relative risk beliefs (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	-0.062	0.94	0.62-1.42	0.768
WL Type		**χ^2=18.21**		**<.001**
Text vs. No WL	**0.764**	**2.15**	**1.28-3.61**	**0.004**
Pic vs. No WL	**1.112**	**3.04**	**1.81-5.11**	**<.001**
Pic vs. Text WL	0.348	1.42	0.86-2.35	0.18
Gender (ref=female)	**-0.498**	**0.61**	**0.40-0.93**	**0.021**
Age	**0.087**	**1.09**	**1.02-1.17**	**0.001**
Smoking Status (ref=daily)		**χ^2=6.39**		**0.041**
Weekly	**-0.874**	**0.42**	**0.21-0.83**	**0.012**
Monthly	-0.383	0.68	0.32-1.46	0.325
Ethnicity (ref=white)	**-0.716**	**0.49**	**0.28-0.84**	**0.010**
Education (ref=low)		χ^2=2.21		0.331
Mod	0.387	1.47	0.88-2.45	0.137
High	0.289	1.34	0.72-2.48	0.361
Income (ref=low)		**χ^2=9.52**		**0.023**
Mod	**-0.603**	**0.55**	**0.31-0.96**	**0.037**
High	**-0.890**	**0.41**	**0.23-0.73**	**0.002**
Not given	-0.239	0.79	0.20-3.15	0.735
HSI	-0.118	0.89	0.76-1.04	0.136
Quit Intention (ref=Within 1 month)		χ^2=1.99		0.738
Within 6 months	0.228	1.26	0.70-2.27	0.449
Beyond 6 months	-0.063	0.94	0.53-1.65	0.827
Not planning to quit	0.338	1.40	0.63-3.10	0.406
Not given	-0.054	0.95	0.22-4.03	0.942
Model Adjusted R Squared		0.117		

Table 31 shows results from the adjusted logistic regression model examining the same ST-NRT relative risk beliefs outcome for each of the four ST products separately. The main effect of viewing a relative risk message was significant for Marlboro. For Marlboro, participants who viewed a relative health risk message had lower odds of reporting accurate beliefs, and those who viewed a picture warning label had higher odds of reporting accurate beliefs compared to those who did not view a warning.

For Marlboro, viewing a warning label was associated with ST-NRT relative risk beliefs in the main effects model (χ^2=6.14, p=.046), but became non-significant when the predictors were added to the model. On the contrary, viewing a relative risk message was not significantly

associated with ST-NRT relative risk beliefs in the main effects model (χ^2=2.79, p=.095), but became significant when the predictors were added to the model.

The interaction between warning label and relative risk message was significant in the main effects model for Ariva, and was therefore included in the full model. In the full model, the interaction between relative risk message and warning label type remained significant (χ^2=6.12, p=.047), such that the odds of reporting willingness to try decreased with the presence of a relative risk message when a text warning label was viewed.

Table 31. Adjusted binary logistic regression model for product-specific ST-NRT relative risk beliefs (n=611)

	duMaurier 				**Marlboro** 				**Copenhagen** 				**Ariva** 			
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	-0.190	0.83	0.51-1.34	0.444	**-0.483**	**0.62**	**0.39-0.99**	**0.043**	-0.289	0.75	0.39-1.43	0.383	0.536	1.71	0.86-3.40	0.127
WL Type	χ^2=2.83		0.243		χ^2=5.66		0.059		χ^2=3.10		0.212		**χ^2=14.60**		**0.001**	
Text vs. No WL	-0.076	0.93	0.52-1.65	0.795	0.122	1.13	0.65-1.95	0.663	-0.311	0.73	0.35-1.55	0.416	**2.54**	**12.68**	**2.69-59.68**	**0.001**
Pic vs. No WL	0.421	1.52	0.83-2.81	0.178	**0.683**	**1.98**	**1.10-3.56**	**0.023**	0.437	1.55	0.66-3.60	0.311	**2.71**	**15.03**	**3.11-72.61**	**0.001**
Pic vs. Text WL	0.497	1.64	0.89-3.04	0.112	0.561	1.75	0.97-3.17	0.064	0.748	2.11	0.92-4.86	0.078	0.170	1.19	0.24-5.76	0.833
RR Message (by WL Type)	--		--		--		--		--		--		**χ^2=6.12**		**0.047**	
For Text WL	--	--	--	--	--	--	--	--	--	--	--	--	**-1.163**	**0.31**	**0.12-0.82**	**0.018**
For Pic WL	--	--	--	--	--	--	--	--	--	--	--	--	-0.904	0.40	0.15-1.08	0.071
Model Adjusted R Squared	0.064				0.065				0.060				0.124			

6.2 Nicotine Replacement Therapy

6.2.1 Familiarity

Respondents were asked if they had seen or heard of four NRT products. Table 32 shows that overall, 96.8% indicated that they were familiar with at least one of the products. Respondents were most familiar with nicotine patch and least familiar with nicotine lozenge.

Table 32. Responses to the question, "Have you ever heard of or seen this product?" (n=611)

	NRT Patch	**NRT Gum**	**NRT Inhaler**	**NRT Lozenge**	**At least one 'yes' for all four products**
					
Condition	**% Yes**	**% Yes**	**% Yes**	**% Yes**	**% Yes**
1-No WL	89.9	85.0	66.0	46.9	**97.9**
2-No WL+RR	90.8	89.0	66.0	46.9	**96.9**
3-Text WL	86.7	88.6	61.5	42.9	**95.0**
4-Text WL+RR	85.3	90.4	66.0	53.4	**97.0**
5-Pic WL	86.9	86.9	63.6	43.8	**94.8**
6-Pic WL+RR	92.2	89.1	63.4	43.4	**99.0**
Overall	**88.6**	**88.2**	**64.4**	**46.2**	**96.8**

Response options: 1 - No, 2 – Yes

Table 33 displays the binary logistic regression model examining overall product familiarity. No differences were observed across experimental conditions. Males, those with high education, those with higher HSI score, and those who did not provide quit intentions compared to those planning to quit within one month had lower odds of familiarity.

Table 33. Adjusted binary logistic regression model for overall product familiarity (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.660	1.94	0.49-7.65	0.346
WL Type		χ^2=0.926		0.629
Text vs. No WL	-0.451	0.64	0.13-3.07	0.574
Pic vs. No WL	-0.856	0.42	0.07-2.45	0.338
Pic vs. Text WL	-0.406	0.67	0.13-3.45	0.630
Gender (ref=female)	**-2.484**	**0.08**	**0.01-0.53**	**0.008**
Age	-0.134	0.87	0.69-1.11	0.267
Smoking Status (ref=daily)		χ^2=2.40		0.302
Weekly	-1.688	0.18	0.02-1.59	0.124
Monthly	-0.827	0.44	0.04-5.04	0.507
Ethnicity (ref=white)	-1.104	0.33	0.09-1.26	0.106
Education (ref=low)		**χ^2=8.30**		**0.016**
Mod	-1.083	0.34	0.05-2.53	0.291
High	**-2.830**	**0.06**	**0.01-0.51**	**0.010**
Income (ref=low)		χ^2=1.66		0.646
Mod	0.097	1.10	0.22-5.55	
High	1.104	3.02	0.44-20.56	0.260
Not given	18.804	1.47×10^8	0.00	0.998
HSI	**-0.959**	**0.38**	**0.22-0.68**	**0.001**
Quit Intention (ref=Within 1 month)		χ^2=6.26		0.181
Within 6 months	-0.672	0.51	0.04-6.16	0.597
Beyond 6 months	-1.236	0.29	0.03-3.18	0.311
Not planning to quit	-1.482	0.23	0.02-2.99	0.260
Not given	**-4.186**	**0.02**	**0.00-0.50**	**0.019**
Model Adjusted R Squared		0.072		

Table **34** shows results from the adjusted binary logistic regression model examining the same familiarity outcome for each of the four NRT products separately. No differences were observed across experimental conditions for any of the four products.

Table 34. Adjusted binary logistic regression model for product-specific familiarity (n=611)

	NRT Patch				NRT Gum				NRT Inhaler				NRT Lozenge			
																
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	0.018	1.02	0.55-1.87	0.954	0.199	1.22	0.70-2.12	0.480	0.028	1.03	0.71-1.50	0.883	0.079	1.08	0.76-1.54	0.658
WL Type	χ^2=0.21		0.900		χ^2=1.83		0.401		χ^2=0.21		0.900		χ^2=0.82		0.665	
Text vs. No WL	-0.151	0.86	0.41-1.79	0.687	0.423	1.53	0.77-3.01	0.223	-0.034	0.97	0.61-1.52	0.882	0.110	1.12	0.73-1.71	0.615
Pic vs. No WL	-0.155	0.86	0.40-1.85	0.692	0.007	1.01	0.52-1.94	0.984	0.072	1.08	0.68-1.71	0.760	-0.092	0.91	0.59-1.41	0.679
Text vs. Pic WL	-0.004	1.00	0.48-2.08	0.992	-0.416	0.66	0.33-1.33	0.246	0.106	1.11	0.70-1.77	0.652	-0.201	0.82	0.53-1.27	0.367
Model Adjusted R Squared	0.104				0.050				0.052				0.032			

6.2.2 Appeal

Respondents were asked if the products would appeal to people their age. Table 35 indicates that overall, 85.8% indicated that at least one of the products would appeal to people their age. Respondents indicated that Nicotine gum would appeal most and Nicotine inhaler would appeal least to those their age.

Table 35. Responses* to the question, "Would this product appeal to people your age?" (n=611)

	NRT Patch	**NRT Gum**	**NRT Inhaler**	**NRT Lozenge**	**At least one 'yes' for all four products**
					
Condition	**%Yes**	**%Yes**	**%Yes**	**%Yes**	**%**
1-No WL	60.0	64.6	43.3	58.6	**87.4**
2-No WL+RR	64.9	67.7	50.0	63.0	**89.0**
3-Text WL	56.9	61.9	38.2	56.4	**79.4**
4-Text WL+RR	65.3	80.4	52.0	66.0	**91.8**
5-Pic WL	56.8	65.6	39.6	58.1	**82.6**
6-Pic WL+RR	60.4	71.4	46.9	60.4	**84.8**
Overall	**60.7**	**68.6**	**45.0**	**60.4**	**85.8**

Response options: 1 –Not at all, 2 –Unlikely, 3 –Undecided, 4 –Somewhat, 5 – Very
*Dichotomised to 'Yes' (4-5) and 'Other' (1-3)

Table 36 displays the logistic regression model examining overall product appeal. No differences were observes across experimental conditions. Males had lower odds of appeal, and those with high income had higher odds of appeal.

Table 36. Adjusted binary logistic regression model for overall product appeal (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	0.539	1.71	0.99-2.96	0.053
WL Type		χ^2=2.05		0.359
Text vs. No WL	-0.337	0.71	0.36-1.41	0.333
Pic vs. No WL	-0.486	0.62	0.31-1.20	0.157
Pic vs. Text WL	-0.149	0.86	0.46-1.62	0.645
Gender (ref=female)	**-0.863**	**0.42**	**0.24-0.74**	**0.002**
Age	-0.019	1.02	0.94-1.11	0.653
Smoking Status (ref=daily)		χ^2=0.209		0.901
Weekly	-0.171	0.84	0.37-1.90	0.681
Monthly	-0.152	0.86	0.33-2.24	0.755
Ethnicity (ref=white)	0.078	1.08	0.56-2.07	0.813
Education (ref=low)		χ^2=0.127		0.938
Mod	-0.084	0.92	0.48-1.75	0.800
High	-0.141	0.87	0.39-1.92	0.727
Income (ref=low)		χ^2=6.93		0.074
Mod	0.437	1.55	0.78-3.07	0.211
High	**0.768**	**2.16**	**1.05-4.42**	**0.036**
Not given	-0.674	0.51	0.14-1.88	0.312
HSI	-0.084	0.92	0.75-1.13	0.418
Quit Intention (ref=Within 1 month)		χ^2=4.62		0.329
Within 6 months	0.545	1.72	0.74-3.99	0.203
Beyond 6 months	-0.157	0.85	0.42-1.73	0.662
Not planning to quit	-0.248	0.78	0.32-1.91	0.588
Not given	-0.523	0.59	0.11-3.19	0.542
Model Adjusted R Squared		0.053		

Table **37** shows results from the adjusted binary logistic regression model examining the same appeal outcome for each of the four NRT products separately. For Nicotine gum and inhaler, those viewing a relative health risk had higher odds of appeal.

Table 37. Adjusted binary logistic regression model for product-specific appeal (n=611)

	NRT Patch 				NRT Gum 				NRT Inhaler 				NRT Lozenge 			
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	0.279	1.32	0.91-1.93	0.148	**0.462**	**1.59**	**1.08-2.34**	**0.020**	**0.380**	**1.46**	**1.02-2.10**	**0.038**	0.162	1.18	0.81-1.70	0.387
WL Type	χ^2=1.10		0.578		χ^2=1.43		0.490		χ^2=0.29		0.867		χ^2=0.50		0.779	
Text vs. No WL	0.076	1.08	0.68-1.72	0.748	0.283	1.33	0.83-2.13	0.243	-0.044	0.96	0.62-1.49	0.846	0.152	1.17	0.74-1.83	0.508
Pic vs. No WL	-0.166	0.85	0.53-1.34	0.480	0.081	1.09	0.68-1.74	0.735	-0.120	0.89	0.57-1.39	0.598	0.024	1.02	0.65-1.61	0.916
Text vs. Pic WL	-0.243	0.79	0.49-1.25	0.307	-0.202	0.82	0.50-1.33	0.413	-0.120	0.89	0.57-1.39	0.598	-0.128	0.88	0.56-1.39	0.582
Model Adjusted R Squared	0.098				0.050				0.060				0.053			

6.2.3 Likelihood of Future Use

Respondents were asked how likely they would be to try each product in the future. Table 38 shows that overall, over three-quarters (77.4%) indicated that they were likely to try at least one of the four NRT products in the future. Respondents indicated that they would be most likely to try nicotine gum and least likely to try nicotine inhaler.

Table 38. Responses* to the question, "Overall, how likely would you be to try this product in the future?" (n=611)

	NRT Patch		**NRT Gum**		**NRT Inhaler**		**NRT Lozenge**		**At least one 'yes' for all four products**
									
Condition	**% Undecided**	**% Yes**	**% Undecided**	**% Yes**	**% Undecided**	**% Yes**	**% Undecided**	**% Yes**	**%**
1-No WL	24.0	51.0	19.0	53.0	16.2	46.5	22.4	58.2	**81.4**
2-No WL+RR	51.9	50.0	13.5	60.4	25.3	49.5	25.3	51.6	**76.1**
3-Text WL	27.2	47.6	30.8	45.2	26.9	38.5	28.2	41.7	**68.0**
4-Text WL+RR	25.7	50.5	22.8	57.4	14.9	55.4	22.5	64.7	**80.6**
5-Pic WL	21.1	53.7	14.3	56.1	21.1	42.1	25.3	54.7	**80.6**
6-Pic WL+RR	25.5	51.0	16.2	61.6	23.0	44.0	21.4	51.0	**77.9**
Overall	**24.3**	**50.6**	**19.6**	**55.5**	**21.2**	**46.0**	**24.2**	**53.6**	**77.4**

Response options: 1 - Definitely not, 2 - Probably not, 3 - Undecided, 4 - Probably try, 5 - Definitely try
*Dichotomised to Yes (4-5) and Other (1-3)

Table 39 displays the logistic regression model examining overall likelihood of future use rating. No differences were observed across experimental conditions. Ethnic minorities, those reporting high income, and those planning to quit within six months compared to those planning to quit within one month had higher odds of reporting future use. Older respondents, those who smoke weekly compared to those who smoke daily, those reporting a high education level, and those not planning to quit compared to those planning to quit within one month had lower odds of reporting future use.

Table 39. Adjusted binary logistic regression model for overall likelihood of future product use (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.125	1.13	0.71-1.81	0.601
WL Type		χ^2=0.012		0.994
Text vs. No WL	0.031	1.03	0.58-1.82	0.916
Pic vs. No WL	0.011	1.01	0.56-1.81	0.972
Pic vs. Text WL	-0.020	0.98	0.55-1.75	0.980
Gender (ref=female)	0.127	1.14	0.71-1.83	0.602
Age	**-0.083**	**0.92**	**0.85-0.99**	**0.034**
Smoking Status (ref=daily)		χ^2=4.00		0.135
Weekly	**-0.710**	**0.49**	**0.25-0.99**	**0.046**
Monthly	-0.301	0.74	0.32-1.74	0.489
Ethnicity (ref=white)	**0.985**	**2.68**	**1.41-5.08**	**0.003**
Education (ref=low)		χ^2=4.59		0.101
Mod	-0.222	0.80	0.45-1.43	0.454
High	**-0.737**	**0.48**	**0.24-0.96**	**0.039**
Income (ref=low)		χ^2=6.78		0.079
Mod	0.407	1.50	0.81-2.77	0.193
High	**0.653**	**1.92**	**1.02-3.61**	**0.042**
Not given	-0.635	0.53	0.16-1.81	0.312
HSI	0.073	1.08	0.90-1.28	0.420
Quit Intention (ref=Within 1 month)		**χ^2=37.95**		**<.001**
Within 6 months	**0.826**	**2.28**	**1.09-4.79**	**0.029**
Beyond 6 months	0.076	1.08	0.58-2.00	0.809
Not planning to quit	**-1.498**	**0.22**	**0.10-0.48**	**<.001**
Not given	-1.196	0.30	0.09-1.07	0.064
Model Adjusted R Squared		0.185		

Table 40 shows results from the adjusted logistic regression model examining the same likelihood of future use outcome for each of the four NRT products separately. For nicotine gum, patch, and inhaler, no differences were observed across experimental conditions.

For nicotine gum, viewing a relative risk message was significantly associated with likelihood of future use in the main effects model (χ^2=4.31, p=.038), but became non-significant when the predictors were added to the model.

The interaction between warning label and relative risk message was significant in the main effects model for nicotine lozenge, and was therefore included in the full model. In the full

model, the interaction remained significant (χ^2=9.02, p=.011), such that the odds of reporting likelihood of future use increased with the presence of a relative risk message when a text warning label was viewed.

Table 40. Adjusted binary logistic regression model for product-specific likelihood of future product use (n=611)

	NRT Patch				NRT Gum				NRT Inhaler				NRT Lozenge			
																
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	-1.02	0.90	0.63-1.29	0.580	0.315	1.37	0.95-1.98	0.093	0.205	1.23	0.85-1.76	0.268	-0.301	0.74	0.39-1.39	0.347
WL Type	χ^2=0.41		0.816		χ^2=0.03		0.985		χ^2=1.24		0.539		**χ^2=6.93**		**0.031**	
Text vs. No WL	0.131	1.14	0.74-1.77	0.558	0.040	1.04	0.66-1.63	0.862	0.083	1.09	0.70-1.70	0.716	**-1.78**	**0.17**	**0.04-0.69**	**0.013**
Pic vs. No WL	0.015	1.01	0.65-1.57	0.948	0.019	1.02	0.65-1.60	0.933	-0.168	0.85	0.54-1.32	0.458	-0.322	0.72	0.18-2.91	0.650
Text vs. Pic WL	-0.116	0.89	0.57-1.39	0.610	-0.021	0.98	0.62-1.55	0.929	-0.251	0.78	0.50-1.22	0.276	**1.461**	**4.31**	**1.06-17.54**	**0.041**
RR Message (by WL Type)	--		--		--		--		--		--		**χ^2=9.02**		**0.011**	
For Text WL	--	--	--	--	--	--	--	--	--	--	--	--	**1.285**	**3.61**	**1.46-8.93**	**0.005**
For Pic WL	--	--	--	--	--	--	--	--	--	--	--	--	0.185	1.20	0.50-2.90	0.680
Model Adjusted R Squared	0.075				0.090				0.093				0.092			

6.2.4 Reasons for Product Use

Respondents were asked whether they would be willing to try each of the four NRT products for five reasons. Three indexes were generated: i) and index for each product for answering 'yes' to at least one of the five reasons, ii) an index for each reason for answering 'yes' for at least one of the four products, and iii) an overall index for answering 'yes' to at least one of the five reasons, for at least one of the four products. Although the overall index explained above accounts for only 'yes' responses, at least 78% of respondents answered 'yes' or 'maybe' to at least one of the five questions about willingness to try at least one of the four NRT products.

Reason #1: Willing to try ST in places where you cannot smoke.

Table 41 shows that overall, over half (51.0%) of the respondents answered that they were willing to use <u>at least one of the four NRT products</u> *in places where they cannot smoke*. Respondents were most willing to try the nicotine lozenge and about equally willing to try the patch, gum, and inhaler.

Table 41. Responses* to the question, "Would you be willing to try this product in places where you can't smoke cigarettes?" (n=611)

	NRT Patch		NRT Gum		NRT Inhaler		NRT Lozenge		At least one 'yes' for all four products
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	41.0	25.0	29.3	20.2	42.4	20.2	30.0	26.0	**52.0**
2-No WL+RR	34.7	14.3	22.4	19.4	42.1	12.6	24.5	27.6	**41.9**
3-Text WL	40.0	22.9	33.3	20.0	35.0	34.0	34.6	26.0	**57.0**
4-Text WL+RR	39.6	19.8	28.4	22.5	41.6	17.8	22.5	25.5	**50.5**
5-Pic WL	35.8	26.3	26.8	28.9	50.0	24.0	31.6	35.8	**57.6**
6-Pic WL+RR	47.5	18.8	33.7	20.8	45.0	21.0	33.0	24.0	**46.5**
Overall	**39.8**	**21.2**	**29.1**	**21.9**	**42.6**	**21.7**	**29.4**	**27.4**	**51.0**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 42 displays the logistic regression model examining 'willingness to try where you can't smoke' index. The main effect of viewing a relative risk message was significant. Participants who viewed a relative health risk message had lower odds of reporting willingness to try NRT. Those planning to quit within six months or beyond six months compared to those planning to quit within one month had higher odds of reporting willingness to try NRT.

Table 42. Adjusted binary logistic regression model for overall 'willingness to try where you can't smoke' index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	**-0.408**	**0.67**	**0.46-0.95**	**0.027**
WL Type		χ^2=1.86		0.395
Text vs. No WL	0.242	1.27	0.82-1.98	0.281
Pic vs. No WL	0.280	1.32	0.85-2.05	0.210
Pic vs. Text WL	0.038	1.04	0.67-1.62	0.868
Gender (ref=female)	-0.017	0.98	0.68-1.42	0.929
Age	0.005	1.01	0.95-1.07	0.859
Smoking Status (ref=daily)		χ^2=0.86		0.651
Weekly	-0.273	0.76	0.43-1.36	0.354
Monthly	-0.095	0.91	0.46-1.80	0.784
Ethnicity (ref=white)	0.061	1.06	0.68-1.67	0.790
Education (ref=low)		χ^2=0.72		0.699
Mod	0.183	1.20	0.75-1.85	0.407
High	0.166	1.18	0.68-2.03	0.551
Income (ref=low)		χ^2=4.88		0.181
Mod	-0.075	0.93	0.57-1.50	0.761
High	-0.437	0.65	0.40-1.05	0.080
Not given	0.328	1.39	0.46-4.20	0.561
HSI	-0.017	0.98	0.86-1.12	0.807
Quit Intention (ref=Within 1 month)		**χ^2=13.28**		**0.010**
Within 6 months	**0.767**	**2.15**	**1.28-3.64**	**0.004**
Beyond 6 months	**0.548**	**1.73**	**1.06-2.82**	**0.028**
Not planning to quit	-0.143	0.87	0.44-1.72	0.682
Not given	0.095	1.10	0.37-3.29	0.865
Model Adjusted R Squared		0.049		

Reason #2: Willing to try ST when you do not want to smoke around others.

Table 43 shows that overall, nearly half (48.6%) of the respondents answered that they were willing to use at least one of the four NRT products *when they don't want to smoke around others*. Respondents were most willing to try the nicotine lozenge and about equally willing to try patch, gum, and inhaler.

Table 43. Responses* to the question, "Would you be willing to try this product for the times when you don't want to smoke around others?" (n=611)

	NRT Patch		NRT Gum		NRT Inhaler		NRT Lozenge		At least one 'yes' for all four products
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	40.0	30.0	30.3	19.2	48.5	23.2	31.3	26.3	**52.6**
2-No WL+RR	40.8	14.3	23.5	18.4	46.9	14.3	30.6	23.5	**37.5**
3-Text WL	47.2	17.9	34.3	18.1	45.6	31.1	33.0	27.2	**50.5**
4-Text WL+RR	38.2	23.5	35.9	18.4	50.5	16.2	32.0	25.2	**49.5**
5-Pic WL	40.0	26.3	25.0	33.3	53.6	21.6	30.5	38.9	**58.1**
6-Pic WL+RR	47.5	13.9	37.3	18.6	53.5	20.8	37.0	21.0	**44.0**
Overall	**42.4**	**20.9**	**31.2**	**20.9**	**49.7**	**21.3**	**32.4**	**26.9**	**48.6**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 44 displays the logistic regression model examining 'willingness to try when you don't want to smoke around others' index. The main effect of viewing a relative risk message was significant. Participants who viewed a relative health risk message on the smokeless products had lower odds of reporting willingness to try NRT. Those planning to quit within six months compared to those planning to quit within one month had higher odds of reporting willingness to try NRT.

Table 44. Adjusted binary logistic regression model for overall 'willingness to try when you don't want to smoke around others' index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	**-0.413**	**0.66**	**0.46-0.95**	**0.024**
WL Type		χ^2=3.17		0.205
Text vs. No WL	0.320	1.38	0.89-2.14	0.152
Pic vs. No WL	0.363	1.44	0.93-2.23	0.104
Pic vs. Text WL	0.043	1.04	0.67-1.63	0.849
Gender (ref=female)	0.164	1.18	0.82-1.70	0.381
Age	0.031	1.03	0.97-1.09	0.294
Smoking Status (ref=daily)		χ^2=0.45		0.798
Weekly	-0.195	0.82	0.46-1.46	0.503
Monthly	-0.051	0.95	0.48-1.87	0.882
Ethnicity (ref=white)	0.224	1.25	0.80-1.95	0.321
Education (ref=low)		χ^2=1.73		0.420
Mod	0.187	1.21	0.79-1.85	0.391
High	-0.102	0.90	0.53-1.55	0.711
Income (ref=low)		χ^2=1.47		0.690
Mod	0.037	1.04	0.64-1.67	0.879
High	-0.163	0.85	0.52-1.38	0.508
Not given	0.341	1.41	0.48-4.13	0.535
HSI	-0.047	0.95	0.83-1.09	0.495
Quit Intention (ref=Within 1 month)		**χ^2=11.86**		**0.018**
Within 6 months	**0.753**	**2.12**	**1.26-3.58**	**0.005**
Beyond 6 months	0.375	1.45	0.89-2.37	0.132
Not planning to quit	-0.132	0.88	0.45-1.72	0.702
Not given	0.724	2.06	0.69-6.17	0.195
Model Adjusted R Squared =		0.045		

Reason #3: Willing to try ST to help cut back the amount you smoke.

Table 45 shows that overall, nearly half (49.2%) of the respondents answered that they were willing to use at least one of the four NRT products *to help cut back the amount they smoke*. Respondents were most willing to try nicotine lozenge and least willing to try nicotine gum.

Table 45. Responses* to the question, "Would you be willing to try this product to help you cut back the amount you smoke?" (n=611)

	NRT Patch		NRT Gum		NRT Inhaler		NRT Lozenge		At least one 'yes' for all four products
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	28.0	26.0	23.2	23.2	38.4	30.3	26.0	26.0	**56.1**
2-No WL+RR	31.6	17.3	26.8	17.5	27.6	21.4	25.5	22.4	**41.1**
3-Text WL	33.0	24.5	27.4	17.9	34.6	33.7	30.1	27.2	**51.0**
4-Text WL+RR	33.0	19.4	23.3	23.3	34.0	19.0	16.7	31.4	**53.6**
5-Pic WL	27.7	28.7	28.9	23.7	42.9	21.4	33.0	31.9	**52.7**
6-Pic WL+RR	36.6	12.9	27.7	14.9	37.6	18.8	33.0	17.0	**41.0**
Overall	**31.7**	**21.4**	**26.2**	**20.1**	**35.8**	**24.2**	**27.3**	**26.0**	**49.2**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 46 displays the logistic regression model examining 'willingness to try to help cut back' index. No differences were observed across experimental conditions. Participants who were planning to quit smoking within or beyond six months compared to those who were planning to quit within one month had higher odds of reporting willingness to try NRT.

Table 46. Adjusted binary logistic regression model for overall 'willingness to try to help cut back' index (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	-0.341	0.71	0.50-1.02	0.061
WL Type		χ^2=0.98		0.611
Text vs. No WL	0.122	1.13	0.73-1.75	0.584
Pic vs. No WL	-0.102	0.90	0.58-1.40	0.646
Pic vs. Text WL	-0.224	0.80	0.51-1.25	0.322
Gender (ref=female)	-0.119	0.89	0.62-1.28	0.524
Age	0.000	1.00	0.94-1.06	0.979
Smoking Status (ref=daily)		χ^2=1.40		0.497
Weekly	-0.269	0.76	0.43-1.35	0.357
Monthly	0.167	1.18	0.60-2.34	0.631
Ethnicity (ref=white)	0.087	1.09	0.70-1.70	0.701
Education (ref=low)		χ^2=1.74		0.418
Mod	0.045	1.05	0.68-1.60	0.837
High	0.329	1.39	0.81-2.38	0.228
Income (ref=low)		χ^2=5.17		0.160
Mod	-0.078	0.93	0.57-1.49	0.748
High	-0.486	0.62	0.38-1.00	0.049
Not given	-0.229	0.80	0.27-2.31	0.673
HSI	0.025	1.03	0.90-1.17	0.709
Quit Intention (ref=Within 1 month)		χ^2=7.17		0.127
Within 6 months	**0.617**	**1.85**	**1.10-3.12**	**0.020**
Beyond 6 months	**0.495**	**1.64**	**1.01-2.67**	**0.047**
Not planning to quit	0.172	1.19	0.61-2.32	0.614
Not given	-0.023	0.98	0.31-3.04	0.968
Model Adjusted R Squared		0.039		

Reason #4: Willing to try ST to help while you are trying to quit smoking.

Table 47 shows that overall, nearly half (46.7%) of the respondents answered that they were willing to use at least one of the four NRT products *to help while they are trying to quit smoking*. Respondents were most willing to try nicotine lozenge and least willing to try nicotine gum.

Table 47. Responses* to the question, "Would you be willing to try this product to help you while you are trying to quit smoking?" (n=611)

	NRT Patch		NRT Gum		NRT Inhaler		NRT Lozenge		At least one 'yes' for all four products
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	25.0	22.0	21.2	19.2	34.3	26.3	24.0	26.0	**46.9**
2-No WL+RR	27.1	15.6	24.5	13.3	24.7	16.5	22.7	23.7	**34.4**
3-Text WL	24.8	24.8	22.6	23.6	31.7	30.8	29.1	31.1	**54.5**
4-Text WL+RR	21.4	26.2	18.4	23.3	26.7	19.8	15.7	28.4	**50.0**
5-Pic WL	23.2	24.2	28.9	25.8	42.3	24.7	31.6	31.6	**54.9**
6-Pic WL+RR	28.4	16.7	27.0	15.0	33.0	17.0	29.0	18.0	**39.4**
Overall	**25.0**	**21.6**	**23.7**	**20.1**	**32.1**	**22.6**	**25.3**	**26.5**	**46.7**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 48 displays the logistic regression model examining 'willingness to try to help quit' index. The main effects of viewing a relative risk message and a health warning were significant. Participants who viewed a relative health risk message had lower odds of reporting willingness to try NRT, and those who viewed a text health warning label on the smokeless products had higher odds of reporting willingness to try NRT compared to those who did not view a warning label. Those who were planning to quit smoking within or beyond six months compared to those planning to quit within one month had higher odds of reporting willingness to try NRT.

Warning labels were not significantly associated with willingness to try NRT in the main effects model (χ^2=5.21, p=.074), but became significant when the predictors were added to the model.

Table 48. Adjusted binary logistic regression model for overall 'willingness to try to help quit' index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	**-0.470**	**0.63**	**0.43-0.90**	**0.011**
WL Type		**χ^2=6.36**		**0.042**
Text vs. No WL	**0.569**	**1.77**	**1.13-2.75**	**0.012**
Pic vs. No WL	0.322	1.38	0.88-2.15	0.156
Pic vs. Text WL	-0.247	0.78	0.50-1.22	0.275
Gender (ref=female)	0.005	1.01	0.70-1.45	0.978
Age	0.024	1.02	0.97-1.09	0.414
Smoking Status (ref=daily)		χ^2=1.59		0.451
Weekly	-0.361	0.70	0.39-1.25	0.223
Monthly	-0.224	0.80	0.40-1.61	0.530
Ethnicity (ref=white)	0.138	1.15	0.73-1.80	0.549
Education (ref=low)		χ^2=1.52		0.468
Mod	0.139	1.15	0.74-1.77	0.530
High	0.341	1.41	0.82-2.42	0.218
Income (ref=low)		χ^2=3.86		0.277
Mod	-0.384	0.68	0.42-1.10	0.119
High	-0.459	0.63	0.39-1.03	0.066
Not given	-0.515	0.60	0.20-1.77	0.352
HSI	-0.012	0.99	0.86-1.13	0.863
Quit Intention (ref=Within 1 month)		χ^2=7.85		0.097
Within 6 months	**0.693**	**2.00**	**1.17-3.41**	**0.011**
Beyond 6 months	**0.596**	**1.82**	**1.10-3.00**	**0.020**
Not planning to quit	0.321	1.38	0.70-2.72	0.353
Not given	0.701	2.02	0.67-6.11	0.215
Model Adjusted R Squared		0.054		

Reason #5: Willing to try ST as a long-term replacement instead of cigarettes.

Table 49 shows that overall, over a third (35.9%) of the respondents answered that they were willing to use at least one of the four NRT products *as a long-term replacement instead of cigarettes*. Respondents were most willing to try the nicotine lozenge and about equally willing to try nicotine patch, gum, and inhaler.

Table 49. Responses* to the question, "Would you be willing to try this product as a long-term replacement instead of cigarettes?" (n=611)

	NRT Patch		NRT Gum		NRT Inhaler		NRT Lozenge		At least one 'yes' for all four products
									
Condition	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% Maybe**	**% Yes**	**% [a]**
1-No WL	63.0	20.0	57.1	15.3	72.7	11.1	58.0	21.0	**36.1**
2-No WL+RR	56.1	14.3	54.1	17.3	59.8	18.6	53.1	21.4	**35.8**
3-Text WL	59.4	19.8	51.9	23.1	55.2	25.7	59.2	17.5	**42.2**
4-Text WL+RR	60.2	18.4	57.8	17.6	61.0	14.0	56.9	17.6	**35.4**
5-Pic WL	60.4	19.8	59.8	17.5	63.5	18.8	59.1	23.7	**39.3**
6-Pic WL+RR	70.3	9.9	60.4	12.9	68.0	14.0	63.6	9.1	**26.8**
Overall	**61.6**	**17.1**	**56.8**	**17.3**	**63.3**	**17.1**	**58.3**	**18.3**	**35.9**

Response options: 1 - No, 2 – Maybe, 3 – Yes
*Dichotomised to 'Yes' (3) and 'Other' (1-2)
[a] Reason-specific index for answering 'yes' for at least one of the four products

Table 50 displays the logistic regression model examining 'willingness to try as a long-term replacement' index. The main effect of viewing a relative risk message was significant. Participants who viewed a relative risk message on the products had lower odds of reporting willingness to try NRT. Those who were planning to quit smoking within or beyond six months compared to those planning to quit within one month had higher odds of reporting willingness to try NRT.

Viewing a relative risk message was not significantly associated with willingness to try NRT in the main effects model (χ^2=2.61, p=.107), but became significant when the predictors were added to the model.

Table 50. Adjusted binary logistic regression model for overall 'willingness to try as a long-term replacement' index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	**-0.499**	**0.61**	**0.41-0.89**	**0.010**
WL Type		χ^2=2.59		0.274
Text vs. No WL	0.228	1.26	0.80-1.98	0.325
Pic vs. No WL	-0.157	0.86	0.54-1.37	0.512
Pic vs. Text WL	-0.384	0.68	0.42-1.09	0.111
Gender (ref=female)	0.074	1.08	0.73-1.59	0.708
Age	0.000	1.00	0.94-1.06	0.974
Smoking Status (ref=daily)		χ^2=1.96		0.376
Weekly	0.350	1.42	0.78-2.59	0.253
Monthly	0.403	1.50	0.72-3.09	0.276
Ethnicity (ref=white)	0.171	1.19	0.75-1.89	0.471
Education (ref=low)		χ^2=1.61		0.446
Mod	0.295	1.34	0.85-2.13	0.209
High	0.162	1.18	0.66-2.09	0.581
Income (ref=low)		χ^2=4.39		0.222
Mod	-0.160	0.85	0.52-1.40	0.527
High	-0.421	0.66	0.39-1.09	0.105
Not given	-1.027	0.36	0.09-1.37	0.134
HSI	0.109	1.12	0.97-1.29	0.136
Quit Intention (ref=Within 1 month)		**χ^2=13.35**		**0.010**
Within 6 months	**0.767**	**2.15**	**1.23-3.78**	**0.008**
Beyond 6 months	**0.685**	**1.98**	**1.17-3.38**	**0.011**
Not planning to quit	-0.203	0.82	0.38-1.76	0.604
Not given	0.361	1.43	0.44-4.65	0.548
Model Adjusted R Squared		0.056		

Reasons for Use Index

Table 51 shows that overall, nearly two-thirds (68.2%) of the respondents answered that they were willing to use at least one of the four NRT products for at least one of the five reasons. Respondents were most willing to try the nicotine lozenge and least likely to try the nicotine patch.

Table 51. 'Yes' responses to at least one of five specific questions regarding willingness to try the NRT product for five reasons

	NRT Patch	NRT Gum	NRT Inhaler	NRT Lozenge	
					**All four combined (Overall)**
Condition	**% Yes** [b]	**% Yes** [b]	**% Yes** [b]	**% Yes** [b]	**% Yes** [c]
1-No WL	42.0	35.7	41.4	44.4	**68.8**
2-No WL+RR	30.2	36.1	38.9	43.3	**65.2**
3-Text WL	40.4	40.4	49.5	46.6	**69.4**
4-Text WL+RR	44.0	40.6	36.7	50.0	**70.7**
5-Pic WL	46.2	50.5	37.2	53.3	**75.6**
6-Pic WL+RR	28.0	30.0	35.7	33.3	**60.4**
Overall	**38.4**	**38.8**	**40.0**	**45.1**	**68.2**

[b] Overall index for answering 'yes' to at least one of the five reasons, for at least one of the four products
[c] Product-specific index for answering 'yes' to at least one of the five reasons

Table 52 displays the logistic regression model examining overall reasons for use index. No differences were observed across experimental conditions. Participants who were planning to quit within six months or beyond six months compared to those who were planning to quit within one month had higher odds of reporting willingness to try NRT (for at least one the four products for at least one of the five reasons).

Table 52. Adjusted binary logistic regression model for overall reasons for product use index (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	-0.298	0.74	0.50-1.10	0.139
WL Type		χ^2=0.43		0.808
Text vs. No WL	0.152	1.16	0.72-1.89	0.537
Pic vs. No WL	0.026	1.03	0.64-1.65	0.915
Pic vs. Text WL	-0.127	0.88	0.54-1.44	0.614
Gender (ref=female)	-0.008	0.99	0.66-1.49	0.971
Age	-0.030	0.97	0.91-1.03	0.353
Smoking Status (ref=daily)		χ^2=0.69		0.708
Weekly	-0.128	0.88	0.47-1.63	0.684
Monthly	-0.301	0.74	0.36-1.53	0.418
Ethnicity (ref=white)	-0.024	0.98	0.60-1.60	0.924
Education (ref=low)		χ^2=1.33		0.515
Mod	0.215	1.24	0.77-1.99	0.372
High	0.337	1.40	0.77-2.55	0.272
Income (ref=low)		χ^2=4.78		0.189
Mod	0.018	1.02	0.60-1.73	0.946
High	-0.404	0.67	0.39-1.13	0.134
Not given	0.505	1.66	0.42-6.47	0.467
HSI	0.034	1.03	0.89-1.20	0.657
Quit Intention (ref=Within 1 month)		**χ^2=19.09**		**0.001**
Within 6 months	**0.984**	**2.68**	**1.53-4.67**	**0.001**
Beyond 6 months	**0.955**	**2.60**	**1.55-4.34**	**<.001**
Not planning to quit	0.174	1.19	0.60-2.36	0.617
Not given	0.512	1.67	0.50-5.54	0.402
Model Adjusted R Squared		0.058		

Table 53 shows results from the adjusted logistic regression model examining the same reasons for use index outcome for each of the four NRT products separately. For nicotine patch, gum, and inhaler, no differences were observed across experimental conditions.

For nicotine patch, viewing a relative risk message was significantly associated with willingness to try NRT in the main effects model (χ^2=4.61, p=.032), but became non-significant when the predictors were added to the model.

The interaction between warning label and relative risk message was in the main effects model for nicotine lozenge, and was therefore included in the full model. In the full model, the

interaction between relative risk message and warning label type remained significant (χ^2=9.04, p=.011), such that the odds of reporting willingness to try NRT decreased in the presence of a relative risk message when a picture warning label was viewed.

Table 53. Adjusted binary logistic regression model for product-specific reasons for product use indexes (n=611)

	NRT Patch				NRT Gum				NRT Inhaler				NRT Lozenge			
																
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	-0.325	0.72	0.50-1.04	0.084	-0.222	0.80	0.56-1.15	0.226	-0.273	0.76	0.53-1.10	0.149	0.069	1.07	0.58-1.97	0.826
WL Type	χ^2=2.09		0.352		χ^2=1.59		0.452		χ^2=1.80		0.406		**χ^2=7.29**		**0.026**	
Text vs. No WL	0.325	1.38	0.89-2.16	0.153	0.215	1.24	0.80-1.92	0.338	0.092	1.10	0.70-1.71	1.10	-0.297	0.74	0.19-2.91	0.670
Pic vs. No WL	0.121	1.13	0.72-1.78	0.601	0.268	1.31	0.84-2.03	0.235	-0.216	0.81	0.51-1.27	0.352	1.504	4.50	1.13-17.95	0.033
Text vs. Pic WL	-0.204	0.82	0.52-1.28	0.376	0.053	1.05	0.68-1.64	0.815	-0.308	0.74	0.46-1.16	0.190	**1.801**	**6.06**	**1.50-24.52**	**0.012**
RR Message (by WL Type)	--		--		--		--		--		--		**χ^2=9.04**		**0.011**	
For Text WL	--	--	--	--	--	--	--	--	--	--	--	--	0.196	1.22	0.51-2.89	0.657
For Pic WL	--	--	--	--	--	--	--	--	--	--	--	--	**-1.076**	**0.34**	**0.14-0.83**	**0.017**
Model Adjusted R Squared	0.055				0.023				0.068				0.061			

6.2.5 Relative Risk Beliefs

Respondents were asked to rate the health risk of the four NRT products compared to cigarettes and ST products.

a) **Nicotine Replacement Therapy vs. Cigarette Relative Risk Beliefs**

Table 54 shows that overall, nearly two-thirds (65.3%) of the respondents answered correctly that all four NRT products are less harmful than cigarettes. Respondents perceived gum to be least harmful and inhaler to be most harmful compared to cigarettes.

Table 54. Responses* to the question, "In your opinion, how harmful to health is this product compared to regular cigarettes?" (n=611)

	NRT Patch		**NRT Gum**		**NRT Inhaler**		**NRT Lozenge**		**All four products 'Less harmful'**
									
Condition	**% Same**	**% Less Harmful**	**% Same**	**% Less Harmful**	**% Same**	**% Less Harmful**	**% Same**	**% Less Harmful**	**%**
1-No WL	14.9	83.0	14.7	84.2	18.9	81.1	14.4	81.1	**69.0**
2-No WL+RR	12.2	82.2	18.0	76.4	20.5	73.9	14.6	80.9	**67.4**
3-Text WL	19.6	72.8	15.6	76.0	19.8	74.7	17.9	78.9	**59.6**
4-Text WL+RR	18.6	77.3	13.4	84.5	16.7	76.0	16.3	80.6	**63.8**
5-Pic WL	23.1	73.6	18.7	79.1	26.4	69.2	18.0	79.8	**59.5**
6-Pic WL+RR	14.1	82.8	12.8	86.2	13.4	85.6	16.3	82.7	**72.5**
"Less harmful"	**17.1**	**78.7**	**15.5**	**81.1**	**19.2**	**76.9**	**16.3**	**80.7**	**65.3**

Response options: 1 – A lot less harmful, 2 – Somewhat less harmful, 3 – No difference, 4 – Somewhat more harmful, 5 – A lot more harmful
*Dichotomised to 'less harmful' (1-2) and 'the same or more harmful' (3-5)

Table 55 displays the logistic regression model examining overall NRT-cigarette relative risk beliefs. No differences were observed across experimental conditions. Ethnic minorities had lower odds of reporting correct beliefs.

Table 55. Adjusted binary logistic regression model for overall NRT-cigarette relative risk beliefs (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	0.283	1.33	0.89-1.97	0.162
WL Type		χ^2=1.09		0.579
Text vs. No WL	-0.252	0.78	0.48-1.26	0.305
Pic vs. No WL	-0.087	0.92	0.56-1.50	0.728
Pic vs. Text WL	0.165	1.18	0.73-1.91	0.503
Gender (ref=female)	-0.211	0.81	0.54-1.21	0.306
Age	-0.024	0.98	0.92-1.04	0.454
Smoking Status (ref=daily)		χ^2=3.84		0.146
Weekly	-0.605	0.55	0.30-1.01	0.053
Monthly	-0.087	0.92	0.43-1.95	0.820
Ethnicity (ref=white)	**-0.871**	**0.42**	**0.26-0.67**	**<.001**
Education (ref=low)		χ^2=1.88		0.391
Mod	0.092	1.10	0.67-1.78	0.712
High	-0.259	0.77	0.43-1.39	0.387
Income (ref=low)		χ^2=2.92		0.405
Mod	0.134	1.14	0.67-1.94	0.619
High	-0.031	0.97	0.57-1.65	0.910
Not given	1.296	3.66	0.71-18.80	0.121
HSI	-0.119	0.89	0.77	0.118
Quit Intention (ref=Within 1 month)		χ^2=1.83		0.768
Within 6 months	-0.333	0.72	0.40-1.27	0.254
Beyond 6 months	-0.149	0.86	0.50-1.49	0.593
Not planning to	-0.220	0.80	0.38-1.69	0.562
Not given	-0.600	0.55	0.16-1.92	0.348
Model Adjusted R Squared		0.065		

Table 56 shows results from the adjusted logistic regression model examining the same NRT-cigarette relative risk beliefs outcome for each of the four NRT products separately. For nicotine patch, gum, and lozenge, no differences were observed across experimental conditions.

For inhaler, the interaction between warning label and relative risk message was significantly associated with NRT-cigarette relative risk beliefs in the main effects model (χ^2=7.43, p=.024), but became non-significant when the predictors were added to the model.

Table 56. Adjusted binary logistic regression model for product-specific NRT-cigarette relative risk beliefs (n=611)

	NRT Patch				NRT Gum				NRT Inhaler				NRT Lozenge			
																
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	0.253	1.29	0.82-2.02	0.273	0.305	1.36	0.85-2.17	0.202	-0.357	0.70	0.33-1.47	0.348	0.099	1.10	0.69-1.76	0.677
WL Type	χ^2=1.97		0.374		χ^2=0.46		0.796		χ^2=3.92		0.141		χ^2=0.216		0.897	
Text vs. No WL	-0.344	0.71	0.41-1.236	0.224	-0.071	0.93	0.54-1.62	0.800	-0.910	0.40	0.08-2.14	0.286	0.131	1.14	0.65-2.01	0.650
Pic vs. No WL	-0.361	0.70	0.39-1.23	0.213	0.127	1.14	0.64-2.03	0.667	**-1.68**	**0.19**	**0.04-0.98**	**0.048**	0.092	1.10	0.62-1.95	0.753
Text vs. Pic WL	-0.017	0.98	0.57-1.69	0.951	-0.199	1.22	0.68-2.18	0.502	0.768	0.46	0.09-2.37	0.356	0.039	0.96	0.54-1.70	0.894
RR Message (by WL Type)	--		--		--		--		χ^2=5.23		0.073		--		--	
For Text WL	--	--	--	--	--	--	--	--	0.591	1.81	0.63-5.16	0.270	--	--	--	--
For Pic WL	--	--	--	--	--	--	--	--	1.26	3.52	1.20-10.36	0.022	--	--	--	--
Model Adjusted R Squared	0.072				0.044				0.047				0.047			

b) Nicotine Replacement Therapy vs. Smokeless Tobacco Relative Risk Beliefs

Table 57 shows that overall, 14.8% of the respondents answered accurately that all four NRT products are less harmful than ST. Respondents perceived lozenge to be least harmful and gum to be most harmful compared to ST.

Table 57. Responses* to the question, "In your opinion, how harmful to health is this product compared to smokeless tobacco?" (n=611)

	NRT Patch		NRT Gum		NRT Inhaler		NRT Lozenge		All four products 'Less harmful'
									
Condition	**% Same**	**% Less Harmful**	**% Same**	**% Less Harmful**	**% Same**	**% Less Harmful**	**% Same**	**% Less Harmful**	**%**
1-No WL	59.8	35.9	67.0	29.7	53.4	37.5	64.4	33.3	**11.6**
2-No WL+RR	58.0	29.5	68.5	25.8	57.5	33.3	67.1	29.4	**14.3**
3-Text WL	61.1	28.9	61.7	27.7	55.1	32.6	53.8	40.9	**8.0**
4-Text WL+RR	53.2	40.4	52.6	42.3	46.8	39.4	54.3	41.5	**19.1**
5-Pic WL	58.4	34.8	57.3	38.2	53.8	34.1	57.3	41.6	**16.5**
6-Pic WL+RR	62.2	33.7	65.2	32.6	57.6	31.5	66.7	32.3	**19.1**
"Less harmful"	**58.8**	**33.9**	**62.0**	**32.8**	**54.0**	**34.8**	**60.4**	**36.6**	**14.8**

Response options: 1 – A lot less harmful, 2 – Somewhat less harmful, 3 – No difference, 4 – Somewhat more harmful, 5 – A lot more harmful
*Dichotomised to 'less harmful' (1-2) and 'the same or more harmful' (3-5)

Table 58 displays the logistic regression model examining overall NRT-ST relative risk beliefs. No differences were observed across experimental conditions. Ethnic minorities had higher odds of reporting accurate beliefs.

Table 58. Adjusted binary logistic regression model for overall NRT-ST relative risk (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	0.467	1.60	0.93-2.75	0.092
WL Type		χ^2=1.59		0.452
Text vs. No WL	0.202	1.22	0.61-2.45	0.567
Pic vs. No WL	0.429	1.54	0.78-3.01	0.211
Pic vs. Text WL	0.227	1.26	0.66-2.39	0.489
Gender (ref=female)	0.344	1.41	0.81-2.46	0.224
Age	-0.017	0.98	0.90-1.07	0.706
Smoking Status (ref=daily)		χ^2=1.30		0.522
Weekly	-0.483	0.62	0.26-1.49	0.282
Monthly	0.051	1.05	0.42-2.62	0.914
Ethnicity (ref=white)	**0.623**	**1.87**	**1.00-3.47**	**0.049**
Education (ref=low)		χ^2=2.23		0.328
Mod	-0.375	0.69	0.35-1.35	0.276
High	0.089	1.09	0.51-2.34	0.820
Income (ref=low)		χ^2=0.30		0.961
Mod	-0.165	0.85	0.41-1.77	0.660
High	-0.023	0.98	0.47-2.03	0.951
Not given	0.085	1.09	0.21-5.68	0.920
HSI	-0.103	0.90	0.74-1.11	0.323
Quit Intention (ref=Within 1 month)		χ^2=3.11		0.540
Within 6 months	0.454	1.57	0.72-3.44	0.255
Beyond 6 months	0.250	1.28	0.60-2.74	0.517
Not planning to quit	-0.378	0.69	0.22-2.16	0.519
Not given	-0.271	0.76	0.08-6.98	0.810
Model Adjusted R Squared		0.043		

Table 59 shows results from the adjusted logistic regression model examining the same NRT-ST relative risk beliefs outcome for each of the four NRT products separately. For nicotine patch, gum, and inhaler, no differences were observed across experimental conditions. For lozenge, participants who viewed a text warning label had higher odds of reporting accurate beliefs compared to those who did not view any warning.

Table 59. Adjusted binary logistic regression model for product-specific NRT-ST relative risk beliefs (n=611)

	NRT Patch				NRT Gum				NRT Inhaler				NRT Lozenge			
																
	Beta	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**	**Beta**	**OR**	**95%CI**	***P* value**
RR Message	0.037	1.04	0.70-1.53	0.853	0.027	1.03	0.69-1.54	0.897	-0.007	0.99	0.67-1.47	0.971	-0.171	0.84	0.57-1.24	0.389
WL Type	χ^2=0.297		0.862		χ^2=4.27		0.118		χ^2=0.371		0.831		χ^2=4.58		0.101	
Text vs. No WL	0.123	1.13	0.70-1.83	0.617	0.496	1.64	1.00-2.71	0.052	0.100	1.11	0.68-1.79	0.682	**0.523**	**1.69**	**1.04-2.73**	**0.033**
Pic vs. No WL	0.108	1.11	0.69-1.80	0.661	0.424	1.53	0.92-2.54	0.101	-0.045	0.96	0.59-1.55	0.855	0.313	1.37	0.84-2.23	0.207
Text vs. Pic WL	0.015	0.99	0.61-1.59	0.951	0.072	0.93	0.57-1.51	0.772	0.145	0.87	0.54-1.40	0.553	0.210	0.81	0.51-1.29	0.380
Model Adjusted R Squared	0.049				0.089				0.058				0.065			

6.3 Relative Addictiveness Beliefs

Respondents were asked to rate the addictiveness of the four ST products compared to cigarettes and NRT, and to rate the four NRTs compared to cigarettes. Table 60 indicates that overall, nearly half (48.1%) of respondents believed that ST is less addictive than cigarettes, over a quarter (27.3%) believed that ST is less addictive than NRT, and almost three-quarters (71.3%) believed that NRT is less addictive than cigarettes.

Table 60. Responses* to the question, "Overall, how addictive are (ST/NRT) products compared to (cigarettes/NRT)?" (n=611)

	Condition 1	Condition 2	Condition 3	Condition 4	Condition 5	Condition 6	Overall
							
ST compared to Cigarettes (% ST "Less Addictive")							
	51.2	60.3	47.2	48.8	37.9	44.8	**48.1**
ST compared to NRT (% ST "Less Addictive")							
	29.1	32.0	25.3	30.2	22.2	25.8	**27.3**
NRT compared to Cigarettes (% NRT "Less Addictive")							
	78.4	78.3	63.4	69.6	69.3	70.1	**71.3**

Response options: 1 – A lot less addictive, 2 – Somewhat less addictive, 3 – No difference, 4 – Somewhat more addictive, 5 – A lot more addictive
*Dichotomised to 'less addictive' (1-2) and 'the same or more addictive' (3-5)

Table 61 displays the logistic regression model examining ST-cigarette relative addictiveness beliefs. The main effect of viewing a relative risk message was significant. Participants who viewed a relative risk message had higher odds of believing ST is less addictive than cigarettes. Thos who viewed a picture warning label had lower odds of believing ST is less addictive than cigarettes. Those reporting no plans to quit smoking and not providing quit plans had lower odds of believing ST is less addictive than cigarettes compared to those planning to quit within one month.

Viewing a warning label was significantly associated with NRT-cigarette relative addictiveness beliefs in the main effects model (χ^2=6.84, p=.033), but became non-significant when the predictors were added to the model. The opposite was seen for relative risk message, where in the main effects model it was non-significantly associated with NRT-cigarette relative addictiveness (χ^2=1.75, p=.186), and became significant when the predictors were added to the model.

Table 61. Adjusted binary logistic regression model for ST-Cigarette relative addictiveness (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	**0.482**	**1.62**	**1.09-2.40**	**0.016**
WL Type		χ^2=5.48		0.065
Text vs. No WL	-0.228	0.80	0.49-1.28	0.351
Pic vs. No WL	**-0.576**	**0.56**	**0.35-0.91**	**0.020**
Pic vs. Text WL	-0.348	0.71	0.44-1.14	0.157
Gender (ref=female)	0.157	1.17	0.79-1.73	0.435
Age	-0.040	0.96	0.90-1.02	0.211
Smoking Status (ref=daily)		χ^2=1.61		0.446
Weekly	0.359	1.43	0.78-2.63	0.246
Monthly	-0.077	0.93	0.44-1.93	0.837
Ethnicity (ref=white)	0.256	1.29	0.80-2.10	0.301
Education (ref=low)		χ^2=5.39		0.067
Mod	-0.415	0.66	0.41-1.06	0.086
High	0.109	1.11	0.63-1.97	0.708
Income (ref=low)		χ^2=2.73		0.434
Mod	0.079	1.08	0.64-1.84	0.770
High	0.388	1.47	0.87-2.50	0.152
Not given	0.115	1.12	0.29-4.33	0.867
HSI	-0.064	0.94	0.81-1.08	0.387
Quit Intention (ref=Within 1 month)		**χ^2=10.29**		**0.036**
Within 6 months	-0.090	0.91	0.53-1.59	0.750
Beyond 6 months	-0.380	0.68	0.41-1.15	0.152
Not planning to quit	**-0.950**	**0.39**	**0.18-0.83**	**0.014**
Not given	**-1.418**	**0.24**	**0.06-0.99**	**0.048**
Model Adjusted R Squared		0.075		

Table 62 displays the logistic regression model examining ST-NRT relative addictiveness beliefs. No differences were observed across experimental conditions. Participants reporting no

plans to quit smoking had lower odds of believing ST is less addictive than cigarettes compared to those who reported plans to quit within one month.

Table 62. Adjusted binary logistic regression model for ST-NRT relative addictiveness (n=611)

	Beta	**OR**	**95% CI**	***p* value**
RR Message (ref=no)	0.371	1.45	0.95-2.22	0.088
WL Type		χ^2=1.74		0.419
Text vs. No WL	-0.141	0.87	0.52-1.45	0.590
Pic vs. No WL	-0.354	0.70	0.41-1.19	0.189
Pic vs. Text WL	-0.212	0.81	0.48-1.37	0.427
Gender (ref=female)	0.405	1.50	0.97-2.31	0.066
Age	-0.011	0.99	0.92-1.06	0.750
Smoking Status (ref=daily)		χ^2=1.57		0.455
Weekly	0.202	1.22	0.65-2.30	0.530
Monthly	-0.376	0.69	0.30-1.56	0.369
Ethnicity (ref=white)	0.480	1.62	0.98-2.67	0.061
Education (ref=low)		χ^2=1.71		0.426
Mod	-0.130	0.88	0.52-1.49	0.632
High	0.225	1.25	0.67-2.33	0.475
Income (ref=low)		χ^2=2.13		0.545
Mod	-0.199	0.82	0.46-1.46	0.501
High	0.172	1.19	0.67-2.10	0.553
Not given	-0.034	0.97	0.23-4.09	0.964
HSI	-0.071	0.93	0.79-1.09	0.380
Quit Intention (ref=Within 1 month)		χ^2=5.51		0.239
Within 6 months	-0.336	0.71	0.40-1.29	0.265
Beyond 6 months	-0.472	0.62	0.36-1.09	0.100
Not planning to quit	**-0.914**	**0.40**	**0.17-0.92**	**0.032**
Not given	-0.105	0.90	0.24-3.35	0.875
Model Adjusted R Squared		0.053		

Table 63 displays the logistic regression model examining NRT-cigarette relative addictiveness beliefs. The main effect of viewing a warning label was significant. Participants who viewed a text warning label had lower odds of believing NRT is less addictive than cigarettes compared to those who did not see a warning label.

Table 63. Adjusted binary logistic regression model for NRT-Cigarette relative addictiveness (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.227	1.26	0.83-1.90	0.283
WL Type		**χ^2=6.16**		**0.046**
Text vs. No WL	**-0.645**	**0.52**	**0.31-0.88**	**0.014**
Pic vs. No WL	-0.445	0.64	0.38-1.09	0.099
Pic vs. Text WL	-0.200	1.22	0.75-1.99	0.422
Gender (ref=female)	-0.294	0.75	0.49-1.14	0.174
Age	-0.063	0.94	0.88-1.00	0.061
Smoking Status (ref=daily)		χ^2=0.45		0.800
Weekly	-0.218	0.80	0.42-1.53	0.505
Monthly	-0.053	0.95	0.44-2.07	0.895
Ethnicity (ref=white)	-0.328	0.72	0.44-1.18	0.194
Education (ref=low)		χ^2=1.53		0.465
Mod	0.191	1.21	0.74-1.98	0.446
High	0.380	1.46	0.80-2.68	0.218
Income (ref=low)		χ^2=7.15		0.067
Mod	0.663	1.94	1.13-3.35	0.017
High	0.462	1.59	0.92-2.73	0.094
Not given	1.260	3.52	0.74-16.86	0.115
HSI	0.034	1.04	0.89-1.21	0.660
Quit Intention (ref=Within 1 month)		χ^2=3.78		0.437
Within 6 months	-0.115	0.89	0.48-1.65	0.714
Beyond 6 months	-0.435	0.65	0.37-1.15	0.136
Not planning to quit	-0.139	0.87	0.40-1.90	0.727
Not given	-0.819	0.44	0.12-1.58	0.208
Model Adjusted R Squared		0.065		

6.4 Summary Comparisons between ST and NRT

Table 64 displays a summary of differences between parallel outcomes measures obtained for ST and NRT. Respondents were significantly more familiar with NRT products, rated NRT products significantly more appealing, and indicated that they would use NRT products in the future significantly more. No differences were observed for willingness to use ST and NRT for any of the five reasons examined. NRT was perceived to be significantly less harmful to health and significantly less addictive than ST, relative to cigarettes.

Table 64. Summary comparisons between core outcome measures for ST and NRT (n=611)

Outcome	ST	NRT	Test Statistic	*p* value
Familiarity	49.2%	96.8%	**χ^2=266.29**	**<.001**
Appeal	53.0%	85.8%	**χ^2=133.61**	**<.001**
Likelihood of Future Use	43.6%	68.2%	**χ^2=154.94**	**<.001**
Use product for any of five reasons	66.3%	68.2%	χ^2=0	1.00
#1: When can't smoke	48.9%	51.0%	χ^2=0.38	0.540
#2: When don't want to smoke	47.6%	48.6%	χ^2=0.25	0.617
#3: To help cut back	48.8%	49.2%	χ^2=0	1.00
#4: To help quit	48.1%	46.7%	χ^2=0.36	0.551
#5: As a long-term replacement	31.7%	35.9%	χ^2=2.48	0.115
ST/NRT-Cigarette Relative Risk	22.8%	65.3%	**χ^2=167.79**	**<.001**
ST/NRT-Cigarette Relative Addictiveness	48.1%	71.3%	**χ^2=65.05**	**<.001**

6.5 Support for Picture Health Warning Labels on ST Packages

Respondents were asked to what extent they support picture health warning labels on ST packages. Table 65 indicates that 71.4% of respondents support picture warning labels.

Table 65. Responses* to the question, "Do you think smokeless tobacco products should have picture health warnings similar to cigarette packages?" (n=611)

	Condition 1	Condition 2	Condition 3	Condition 4	Condition 5	Condition 6	Overall
							
% Yes	76.8	70.7	66.7	74.5	64.6	75.0	**71.4**

Response options: 1 - Disapprove strongly, 2 - Disapprove, 3 - Undecided, 4 - Approve, 5 - Approve strongly
*Dichotomised to 'Yes' (4-5) and 'Other' (1-2)

Table 66 displays the logistic regression model examining support for picture warning labels. No differences were observed across experimental conditions. Participants who reported having no plans to quit smoking had lower odds of support for picture warning labels on ST compared to those planning to quit within one month.

Table 66. Adjusted binary logistic regression model for overall support for ST picture health warnings (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.045	1.05	0.71-1.54	0.819
WL Type		χ^2=1.82		0.402
Text vs. No WL	-0.204	0.82	0.50-1.32	0.408
Pic vs. No WL	-0.331	0.72	0.44-1.16	0.179
Pic vs. Text WL	-0.127	0.88	0.55-1.40	0.593
Gender (ref=female)	0.138	1.15	0.77-1.71	0.497
Age	0.023	1.02	0.96-1.09	0.463
Smoking Status (ref=daily)		χ^2=0.326		0.850
Weekly	-0.135	0.87	0.48-1.60	0.664
Monthly	0.095	1.10	0.52-2.35	0.806
Ethnicity (ref=white)	-0.109	0.90	0.56-1.44	0.652
Education (ref=low)		χ^2=2.51		0.285
Mod	0.339	1.40	0.88-2.23	0.152
High	0.057	1.06	0.60-1.87	0.844
Income (ref=low)		χ^2=0.213		0.975
Mod	0.068	1.07	0.64-1.80	0.797
High	-0.028	0.97	0.58-1.64	0.915
Not given	-0.096	0.91	0.30-2.75	0.865
HSI	-0.047	0.95	0.83-1.10	0.528
Quit Intention (ref=Within 1 month)		χ^2=7.70		0.103
Within 6 months	-0.205	0.81	0.46-1.45	0.487
Beyond 6 months	-0.147	0.86	0.50-1.49	0.598
Not planning to quit	**-0.928**	**0.40**	**0.20-0.79**	**0.009**
Not given	-0.233	0.79	0.25-2.51	0.693
Model Adjusted R Squared		0.030		

6.6 Support for Relative Health Risk Information on ST Packages

Respondents were asked to what extent are interested in seeing information that compares the health risk of using ST to cigarettes on ST packages. Table 67 indicates that 67.8% of respondents support relative health risk information on ST packages.

Table 67. Responses* to the question, "Are you interested in seeing information on smokeless packages that compares the health risks of using ST to the health risks of smoking cigarettes?" (n=611)

	Condition 1	**Condition 2**	**Condition 3**	**Condition 4**	**Condition 5**	**Condition 6**	**Overall**
							
% Yes	72.0	72.2	67.6	72.3	60.6	61.6	**67.8**

Response options: 1 – Not at all, 2 – Unlikely, 3 – Undecided, 4 – Somewhat, 5 – A lot
*Dichotomised to 'Yes' (4-5) and 'Other' (1-2)

Table 68 displays the logistic regression model examining support for relative risk information. The main effect of viewing a warning label was significant. Participants who viewed a picture warning label had lower odds of support for relative risk information. Respondents who did not provide income information also had lower odds of support for relative risk information.

Table 68. Adjusted binary logistic regression model for support for ST health risk rating (n=611)

	Beta	OR	95% CI	*p* value
RR Message (ref=no)	0.081	1.08	0.74-1.58	0.674
WL Type		**χ^2=7.90**		**0.019**
Text vs. No WL	-0.212	0.81	0.50-1.30	0.380
Pic vs. No WL	**-0.647**	**0.52**	**0.33-0.83**	**0.006**
Pic vs. Text WL	-0.435	0.65	0.41-1.02	0.063
Gender (ref=female)	-0.141	0.87	0.59-1.28	0.472
Age	-0.013	0.99	0.93-1.05	0.677
Smoking Status (ref=daily)		χ^2=0.71		0.701
Weekly	-0.256	0.77	0.42-1.41	0.402
Monthly	-0.117	0.89	0.43-1.83	0.750
Ethnicity (ref=white)	0.172	1.19	0.74-1.91	0.477
Education (ref=low)		χ^2=1.77		0.412
Mod	-0.069	0.93	0.60-1.46	0.761
High	0.275	1.32	0.74-2.33	0.347
Income (ref=low)		χ^2=6.15		0.105
Mod	0.164	1.18	0.72-1.94	0.519
High	0.194	1.21	0.73-2.01	0.451
Not given	**-1.152**	**0.32**	**0.11-0.95**	**0.040**
HSI	-0.033	0.97	0.84-1.11	0.644
Quit Intention (ref=Within 1 month)		χ^2=2.36		0.670
Within 6 months	0.040	1.04	0.60-1.81	0.887
Beyond 6 months	-0.081	0.92	0.55-1.54	0.758
Not planning to quit	-0.453	0.64	0.32-1.26	0.196
Not given	-0.125	0.88	0.30-2.63	0.823
Model Adjusted R Squared		0.040		

7.0 DISCUSSION

To our knowledge, this research is the first to examine the impact of health warning labels on Canadian smokers' perceptions of smokeless tobacco (ST) appeal, health risk beliefs, and intentions to use ST products. It is also the first study to examine the impact of adding a relative health risk message to tobacco packaging regarding the health risk of ST compared to smoking cigarettes. This research addresses gaps identified in previous research on ST that called for testing to determine how features such as labeling and relative risk messages affect perceptions of ST, how perceptions might affect patterns of uptake and use of ST, and how methods of labeling and health messages can be used to minimise the harm ST products pose to public health.

The findings indicate an effect of health warning labels and relative health risk messages on ST product appeal, health risk beliefs and intentions to use the products. The findings also suggest that young adult Canadian smokers are open to trying ST products concurrently with smoking, as a replacement for smoking, as well as for cessation assistance, but that many are confused about the much lower health risk of using ST relative to smoking.

7.1 Smokers' awareness of ST products

Half (49%) of the respondents were familiar with at least one of the four ST products. Relatively low familiarity with ST was expected given that less than 1% of Canadians use ST (CTUMS, 2003) and even fewer smoke and use ST concurrently (O'Connor et al., 2007). In fact, only 17.3% of the respondents in this study had ever used ST and, of those, 8.8% had used it in the past month. In fact, only 17% of the respondents in this study had ever used ST. These findings concur with previous research which indicates that 68% of adult Canadian smokers are aware of ST products (O'Connor et al., 2007). Smokers are likely more aware of ST than non-smokers because they are more sensitive to ST advertising, which is often targeted to adult smokers "for when you can't smoke" (Polito, 2004), and as an alternative to smoking (Hatsukami et al., 2007). On the other hand, nearly all (97%) respondents were familiar with at least one of the four nicotine replacement therapy (NRT) products.

Respondents were most familiar with the Copenhagen snuff (38%), followed by duMaurier snus (14%) and Marlboro snus (12%). Respondents were least familiar with the Ariva compressed tobacco lozenge (10%). It is not surprising that respondents were most familiar with Copenhagen snuff, since it has been on the Canadian market for many years and is a leading ST brand. The duMaurier snus was only introduced to select Canadian markets in 2008, though it was widely advertised in newspapers (http://goodhealth.freeservers.com/du_Maurier_snus_ad_12_2009.jpg). Marlboro snus and Ariva lozenge are both relatively new products and are not sold in Canada, therefore it is not surprising that young adult Canadian smokers were least aware of these products. Consumers might also know of the sister product to Ariva lozenge, Stonewall lozenge, which is manufactured by the same company, Star Scientific, Inc. (Chester, VA). However, familiarity with Stonewall was not assessed.

Males were found to be more familiar with ST, whereas older respondents, and those who were not planning to quit were less familiar with ST. The finding that males were more familiar with ST products may be related to the fact that ST users tend to be male (Tomar, 2003). ST users also tend to be in male-dominated blue-collar occupations (Marcus et al., 1989; Lee et al., 2007). Therefore, males may be more exposed to ST products because of their social circles, occupations, involvement in sports and recreation, as well as other reasons. The finding that those who were not planning to quit were less familiar with ST could be because they are satisfied with their current smoking habit and are not interested in alternatives such as ST, and therefore either have not sought them out or noticed them in advertising. The finding that younger respondents were more familiar with ST is likely due to the fact that ST use is highest among younger adults (Marcus et al., 1989; CDC, 1991; Nelson et al., 1996; Howard-Pitney & Winkleby, 2002; Tomar, 2002).

7.2 Appeal of ST products

Just over half (53%) of respondents found at least one of the four ST products appealing. Respondents found duMaurier snus (33%) to be most appealing, followed by Ariva lozenge (29%), Marlboro snus (26%), and Copenhagen snuff (16%). The finding that Marlboro snus was less appealing than the similar looking duMaurier snus product suggests that awareness of the

product, and particularly brand familiarity, may play a role in product appeal. A significantly larger proportion (86%) of the respondents found at least one of the four NRT products appealing. Previous research also indicates that smokers find NRT more appealing than ST (Shiffman, Gitchell, Rohay, Hellebusch & Kemper, 2007).

The appeal of a particular product seems to be based more on the perceptions of that brand than the sensory qualities of the product itsself, as exemplified in a British American Tobacco report: "One of every two smokers is not able to distinguish in blind (masked) tests between similar cigarettes…for most smokers and the decisive group of new, younger smokers, the consumer's choice is dictated more by psychological, image factors than by relatively minor differences in smoking characteristics." (British American Tobacco, 1978). Therefore, although Marlboro is one of the most globally recognised brands, the duMaurier snus – having branding and imagery that is well-known to Canadian smokers – was most appealing. However, the finding that Copenhagen was least appealing, despite the finding that respondents were by far most aware of this product, suggests that other factors, such as the product characteristics and perceived risk, play a significant role in product appeal. In fact, the current study found that Copenhagen snuff was perceived to be the most harmful to health compared to cigarettes.

Product characteristics, packaging, flavour descriptors, and even social factors appear to influence the appeal of tobacco products and ST. The product appearance and characteristics may influence appeal of these ST products to young adult smokers such that the Ariva lozenge, which is similar in appearance to a breath mint and contained in a package similar to chewing gum, is rated higher in appeal than the Copenhagen snuff, which is similar in appearance to black coffee grounds and contained in a package much like a tuna can. Features such as the package colour may also influence appeal due to perceptions of health risk or other factors. For example, Copenhagen packaging is predominantly black and was found least appealing, whereas Ariva lozenge packaging is light green and was found relatively more appealing by respondents. For cigarette packaging, research indicates that colour does influence perceptions; the closer to white the package is the cleaner, healthier, and lower delivery and strength a product is perceived to be (Wakefield, Morley, Horan & Cummings, 2002). Flavour descriptors may also affect appeal. For example, Copenhagen does not advertise flavouring on the package, whereas Ariva advertises

wintergreen flavor. Previous research has found that cigarette packages with flavour descriptors compared favourably to those with more traditional descriptors (Manning, Kelly & Comello, 2009). Package material may be an important factor too. Plain packaging has also been found to reduce the appeal of cigarettes for both young people (Northrup & Pollard, 1995; Rootman & Flay, 1995; Freeman, Chapman & Rimmer, 2008) and adults (Wakefield, Germain & Durkin, 2008). For example, in the current study the duMaurier and Copenhagen products presented came in metal packaging, the Ariva lozenge was packaged in paper, and the Marlboro was packaged in plastic. package preference research done by Philip Morris found that "a plastic pack has particular appeal among the young, fitting their lifestyle of sports, outdoor activities and being 'on the go'" (Wakefield, Morley, Horan & Cummings, 2002). Finally, social acceptability may also affect ST appeal. Previous research has found that ST users perceived use of their product as socially risky, and they regarded ST use as having a lower image in urban centres than rural areas (Créatec, 2003).

Viewing a picture health warning significantly decreased appeal. The general finding that health warning labels decreased appeal concurs with the literature on cigarettes, where prominent health warnings covering a significant proportion of the package lowered appeal (Borland & Hill, 1997; Willemsen, 2005; Borland et al, 2009). The specific finding that picture warnings were associated with the lowest appeal is supported by previous research examining the effect of picture warning labels on reduced exposure products including ST and cigarettes (Thrasher et al., 2007; Stark et al., 2008). Picture warnings have particular impact on young Canadians, with over 90% reporting that pictorial warnings provided them with health risk information that made smoking less appealing (Health Canada, 2005).

It is surprising that viewing the relative risk message describing ST as lower risk than cigarettes was not associated with higher appeal, given that perceptions of risk are an important predictor of tobacco use (Weinstein, 1999; Romer & Jamieson, 2001), and in light of the finding mentioned above regarding the importance of package health risk information for young Canadians.

Those who smoked weekly compared to daily, ethnic minorities, and those with high income rated the ST products most appealing. The finding that those who smoked less frequently rated the ST as more appealing may be related to a desire by these smokers to stop smoking completely. Weekly smokers may have already cut down their smoking substantially, for example, but cannot or do not want to eliminate smoking completely. They may be influenced by the social unacceptability of smoking and are looking to eliminate smoking by using a more discrete product to obtain nicotine. It is also possible that cigarette smoking is not so deeply ingrained into less frequent smokers' behaviour or self-concept, allowing them to consider alternative products more readily than more committed smokers. It is interesting that less frequent or less nicotine dependant smokers found ST more appealing in light of the evidence from Sweden where ST was particularly helpful as a cessation aid for more nicotine dependant smokers (Fagerström & Ramström, 1998). Perhaps more nicotine dependant smokers are more reluctant users of ST.

The finding that higher income was associated with higher appeal might be related to perceived risk or willingness to use ST. This study found that those with higher income had more accurate health risk beliefs about ST compared to smoking, and were also more willing to try ST for the times when they cannot smoke. That is, those who correctly believed that ST is less harmful than smoking also found ST more appealing. Research indicates that smokers find products that are perceived to be less harmful as more appealing (Geertsema, Phillips & Heavner, under review; Heavner, Rosenberg & Phillips, 2009). Respondents may also have found ST more appealing because they saw utility in using ST for the times when they cannot smoke, or they may have seen utility in the use of ST because they find it to be appealing.

It is interesting that ethnic minorities found ST to be more appealing in light of evidence from the US which shows that in recent years ST prevalence has decreased markedly among nonwhites (Mumford, Levy, Gitchell & Blackman, 2005), and that ST users are almost exclusively white (Rodu & Cole, 2009). However, research also indicates that ST prevalence is disproportionately high in the US among American/Indians and Alaskan Natives (Spangler et al., 2009). Therefore, Canadian smokers belonging to certain ethnic groups may find ST particularly

appealing. However, this is difficult to determine from this study given the low frequency of respondents in each of the eleven minority groups assessed.

7.3 Likelihood of smokers taking up ST

Almost half (44%) of respondents indicated that they were likely to try at least one of the four ST products, even though only 17% had ever used ST. This finding has implications for the impact and efficacy of advertising of ST on young adult Canadian smokers, and provides information about how young adult Canadian smokers might use ST products. On the other hand, significantly more (77%) respondents indicated that they were likely to try at least one of the four NRT products.

The responses for likelihood of future use followed the same general trend as the ratings of product appeal. It is intuitive that products which are rated as more appealing (duMaurier snus, Ariva lozenge, Marlboro snus) would receive higher intentions for future use. The same factors that influence appeal might also influence likelihood of future use, either directly, through increased product appeal, or another mechanism.

It should be noted that the wording of the question, “Overall, how likely would you be to try this product in the future?” is limited by its generality. The question does not access the various reasons a respondent might use a ST product, such as to substitute for smoking when they do not want to smoke or cannot smoke, or to help cut back or quit smoking altogether. There are reasons a respondent might choose to use ST that are personal and could not be anticipated. This question has value, therefore, in determining how likely young adult smokers would be to try ST for any reason or in general, not limited to the reasons mentioned above and detailed in section 7.4.

Respondents were slightly more (66%) willing to use at least one of the four ST products when prompted to consider one of five potential reasons for using ST. Thus, when smokers were offered specific reasons for using ST, they rated themselves as more open to trying ST than when they were asked about using ST in general—discussed in the follow section.

Viewing a picture health warning significantly lowered likelihood of future ST use, and viewing a relative risk message significantly raised likelihood of future ST use. There was a trend towards decreased odds of future ST use as the health warning was increased from none, to text, to picture. But only when comparing picture warnings to text warnings or no warning was the decrease statistically significant. These findings are consistent with the literature on cigarette warnings. In a study that assessed the impact of the introduction of picture warning labels in Canada on adolescents, it was found that the adolescents noticed, thought, and talked about the warnings more, and in turn both experimental and regular smokers had more thoughts about quitting and forgoing cigarettes (White, Webster & Wakefield, 2008). However, the current finding is not consistent with a relatively old study examining the impact of text warning labels on ST for high school students which found that text warning labels had no effect on students' ratings of whether they would use ST in the future (Brubaker & Mitby, 1990).

The finding that viewing a picture health warning decreased likelihood of future ST use indicates that the picture health warning labels achieved their ultimate purpose – to discourage use of the product. This finding is consistent with the literature for cigarettes which indicates that picture warnings are effective at reducing cigarette consumption (Borland & Hill, 1997; Hammond, Fong, McDonald, Cameron & Brown, 2003; White, Webster & Wakefield, 2008; Borland et al., 2009).

The finding that viewing a relative health risk message comparing the harm of using ST to smoking cigarettes raised likelihood of future use suggests that the relative health risk message was successful in achieving its purpose – to encourage accurate health risk perceptions about ST, and an informed choice of tobacco product. This is a significant finding since tobacco users have been shown to be more open to trying a reduced risk product (Stark et al., 2008; Geertsema, Phillips & Heavner, under review; Heavner, Rosenberg & Phillips, 2009).

Minorities were found to have higher likelihood of future ST use. This is an interesting finding given that in recent years in the US, use of ST by minorities has significantly decreased (Mumford, Levy, Gitchell & Blackman, 2005), and ST users are almost exclusively white (Rodu & Cole, 2009). However, in this study minorities also found ST to be more appealing. There may

be differences between young adult minority Canadian smokers and US ST users that make them more likely to embrace ST use; a notion that is supported by the finding in this study that minorities were more willing to try ST as a long-term replacement for smoking.

7.4 Potential for ST use for smoking substitution, replacement, and cessation

Whether ST will prevent or promote cigarette smoking, serve as a cessation tool or complete replacement for smoking, or be used in conjunction with cigarettes is unknown and depends on a number of factors. The proportion of respondents willing to try each product for each of the five reasons follows the same general trends as how aware respondents were of each product, and how appealing they found each product. This finding suggests that product awareness, product appeal, the factors that influence product awareness and appeal, and certainly other factors, influenced willingness to try ST for each of the five reasons detailed in the following sub-sections.

About half of the respondents were willing to try at least one of the four STs for the times when they cannot smoke, when they do not want to smoke around others, to help cut back, and to help quit. About one-third of the respondents were willing to try at least one of the four STs as a long-term replacement for smoking. There was no significant difference in the proportion of respondents who expressed willingness to try NRT for each of the same five reasons.

There is a trend towards decreased willingness to try ST for all five reasons as the health warning is increased from none, to text, to picture. Specifically, the difference between picture warning and no warning was significant for four of the five reasons examined (with the exception being when they cannot smoke around others). The finding that picture warnings decrease willingness to try ST for each of the five reasons is reflected in the literature for cigarette warning labels, which indicates that picture warnings increase perceptions of harm and decrease product consumption (Stark et al., 2008; Geertsema, Phillips & Heavner, under review; Heavner, Rosenberg & Phillips, 2009).

For example, previous research examining the effect of picture warning labels on reduced exposure products including ST found that smokers and non-smokers rated products with picture

warnings as more harmful (Stark et al., 2008). The notion 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, Phillips & Heavner, under review; Heavner, Rosenberg & Phillips, 2009).

Viewing a text warning on ST packages reduces willingness to try ST, but viewing a relative risk message appears to compensate for this reduction in willingness to try ST for each of the five reasons. On the other hand, there was a decrease in willingness to try ST for each of the five reasons when the relative risk message was added to packages with a picture warning label, which was unexpected (see section 7.4.4). However, for all five reasons the compensatory increase in willingness to try ST was not statistically significant. In short, the relative risk message compensated for the decrease in willingness to try ST for packages with a text warning, but decreased willingness to try ST even further for packages with a picture warning.

7.4.1 Potential for use as a substitution when smokers cannot smoke

Nearly half (49%) of the respondents indicated that they were willing to use at least one of the four ST products *in places where they cannot smoke*. The large proportion of smokers in this study who said they would use ST in places where they cannot smoke may have been influenced by (or may have influenced) ST advertising. ST is commonly marketed to adult tobacco users "for when you can't smoke" (Polito, 2004) and as an alternative to smoking (Hatsukami et al., 2007). Full-page newspaper advertisements for the recently test-marketed duMuarier snus read, "the handy tobacco option…smoke free, chew free and spit free, SNUS is an alternative for adult tobacco users" (http://goodhealth.freeservers.com/du_Maurier_snus_ad_12_2009.jpg). The marketing strategy 'for when you can't smoke' is likely a strategic response on the part of tobacco companies to the many smoke-free policies that have been enacted in Canada in recent years (OTRU, 2009). A study of industry documents on the development of ST products supports the notion that the tobacco industry deliberately developed ST to target smokers in response to smoking restrictions, health concerns, the growing social unacceptability of smoking, and the changing demographics of ST users (Carpenter, Connolly, Ayo-Yusuf & Wayne, 2009). That is, in North America ST appears to have been developed and marketed to be used alongside

cigarettes. Furthermore, the evidence indicates that dual-use of cigarettes and ST is not uncommon (Mumford, Levy, Gitchell, & Blackman, 2005; Rodu & Cole, 2009).

The finding that a significant proportion of smokers in this study were willing to try ST in places where they cannot smoke concurs with the findings from research on secular trends in Sweden which indicate that Swedish snus might have been used by men to partially replace smoking (Tomar, 2007), and the findings from two US national surveys (Tomar, 2002; Hatsukami, Lemmonds & Tomar, 2004) which showed that dual-users of cigarettes and ST smoked fewer cigarettes; and daily ST users smoked less than occasional and non-users of ST, who did not smoke fewer cigarettes. That dual-users of cigarettes and ST smoke fewer cigarettes is further supported by a cancer prevention trial studying dual-use and smoking cessation (Wetter et al., 2002). Dual-use was also evident in a Health Canada commissioned focus group study of the effect of warnings on ST users which found that users had mainly chosen to use ST to get nicotine when they could not smoke, such as during sporting events or recreational activities, at work, and at home (Créatec, 2003). In short, this finding indicates that a significant proportion of smokers may want to use ST as a nicotine substitution while continuing to smoke. The literature suggests that use of ST in this fashion could decrease total cigarette consumption.

Participants with a moderate income level were more willing to try at least one ST product when they cannot smoke. This finding is contrasted by research showing that ST users had lower income than never users of tobacco (Rodu & Cole, 2009), although exclusive smokers and primarily ST users may not be comparable groups. One potential explanation is that those with a moderate income may work in occupations and/or frequent public spaces where smoking is restricted or socially unacceptable more often than those with low or high incomes, and therefore out of necessity are more open to using ST when they cannot smoke.

7.4.2 Potential for use as a substitution when smokers do not want to smoke around others

Nearly half (48%) of the respondents were willing to use at least one of the four ST products *when they do not want to smoke around others*. The appearance of the product may have had a significant effect on smokers' willingness to try ST when they do not want to smoke around others. The three products that respondents indicated they were most willing to use are

comprised of two teabag-like snus products and one lozenge – ST forms that appear easy and discrete to use (i.e., spit-free). In contrast, the ST product respondents indicated they were least willing to use was the coffee ground-like snuff – a product which does not appear easy or discrete to use. The idea that smokers may be more likely to consider using a product that looks discrete to use is supported in a study of adult Canadian smokers, which found that 44% of women and 36% of men would not consider switching to ST because it was socially unacceptable or gross. Interestingly though, when asked about a hypothetical product that could be used discretely, 79% of those indicated that they would consider switching (Heavner, Rosenberg & Phillips, 2009). As the authors of the study note, these erroneous beliefs demonstrate the lack of awareness among smokers with regards to modern ST products which are spit free and can be used discretely, and indicate that with minimal education efforts smokers may consider switching to ST.

Some factors that may influence smokers' product choices include the various social and legal pressures smokers face to not smoke around others, and children in particular. Indeed, a lack of secondhand smoke has been cited by ST users as an important reason for using ST (Créatec, 2003). Furthermore, as of Jan 1, 2010, smoking in cars with children will be restricted in six of the thirteen Canadian provinces and territories, and in Ontario many municipalities have banned smoking near playgrounds, parks, public pools, zoos, and popular family-oriented recreational sites (OTRU, 2009). Interestingly, a 2008 survey of Ontario adults found that more provisions are supported: smoking bans were supported in multi-unit dwellings, for adults smoking at home with children present, in parks and beaches, and on sidewalks (OTRU, 2009).

Health authorities are concerned with protecting adults and children from secondhand smoke as well. In their 2004 position paper, the Ontario Medical Association recommends protection from secondhand smoke for children at home, in vehicles, and in care facilities (OMA, 2004). Internationally, Article 8 of the WHO's Framework Convention on Tobacco Control requires member states to implement smoke-free legislation to protect people from secondhand smoke exposure in all indoor public spaces and workplaces, public transport, and other public places (WHO, 2009).

7.4.3 Potential for use as a partial replacement to reduce cigarette smoking

Nearly half (49%) of the respondents were willing to use at least one of the four ST products *to help cut back the amount they smoke*. Rodu and Godshall (2006) have stated that, "Many smokers are unable – or at least unwilling – to achieve cessation through complete nicotine and tobacco abstinence; they continue smoking despite the very real and obvious adverse health consequences. Conventional smoking cessation policies and programs generally present smokers with two unpleasant alternatives: quit, or die." As reduced harm tobacco products, the use of ST to cut back on smoking presents a viable alternative for these "inveterate" smokers. This study demonstrates that a substantial proportion of young adult Canadian smokers are willing to use ST to help cut back the amount they smoke. The results of this study are contrasted by a Health Canada commissioned focus group study of the effect of warnings on ST users which found that many smokers used ST for nicotine relief, and not necessarily to cut back on smoking (Créatec, 2003).

7.4.4 Potential for use as a cessation aid to help smokers quit

Nearly half (48%) of the respondents were willing to use at least one of the four ST products *to help while they are trying to quit smoking*. These are interesting findings given that smoking cessation rates are generally quite low. In 2003, just over half of ever-smokers in Canada had quit smoking (Health Canada, 2003) and in 2006 about half (50%) of ever-smokers in the US were currently former smokers (CDC, 2007). Though in 2000, 70% of US smokers said they want to quit smoking altogether, only 5% of smokers who smoked most days managed to quit and remain abstinent for 3-12 months (CDC, 2002). ST may therefore be used viably as a cessation aid by young adult smokers in addition to, or as an alternative to, more traditional cessation assistance.

A frequent argument made against the use of ST as a cessation aid in harm reduction is the widespread non-prescription availability of NRT, which has proven effective in smoking cessation (Silagy, 2002; ASH, 2007). However, a 2003 meta-analysis indicated that the long-term quit rate for those who use non-prescription NRT is only 7% (Hughes, Shiffman, Callas & Zhang, 2003). Therefore, ST might be a viable alternative to NRT for some smokers, including

“inveterate” smokers. The 1998 US National Health Interview Survey (NHIS) indicated that 6% former smokers quit with the help of ST (Tomar, 2007), which is comparable to the success rate for those using NRT.

There is a significant body of evidence which indicates that smokers have successfully used ST to help them quit. The 1991 US NHIS indicated that 33.3% of current ST users were former smokers (Centers for Disease Control and Prevention, 1993). Data from the 2000 US National Health Interview Survey show that male smokers who tried ST to help quit had the highest success rate (73%), compared to those who tried nicotine patch (35%), gum (34%), and inhaler (28%) (Rodu & Phillips, 2008). And another study has demonstrated short-term efficacy of ST as a smoking cessation aid (Tønnesen, Mikkelsen & Bremann, 2008). On the other hand, NRT has been preferred over ST in a number of studies. (Mendoza-Baumgart et al., 2007; Shiffman et al., 2007). In this study, 48% of the young adult smokers had ever used any NRT, and of those, respondents had used gum (46%), patch (31%), lozenges (7%), tablets (2%), inhaler (7%), and nasal spray (1%). However, all respondents remained current smokers upon entry into ths study; they had not successfully quit using traditional NRT. Although they were not asked, it is possible that NRT had helped them cut back on cigarette consumption.

Regardless of the efficacy of ST and NRT as cessation aids, the nicotine delivery characteristics of ST may make it preferable for smoking cessation compared to NRT. There is a notable difference in the level of nicotine in ST compared to NRT. ST products contain much higher levels of nicotine than NRT; high enough that they are generally recognized as being addictive (Tilashalski, Rodu & Mayfield, 1994; Richter & Spierto, 2003). For example, NRT patch delivers nicotine in low levels such that concurrent smoking is common (Benowitz, 1988). On the other hand, the nicotine in ST is absorbed more slowly, but results in peak blood nicotine levels similar to cigarettes that persist for longer than the levels from cigarettes (Henningfield, 1995). However, high-strength nicotine patches have been tested and may provide more adequate nicotine replacement (Dale et al., 1995; Ebbert et al., 2007). Regardless, the quantity of nicotine consumed by ST users and smokers is similar (Ramstrom, 2003). In short, lower nicotine ST products may be less addictive, but also less likely to replace cigarettes for current smokers. On

the other hand higher nicotine products may be addictive, but they are more likely to replace the more harmful cigarette (Hatsukami et al., 2007).

The notion that the nicotine delivery characteristics might make ST a preferable smoking cessation aid compared to NRT is supported in data from Sweden, where ST used as a cessation aid also shows a higher success rate compared to NRT (TEMO, 2001; Ramström, 2002), particularly for smokers who are more nicotine dependant (Fagerström & Ramström, 1998). However, in the US ST accounts for a small fraction of successful smoking cessation, according to Tomar (2007). A US longitudinal study of smokers that examined the use of ST as a cessation aid found that a quarter had quit using ST at one year follow-up, and about a quarter had quit and remained abstinent using ST at seven year follow-up (Tilashaki, Rodu & Cole, 2005). However, consumer preference may matter more than product effectiveness; some people prefer ST, some people prefer NRT, and some people prefer no help whatsoever in quitting smoking (Kotlyar et al., 2007). For example, a study that examined preferences, usage, and health risk of NRT lozenge and ST lozenges found that Ariva lozenge was preferred over NRT lozenge, even though feelings of withdrawal and craving, and carcinogen uptake were similar between the Ariva and NRT lozenge (Mendoza-Baumgart et al., 2007).

Participants who were planning to quit smoking beyond six months compared to those planning to quit within one month were found to have significantly higher willingness to try ST to help quit smoking. These smokers who plan to quit, but not in the immediate future, may be more willing to try ST because their desire to quit smoking or quit using tobacco is less urgent than those who plan to quit within a month or six months, for example. These smokers may be more willing to delay complete tobacco abstinence by using ST as an alternative tobacco product. Previous research indicated that smokers who were trying to cut down were more willing to substitute ST for cigarettes (Timberlake, 2009). Previous research also indicated that smokers who had plans to quit in the more distant future were more open to switching to ST than smokers with no plans to quit (Heavner, Rosenberg & Phillips, 2009). The current research and previous research taken together suggest that smokers with distant quit plans, but not proximal or non-existent quit plans are more likely to consider using ST.

7.4.5 Potential for use as a long-term complete replacement for cigarettes

Nearly a third (32%) of the respondents were willing to use at least one of the four ST products *as a long-term replacement instead of cigarettes*. Research has shown that the long-term use of a nicotine replacement product in place of cigarettes is not uncommon. Despite the fact that the FDA limits use of NRTs to 10-12 weeks (based on concern about nicotine addiction, not health per se), many users continue to use NRT for up to six months and beyond (Henningfield, 1995; Garvey et al., 2000; Shiffman, Hughes, Pillitteri, & Burton, 2003). This study concurs with previous research on smokers' willingness to switch to ST as a long-term replacement. A small study of adult Canadian (Edmonton) smokers indicated that 10% had considered switching to ST, and 40% had considered switching to NRT. Those who had not considered switching to ST or NRT offered reasons related to their perceived health risks of these products, which were erroneous (Heavner, Rosenberg & Phillips, 2009). Similarly, research has shown that over half of US smokers believe incorrectly that nicotine causes cancer (Cummings et al., 2004). These findings support the notion that smokers' reluctance to switch to ST (and NRT) is partly a result of misperceptions about the relative health risks of these products compared to smoking. Many also indicated that they did not consider switching to ST because it was socially unacceptable or gross (Heavner, Rosenberg & Phillips, 2009). As the authors of the study note, these false beliefs demonstrate the lack of awareness among smokers with regards to modern ST products which are spit free and can be used discretely. Interestingly though, when asked about a hypothetical product that could be used discretely, most of those who did not consider switching because they found ST socially unacceptable indicated that they would consider switching (Heavner, Rosenberg & Phillips, 2009).

The notion that smokers would be especially interested in using ST products as long-term replacements for cigarettes when given accurate information about relative health risk is supported by research which indicates that the majority of smokers were interested in switching to an oral nicotine product when it was described similarly to modern pouch or sachet style ST (snus); that is, a tobacco product that carries 1% of the health risk of smoking cigarettes and is nearly as satisfying (Geertsema, Phillips & Heavner, under review; Heavner, Rosenberg &

Phillips, 2009). These smokers may fall under the category of "inveterate" smokers described by Rodu and Godshall, who are unwilling or unable to completely eliminate tobacco use.

7.5 Smokers' health risk beliefs about ST, cigarettes and NRT

7.5.1 Smokeless Tobacco vs. Cigarettes

Over a quarter (28%) of respondents had misperceptions about the relative health risks of ST and cigarettes and incorrectly believed that all four ST products were at least as harmful, or more harmful than cigarettes. Depending on the product, between 30% and 47% of respondents incorrectly indicated that ST and cigarettes are equally harmful, and a small proportion believed that ST is more harmful than cigarettes. In fact, ST carries much lower health risk than smoking (Stratton, Shetty, Wallace & Bondurant, 2001; TAGRCP, 2002; Levy et al., 2004).

Misperceptions about the relative risk of ST and cigarettes are not uncommon. Previous research has shown that 68% of adult Canadian smokers are aware of ST products, and of those only 14% believe they are less harmful than conventional cigarettes (O'Connor et al., 2007). The risk of ST compared to cigarettes was also overestimated in data from adult smokers in Australia, the US, and the UK (O'Connor et al., 2005; O'Connor et al., 2007; Smith, Curbow & Stillman, 2007), and high school seniors in the US (Tomar & Hatsukami, 2007). A 2000 study of 36,012 young adult US Air Force entrants found that the vast majority underestimated the harm reduction potential of switching from smoking to using ST (Haddock et al, 2004). On the contrary, both Americans (Phillips, Wang & Guenzel, 2005) and Canadians (Heavner, Rosenberg & Phillips, 2009) overwhelmingly hold the incorrect belief that switching to ST from smoking will result in a large increase in the risk of oral cancer. Similarly, a study of Canadian university students found that half believed that ST 'definitely causes oral cancer' (Geertsema, Phillips & Heavner, under review). Even in Norway and Sweden, where ST is more commonly used, adolescents (Øverland, Hetland & Aarø, 2008) and adults (Anon, *n.d.*) overestimate the harm of ST relative to smoking.

On the other hand, a focus group study commissioned by Health Canada found that adult smoking and non-smoking ST users perceived ST to be generally less harmful than smoking

cigarettes. In fact, the study found that ST users had a strong tendency to view ST as less harmful than smoking; partly because many ST users who still smoked had taken up ST in order to reduce cigarette consumption (Créatec, 2003). A large study of adult smokers in Canada, the US, the UK, and Australia also found that users of ST were more likely to believe ST is less harmful than cigarettes (O'Connor et al., 2007). This is likely because they use the product, and engage in some form of self-exempting belief or optimistic bias.

That so many people are misinformed about the relative health risk of ST compared to smoking is not surprising given the finding from a systematic review of internet content in 2003 that found that the risks of ST and smoking cigarettes were almost always made confusing, most often by websites which implied that the risks are comparable, as well as by about a third of websites which claimed that ST is equally or more harmful than smoking. Public health authorities and tobacco control advocates also tend to exaggerate the health risk of ST compared to cigarettes (Phillips, Wang & Guenzel, 2005). Phillips and Heavner (2009) argue that the problem is exacerbated by the Canadian prohibition on the dissemination of accurate information about the relative harms of tobacco products.

The notorious failure of the "low yield" cigarette is also used often as a counter-argument to the promotion of reduced harm ST (Stratton et al., 2001). In fact, the failure of the "low yield" cigarette, which was incorrectly perceived to be lower risk, was at least informative – the widespread commercial success of the product demonstrated that smokers will readily change their current tobacco product and take up a new product that is (perceived to be) less harmful to their health. Though, as Kozlowski (2007) notes, "The longstanding, current, and legal availability of smokeless tobacco products gives some reason to believe that those who like smoking will not readily come to prefer smokeless tobacco."

Viewing a picture health warning label significantly decreased correct beliefs about the health risk of ST compared to cigarettes, and viewing a relative risk message significantly increased correct beliefs about the health risk of ST compared to cigarettes. This finding is supported by previous research examining the effect of picture warning labels on reduced exposure products

including ST, which found that smokers and non-smokers rated products with picture warnings as more harmful (Stark et al., 2008).

The finding that picture warning labels resulted in erroneous beliefs about the health risk of using ST compared to smoking concurs with the results found in the literature for picture warnings on cigarette packages. Picture warnings increase knowledge (Thrasher, Hammond, Fong & Arillo-Santillán, 2007) and concerns (O'Hegarty et al., 2006) about the health effects of smoking, as well thoughts of harm (Borland et al., 2009). A similar result is seen in the current study's findings, in that picture warnings seem to have increased perceptions of ST risk, but to inaccurate levels. In contrast, text warnings did not have the effect of increasing misperceptions about ST health risk. This is a striking finding given that Hammond's (2009) evidence review on tobacco warning labels reports that, "Several large studies have shown that large text-based warnings are associated with increased perceptions of risk." Compared to picture warnings, text warnings on ST seem to cultivate far more accurate beliefs about the true health risk of ST compared to cigarettes.

Interestingly, a Health Canada commissioned focus group study found that adult smoking and non-smoking ST users expressed low personal impact from picture warnings for a variety of reasons; some did not want to accept the health risks since they had already switched from cigarettes to reduce personal harm, and some found the images repulsive. However, some noted that the text warnings did not get their attention and were not convincing (Créatec, 2003). So while text warnings encourage more accurate health risk beliefs than picture warnings, they may not necessarily have their desired impact.

Regardless of the type of warning label, the addition of a relative health risk message on the package was effective in promoting accurate perceptions about the health risk of ST compared to cigarettes. However, the effect of the relative health risk message was not sufficient to counter the increase misperceptions caused by the picture warning label. In fact, for packages with a picture warning, the relative risk message reduced misperceptions only to around the levels seen for packages with either no warning or text warning without the relative risk message.

Males, those with moderate education, and those with high income had significantly higher correct beliefs about the health risk of ST compared to cigarettes. Males may hold more accurate beliefs about the relative health risk of ST compared to cigarettes because they are more familiar with ST, and are more likely to be exposed to modern ST products in their social groups consisting of other males. The finding that higher socioeconomic status smokers hold more correct beliefs about the health risk of ST is concurs with previous research which found that higher socioeconomic status smokers were more knowledgeable about the health risks of smoking, and had less misperceptions about nicotine (Siahpush, McNeill, Hammond & Fong, 2006).

The responses to the survey questions assessing relative health risk beliefs were dichotomised to 'less harmful' and 'the same or more harmful'. The choice to dichotomise to "less harmful" and "the same or more harmful" was made based on the strong epidemiological evidence indicating that using ST is much less harmful to health than smoking (Stratton, Shetty, Wallace & Bondurant, 2001; TAGRCP, 2002; Levy et al., 2004), and based on the choice of dichotomised responses used in previous studies (O'Connor et al., 2007, Øverland, Hetland & Aarø, 2008). The same method was used to dichotomise responses to the questions assessing relative risk and relative addictiveness beliefs about ST compared to NRT, and NRT compared to cigarettes.

7.5.2 Smokeless Tobacco vs. Nicotine Replacement Therapy

Less than half (48%) of the respondents answered accurately that all four smokeless tobacco products are the same or more harmful than nicotine replacement therapy. Interestingly, when viewing NRT and responding to the analogous question less than a fifth (15%) of respondents answered accurately that all four NRTs are less harmful than ST. This finding indicates that a large proportion of smokers are confused about the relative health risks of ST and NRT. There is little other research on perceptions about the relative risk of ST compared to NRT, however misperceptions about the health risks of nicotine are common. In a study consisting of a large sample of smokers in Canada, the US, the UK, and Australia, more than 40% believed incorrectly that the nicotine in cigarettes is the primary cause of cancer (Siahpush, McNeil, Hammond & Fong, 2006).

Viewing either a picture or a text health warning label significantly increased accurate beliefs about the risk of ST compared to NRT, likely by increasing perceptions of the risk of ST relative to NRT.

Older participants were found to have significantly more accurate beliefs, and males, ethnic minorities, those who smoke weekly compared to those who smoke daily, and those reporting moderate or high income were found to have significantly less accurate beliefs. These findings are contradicted by previous research on perceptions about the health risks of cigarettes which found that younger participants and those with higher income and education levels had more accurate perceptions about both the health risk of cigarettes and the health risk of nicotine. Although, the same study found also that females tended to have more accurate beliefs, but the association was not significant (Siahpush, McNeill, Hammond & Fong, 2006).

7.6 Smokers' beliefs about the addictiveness of ST, cigarettes and NRT

7.6.1 Smokeless Tobacco vs. Cigarettes

Nearly half (48%) of respondents believed that ST is less addictive than cigarettes. Similarly, previous research has found that adult smoking and non-smoking ST users perceived ST to be less addictive than smoking cigarettes. However, ST users also reported feeling the most strongly addicted to nicotine, and their product (Créatec, 2003).

Viewing a picture warning label significantly decreased the accurate belief that ST is less addictive than cigarettes, and viewing a relative risk message significantly increased the accurate belief that ST is less addictive than cigarettes. These findings indicate that the effects of viewing text warning labels and viewing relative health risk messages early on in the survey remained and had an effect on later perceptions of the addictiveness of ST compared to cigarettes. Picture warnings seem to have increased perceptions of the addictiveness of ST to inaccurate levels, whereas the relative health risk message seems to have been effective at encouraging accurate perceptions about the addictiveness of ST.

Those reporting no plans to quit smoking and those who did not provide quit plans were found to be significantly less likely to accurately believe that ST is less addictive than cigarettes compared to those planning to quit within one month. Smokers who do not plan to quit may be more content with smoking cigarettes, more reluctant to consider alternative products, and/or may ascribe all tobacco products as equally 'bad' and addictive. This hypothesis is consistent with the earlier hypothesis that smokers with distant quit plans, but not proximal or non-existent quit plans are more likely to consider using ST.

7.6.2 Smokeless Tobacco vs. Nicotine Replacement Therapy

Over a quarter (27%) of respondents incorrectly believed that ST is less addictive than NRT. STs generally deliver higher levels of nicotine than NRTs (Benowitz, 1988; Tilashalski, Rodu & Mayfield, 1994; Richter & Spierto, 2003; Kotlyar et al., 2007), and are therefore likely to be more addictive than NRT. However, there is a lack of other research on smokers' perceptions of the addictiveness of ST compared to NRT. Misperceptions may be partially due to the knowledge that nicotine is the addictive agent in tobacco, and nicotine in the active ingredient in NRT.

Participants reporting no plans to quit smoking were found to be significantly more likely to have accurate beliefs about the addictiveness of ST compared to NRT. Of possible concern, this finding indicates that smokers who are planning to quit have inaccurate perceptions about the addictive properties of one of the lowest risk smoking alternatives, NRT, which might prevent the use of NRT (and favor the use of ST) for smoking cessation.

7.6.3 Nicotine Replacement Therapy vs. Cigarettes

Almost three-quarters (71%) believed correctly that NRT is less addictive than cigarettes. This finding complements previous findings that many smokers are still confused about the health effects of nicotine and NRT (Cummings et al., 2004; Siahpush, McNeill, Hammond & Fong, 2006).

Viewing a text warning label on the ST products decreased the accurate belief that NRT is less addictive than cigarettes. This finding indicates that there may have been a carry-over effect of viewing text warning labels on ST that affected later perceptions of the addictiveness of NRT compared to cigarettes. It is possible that respondents came to associate the ST products presented to them as a kind of NRT, or alternative product to smoking, possibly because respondents were asked about how they might use both the ST and NRT products as alternatives to smoking. However, this is unlikely given that a similar effect was seen for beliefs about the addictiveness of ST compared to cigarettes.

7.7 Smokers support picture health warning labels on ST packages

Nearly three-quarters (71%) of respondents supported picture warning labels. The results of this study confirm previous research which found strong support for tobacco health warnings and the valuable health risk information they provide. For example, a Health Canada commissioned study just prior to the introduction of picture warning labels in Canada found that when asked unprompted, both adult (20%) and youth (25%) smokers and non-smokers suggested introducing picture warning labels on cigarettes (Environics Research Group, 1999). Furthermore, in a 2002 Brazilian survey of 2,216 adults upon introduction of picture health warnings on cigarettes, 73% of smokers approved of the new warnings (Cavalcante, *n.d.*). And in an assessment of the Canadian picture health warnings on cigarettes 1.5 years after their implementation over 70% of adult smokers and over 90% of youth smokers reported that the warnings effectively informed them about the health effects associated with smoking; over half of adults and youth reported that the health warnings discouraged them from smoking around others; and over 40% of adults said the warnings have encouraged them to try to quit (WHO TFI, 2005).

Participants who reported having no plans to quit smoking supported picture warning labels on ST significantly less than those planning to quit within one month, which seems to be consistent with previous research. A telephone survey of adult smokers and ex-smokers performed to gather data for the introduction of newer, stronger cigarette health warnings in Australia in 1995, found strong support for the proposed stronger warning labels, and those wanting to quit were more likely to want more health information (Borland & Hill, 1997). It seems that those who are

planning to quit support more health information on the package, and those who do not plan to quit are not interested in more information.

7.8 Smokers support relative health risk information on ST packages

Two-thirds (68%) of respondents supported relative health risk information on smokeless tobacco packages. The data from this study concurs with the findings of widespread support of health risk information on cigarettes packages. For example, two years following the implementation of picture warnings in Uruguay 62% of adult smokers reported that they would like more health information on the package, whereas 8% reported that they would like to see less health information (reported from unpublished data in Hammond, 2009). Similar findings were observed following the implementation of picture warnings in Thailand (reported from unpublished data in Hammond, 2009). Furthermore, a telephone survey of adult smokers and ex-smokers performed to gather data for the introduction of newer, stronger cigarette health warnings in Australia in 1995, found that 38% thought there should be more health information, whereas just 2% thought there should be less. Interestingly, younger smokers and those who wanted to quit were more likely to want more health information (Borland & Hill, 1997). In addition, a Health Canada commissioned study just prior to the introduction of picture warning labels in Canada found that when asked unprompted, both adult (10%) and youth (21%) smokers and non-smokers suggested adding more detailed information to the warning labels on cigarettes (Environics, 1999). And another series of Health Canada commissioned studies that evaluated the picture warning labels found that 59% of adult smokers and 73% of youth smokers report that the warning labels provide them with valuable information about the health effects associated with smoking (Environics, 2004a, 2004b). After the introduction of cigarette warnings in Canada, it was also found that half of adult smokers in southwestern Ontario, Canada wanted to see more health risk information on cigarette packages, whereas only 27% thought the warnings contained “too much” health risk information (Hammond, Fong, McDonald, Brown & Cameron, 2004). Finally, ITC project research indicates that the proportion of smokers who want to see more information on cigarette packages is greater than the proportion who want to see less information in all ITC countries, including those where picture warnings are already implemented (ITC Project, 2009).

Viewing a picture warning label significantly decreased support for relative risk information. The finding that those who viewed a picture warning were less likely to support relative risk information probably results from a number of factors. First, picture warning labels tend to increase perceptions about the risk of ST products (Stark et al., 2008). Furthermore, picture warnings on cigarette packages have been found to increase concerns about the health effects of products (O'Hegarty et al., 2006) and thoughts of harm from the product (Borland et al., 2009). If perceptions of the health risk of the ST products were raised sufficiently by the picture warning labels, respondents may have begun to question the credibility of the relative risk messages telling them that ST is much less harmful to health than smoking. In fact, a Health Canada commissioned focus group study on the effect of warnings on ST users perceptions found that users tended to question and/or disagree with extreme images and claims on picture warnings (Créatec, 2003). It is probable then that the relative risk information might also be questioned when simultaneously viewing the strong images and claims on the picture warnings that the respondents viewed. However, it is surprising that the text warnings did not also have a significant effect given that Hammond's (2009) evidence review on tobacco warning labels reports that, "Several large studies have shown that large text-based warnings are associated with increased perceptions of risk."

7.9 Study Limitations and Future Research

The current study has a number of limitations. First, the sample of young adult smokers may not be representative of all young adult Canadian smokers. The sample was obtained from the registered participant panel of the market research firm, GMI. Registrants with GMI must have computer and internet access, therefore lower socioeconomic status (SES) Canadians may be underrepresented in this study. Respondents could have been recruited to complete the computerised survey in person, which might have increased the access of lower SES smokers. However, the proportion of respondents in the "low" income category in this study (25%) was similar to that in a much larger study (29%) that used the same methods to categorise income, and was conducted using random-digit dialing methods that likely resulted in a more representative sample (Hammond et al., 2007). Furthermore, a study sample recruited in person

would be regionally representative, whereas the participants recruited for this study came from across Canada.

A second limitation of this study was the limited number of brands and forms of ST presented to respondents. The number of ST products was limited to four brands consisting of three forms: two snus or sachet-style STs, one loose moist snuff, and one compressed tobacco lozenge. Other types of ST such as chew, and other popular brands such as Skoal and Access were not included. This choice was made in order to keep the survey length manageable. Including more products would be more representative of the STs available to Canadian consumers, but may have resulted in longer survey length and subsequently poorer data quality.

A third limitation with regards to ST products is that two of the four STs are US products, and are not available in Canada. Marlboro snus was included because we wanted to specifically test perceptions of modern 'snus' STs and duMaurier was the only snus on the Canadian market. Other snus products might have been chosen, but Marlboro is one of the most globally recognised tobacco brands. Similarly, Ariva was chosen because it is a unique modern ST product manufactured by compressing powdered tobacco into a dissolvable lozenge. We hypothesised that this product might be a particularly appealing product to current smokers, and that it therefore warranted testing.

A fourth limitation is that only current smokers were included in the sample. Non-smokers and former smokers were excluded. It is particularly important to understand non-smokers perceptions and intentions around using ST in order to establish a sound scientific basis for promoting ST for harm reduction while minimising public health risk. Understanding how former smokers might use ST could be of importance as well, since promoting ST as a harm reduced product might allow former smokers or those who might otherwise have quit to continue using tobacco and not realise the full health benefits of complete abstinence, albeit using a much less harmful form of tobacco than cigarettes. On the other hand, former smokers might see the utility of smokeless tobacco for coping with cravings and preventing relapse. However, we were particularly interested in examining young adult smokers perceptions of ST in this study because this group was hypothesised to be most likely to take up ST use.

In light of the fourth limitation of this study, future studies should investigate former smokers', and particularly non-smokers' 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 relative risk of tobacco products (Zeller & Hatsukami, 2009), and the potential ill effects of promoting ST in tobacco harm reduction (Kozlowski, 2007; Tomar, 2007).

Future studies should also test the credibility of the relative risk message, the warning message, as well as their credibility together on ST products. The results of this study found that the relative risk message had the opposite of its intended effect when in the presence of a picture warning. This finding was hypothesised to have resulted from a loss of credibility of the relative risk message, which communicated the lower risk of ST compared to cigarettes, when a picture warning simultaneously communicated that there are serious health risks associated with using ST. Further research could elucidate the issue of message credibility when using the novel approach of communicating relative risk on tobacco health warnings. Determining the perceived credibility of relative risk messages which are meant to communicate accurate information about health risk is important given the finding that picture warnings significantly increased misperceptions about the health risk of ST, and the political reality that picture warnings are likely to be mandated on ST packages in Canada in the near future.

7.10 Implications and Conclusions

Young adult Canadians' perceptions about ST, beliefs about the health risk of ST relative to smoking, and intentions to use ST have important public health implications given the potential for ST to reduce tobacco-related mortality. The impact of health warning labels on ST are of particular importance not only with respect to current Health Canada initiatives to revise and improve all tobacco warning labels, but also in light of the need to correct consumer misperceptions by communicating accurate information about the relative health risk of tobacco products.

In the current study, a number of important findings emerged. First, the findings confirm that many smokers are unaware of the low health risk of ST and NRT relative to smoking. Furthermore, the study found that picture health warnings increased misperceptions about ST health risk. In contrast, text warnings did not have the effect of increasing misperceptions about ST health risk. Evidence suggests that more users might use much less harmful ST, or NRT, to reduce or replace smoking cigarettes if not for misperceptions about these products and their health risk compared to cigarettes. This finding highlights the need to effectively communicate accurate information about the relative health risks of ST and cigarettes.

Despite the fact that many smokers were unaware of the low health risk of ST relative to smoking, 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. Interestingly, there was no difference in the proportion of respondents who were open to trying NRT for the same five reasons. These findings indicate that young adult smokers might readily try ST for a variety of reasons, and do not distinguish between ST and NRT products in their potential for use. 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 whether increased ST use will result in decreased cigarette consumption and reductions in tobacco-related illness.

Furthermore, the current study found that health warning labels reduced young adult Canadian smokers' willingness to try ST. Picture warnings significantly decreased willingness to try ST, whereas the decrease resulting from text warnings was small. In other words, picture warnings significantly reduced young adult cigarette smokers' willingness to take up a much less harmful tobacco product, ST, whereas text warning labels did not. This finding may be used to guide Health Canada initiatives to revise all tobacco warning labels, including the current text warnings on ST.

Finally, adding a relative health risk message to ST health warnings that communicated a favourable (reduced) health risk for ST compared to cigarettes increased willingness to try ST when added to text warning labels, but decreased willingness to try ST even further when placed

on picture warnings. This finding, taken together with the previous finding regarding the differential impact of text and picture warning labels on willingness to try ST, suggests that picture warnings may make it more difficult to communicate the differences in risk between ST and cigarettes.

APPENDICES

APPENDIX A: Screener & Demographic Information, Consent

SCREENER & DEMOGRAPHIC INFO, CONSENT	
PROGRAMMER NOTE: Show the following script: Welcome! To get started, please answer a few questions to verify your eligibility to participate in this study. **PROGRAMMER NOTE:** Show the following script: Screen1. What is your age in years? |_____| **Number (e.g., 24)** [1-99 limit] **PROGRAMMER NOTE:** If less than 18 or over 30, show the following script and end survey: Unfortunately, to be eligible for this study you must be between 18 and 30 years of age. Sorry about that. [END SURVEY] **PROGRAMMER NOTE:** If no age entered, show the following script: Unfortunately, we need to know your age to determine your eligibility for the study. Continue to age question. Otherwise, ask:	
Sex	I am (select): 01 – Female 02 - Male
Ethnicity	People in Canada come from many racial and cultural groups. Are you . . . 01 – White 02 – Chinese 03 – South Asian (for example, East Indian, Pakistani, Sri Lankan, etc.) 04 – Black 05 – Filipino 06 – Latin American 07 – Southeast Asian (for example, Cambodian, Indonesian, Laotian, Vietnamese, etc.) 08 – Arab 09 – West Asian (for example, Afghan, Iranian, etc.) 10 – Japanese 11 – Korean 12 – Aboriginal (that is, North American Indian, Métis, or Inuit), or 13 – Another group?
Education	What is the highest level of formal education that you have completed? 01 – Grade school or some high school 02 – Completed high school 03 – Technical or trade school or community college (some or completed) 04 – Some university (no degree) 05 – Completed university degree 06 – Post-graduate degree

Income	Please be assured that your responses will be kept completely confidential. Which of the following categories best describes your annual household income, that is the total income before taxes, or gross income, of all persons in your household combined, for one year? 01 – Under $10,000 02 – $10,000 to $29,999 03 – $30,000 to $44,999 04 – $45,000 to $59,999 05 – $60,000 to $74,999 06 – $75,000 to $99,999 07 – $100,000 to $149,999 08 – $150,000 and over
Employment	Are you currently employed outside the home? 01 – Yes 02 – No

PROGRAMMER NOTE: If between 18 and 30 (inclusive):

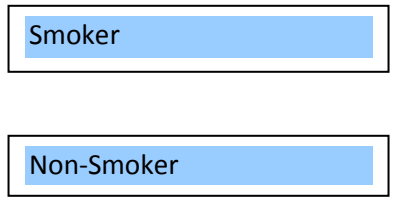
Screen2a. Have you smoked 100 cigarettes or more in your lifetime?

01 - Yes
02 - No

Screen2b. How often do you smoke?

01 - Daily
02 - Weekly
03 - Monthly

04 - Less than monthly
05 - Not at all



PROGRAMMER NOTE: If non-smoker, show the following script and end survey:

Unfortunately, to be eligible for this study you must have smoked at least 100 cigarettes in your lifetime and smoke at least monthly. [END SURVEY]

Otherwise, ask:

Screen3. Have you ever used any other tobacco product other than cigarettes? (Select any)

☐ Cigars
☐ Pipes
☐ Roll-your-own cigarettes
☐ Smokeless tobacco (e.g., chewing)

PROGRAMMER NOTE: If yes in Screen3, include response category in Screen4.

Screen4. Have you used any of the following products in the last month? (Select any)

☐ Cigars
☐ Pipes
☐ Roll-your-own cigarettes
☐ Smokeless tobacco (e.g., chewing)

INFO / CONSENT

PROGRAMMER NOTE: Show the following script:
Great – thank you for your interest! You are eligible to participate in this survey. The survey will take approximately 20 minutes. First, you'll review an information letter. Once you have read and understand the details of the study you may choose to click "agree" to continue completing the survey or "decline" to end the survey.

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INFORMATION LETTER

Title of Project: Smokeless Labels Study

Student Investigator:
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Faculty Supervisor:
Dr. David Hammond, PhD
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1.PURPOSE OF THIS RESEARCH STUDY

You are being asked to be part of a research study that examines people's opinions about smokeless tobacco warning labels. We are interested in people's opinions about different forms of warning labels and how they may affect people's perceptions of appeal and health risk.

2.PROCEDURES

In total, approximately 500 people will take part in the study. Participation involves a 20 minute online survey, conducted at a computer terminal. The survey will be split up into three parts.

During the first portion, you will be asked questions about demographics as well as questions about your smoking history, such as the number of cigarettes you have smoked in your lifetime. During the second portion of the interview, you will be shown pictures of different smokeless tobacco packages and warning labels and asked to rate them on, for example, how likely you would be to try them and how risky they are. In the third portion of the interview, you will be asked questions about your opinion of smokeless tobacco in general.

We are interested in participants who are 18-30 years of age who have smoked greater than 100 cigarettes in their lifetime, and smoke at least monthly. Participation is voluntary and you may decline to answer particular questions if you wish.

3.POSSIBLE RISKS OR DISCOMFORT

There are no known or anticipated risks to your participation in this study.

4.POSSIBLE BENEFITS

Participation in the study is not expected to benefit you directly but you are taking part in an important study that we think you will find interesting. This study has the potential to inform

packaging regulations in Canada and other countries. At the end of the interview session, we will be happy to answer any questions you may have. Information on smoking cessation resources will be available should these be of interest to you. If you want to quit at any time during this study, information about how to quit and a list of local organizations that provide services to help you quit will be available from the researcher, if you wish. Taking part in this study will not require you to consider quitting. However, as you may know, smoking causes lung cancer, heart disease, and emphysema and may complicate pregnancy. Quitting smoking now greatly reduces serious risks to your health.
You will also have the option of receiving the final results of the study, if you're interested. If you desire this information, we will keep your contact address in a separate file and mail out the results when the study is completed.

5.FINANCIAL CONSIDERATIONS

In appreciation for your time and any inconvenience, you will receive financial remuneration worth a minimum of $2.50, according to the offer you received by e-mail as a registered member of GMI (http://www.globaltestmarket.com/).

6.CONFIDENTIALITY

There is always a concern about keeping your privacy when you provide information about yourself such as your smoking history and demographics. All information obtained will be kept confidential. For your protection, we will assign you a number that will be used to label all information. Any personal information such as your name and contact information will be kept in a separate file that will be locked securely in our lab at the University of Waterloo and will be destroyed after the study is completed in approximately 1 year. Electronic copies of your data will not contain any personal identifiers and will be stored indefinitely on a password protected computer at the University of Waterloo.

The results of the study may be published for scientific purposes but will not give your name or include information that will identify you.

7.TERMINATION OF RESEARCH STUDY

You are free to choose whether or not to take part in this study. You can choose to stop being a part of the study at any time. If during the study you decide to withdraw, you will still receive partial compensation from GMI for your time.

8.ETHICS REVIEW

This study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. However, the final decision about participation is yours. Should you have any comments or concerns resulting from your involvement in this study, please contact Dr. Susan Sykes in the Office of Research Ethics at (519) 888-4567, x36005.

9.AVAILABLE SOURCES OF INFORMATION

If you have any questions later, or if you require additional information about the study, please feel free to contact the researchers listed at the beginning of this information letter.

Click here to continue

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CONSENT FORM

Title of Project: Smokeless Labels Study

I agree to take part in this research study being conducted by William Callery, a Masters student of the Department of Health Studies at the University of Waterloo.

I have made this decision based on the information I have read in the information letter. All the procedures and any risks and benefits relating to my participation have been explained to me. I have had the opportunity to ask any questions and to receive any additional details I wanted about the study. If I have questions later about the study, or would like the information and consent form sent to me, I can ask one of the following researchers:

Student Investigator:
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Faculty Supervisor:
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E-mail: dhammond@uwaterloo.ca

I understand that I may withdraw from the study at any time without penalty by contacting the researcher listed above.

This project has been reviewed by, and received ethics clearance, through the Office of Research Ethics at the University of Waterloo. I am aware that I may contact Dr. Susan Sykes at this office (519-888-4567, x 36005) if I have any concerns or questions from my involvement in this study.

I agree to participate in this study:

☐ Agree

☐ Decline

☐ Return to Information Letter

APPENDIX B: Background

SMOKING BEHAVIOUR & SMOKING CESSATION	
PROGRAMMER NOTE: Show the following script: To begin, please answer a few questions about your smoking.	
1	**Programmer note: If Screen2b = 01 (daily smoker), ask:** On average, how many cigarettes do you smoke each day, including both factory-made and roll-your own cigarettes? |_____| **Number** [enter number] **Programmer note: If Screen2b = 02 (weekly smoker), ask:** On average, how many cigarettes do you smoke each week, including both factory-made and roll-your own cigarettes? |_____| **Number** [enter number] **Programmer note: If Screen2b = 03 (monthly smoker), ask:** On average, how many cigarettes do you smoke each month, including both factory-made and roll-your own cigarettes? |_____| **Number** [enter number]
2	**Programmer note: If Screen2b = 01 (daily smoker) ask:** How soon after waking do you usually have your first cigarette? 01 – |_____| **Minutes** [enter number] 02 – |_____| **Hours** [enter number] **Programmer note: If Screen2b = 02, 03 (non-daily smoker) ask:** On days that you smoke, how soon after waking do you usually have your first cigarette? 01 – |_____| **Minutes** [enter number] 02 – |_____| **Hours** [enter number]
3	a. Have you tried to quit smoking in the past 2 years? 01 – Yes 02 – No 03 – Don't know (CTUMS, 2007)
4	a. Are you planning to quit smoking: 01 – Within the next month? 02 – Within the next 6 months? 03 – Sometime in the future, beyond 6 months 04 – Not planning to quit
5	Have you ever heard the following brands? DuMaurier (01 – YES, 02 – NO, 03 – DON'T KNOW) Marlboro (01 – YES, 02 – NO, 03 – DON'T KNOW) Copenhagen (01 – YES, 02 – NO, 03 – DON'T KNOW) Arriva (01 – YES, 02 – NO, 03 – DON'T KNOW)

NICOTINE REPLACEMENT THERAPY	
PROGRAMMER NOTE: Show the following script: Now we would like to ask you a few questions about nicotine replacement therapy (e.g., gum, patch, etc.).	
6	Have you heard about medications to help people stop smoking such as nicotine replacement therapy (e.g., gum, patch), or pills such as Zyban or Champix? 01 – Yes **GO TO Q.7** 02 – No **GO TO Q.10**
7	Have you ever used any stop-smoking medication such as nicotine replacement therapy (e.g., gum, patch, etc.)? 01 – Yes **GO TO Q.8** 02 – No **GO TO Q.10** 03 – Can't remember **GO TO Q.10**
8	Which medication did you use? (Select any) 01 – Nicotine gum 02 – Nicotine patch 03 – Nicotine lozenges 04 – Nicotine (sub-lingual) tablets 05 – Nicotine inhaler 06 – Nicotine nasal spray 07 – Zyban (or bupropion) 08 – Wellbutrin 09 – Other (specify)
9	What was the main reason you used these medications? **(**select only one**)** 01 – To stop smoking completely 02 – To reduce the amount you smoke 03 – To cope with times when you could not or were not allowed to smoke 04 – Or some other reason? Specify: _____

WARNING LABELS	
PROGRAMMER NOTE: Show the following script: The next set of questions will ask you about cigarette package warning labels. Please think about the warning labels you have seen on cigarette packages.	
10	In the last month, how often, if at all, have you noticed the warning labels on cigarette packages? 01 – Never 02 – Rarely 03 – Sometimes 04 – Often 05 – Very often
11	In the past 6 months, has information about the health risks of smoking on warning labels led you to think about quitting? 01 – Not at all

	02 – Once 03 – A few times 04 – Many times (ITC, 2008)

APPENDIX C: Product-Specific Ratings

PRODUCT-SPECIFIC RATINGS	
PROGRAMMER NOTE: Show the following script: You are now going to view 4 different smokeless tobacco packages. Smokeless tobacco (e.g., chewing, snuff) is used by placing it in the mouth, not smoking. After looking at picture of each product you'll be asked to answer several questions. **PROGRAMMER NOTE:** Participants will be randomly assigned one of six experimental conditions where they will view only packages with either no warning, no warning with a relative risk message, a text warning, a text warning with relative risk message, a picture warning, or a picture warning with relative risk message. Participants will then be assigned random package/warning combination, and presented images in random order (first 4 tobaccos at random, then 4 nicotine replacement therapies at random – referred in text as 1. And 2.).	
Familiarity	a) Have you ever heard of or seen this product? 01 – Yes 02 – No 03 – Don't know
Appeal	b) Would THIS product appeal to people your age? 01 – Not at all 02 – Unlikely 03 – Undecided 04 – Somewhat 05 – Very
Reasons for Use	c) Would you be willing to try this product for any of the following reasons: f. In places where you <u>can't smoke</u> cigarettes? (01-YES, 02-NO, 03-MAYBE) g. For the times when you <u>don't want to smoke</u> around others? (01-YES, 02-NO, 03-MAYBE) h. To help you <u>cut back</u> the amount you smoke? (01-YES, 02-NO, 03-MAYBE) i. To help you while you are trying to <u>quit</u> smoking? (01-YES, 02-NO, 03-MAYBE) j. As a <u>long-term replacement</u> instead of cigarettes? (01-YES, 02-NO, 03-MAYBE)
Likelihood of Future Use	d) Overall, how likely would you be to try THIS product in the future? 01 – Definitely not 02 – Probably not 03 – Undecided 04 – Probably try 05 – Definitely try

Relative Risk Beliefs	**PROGRAMMER NOTE:** For first four smokeless products... e) In your opinion, how HARMFUL TO HEALTH is this product… a. Compared to regular cigarettes d. Compared to other types of smokeless tobaccos e. Compared to nicotine replacement therapy (e.g., gum, patch, etc.) 01 – A lot less harmful than (a. Cigarettes b. other smokeless tobaccos, c. nicotine replacement therapy) 02 – Somewhat <u>less harmful</u> 03 – No difference 04 – Somewhat <u>more harmful</u> 05 – A lot more harmful than (a. Cigarettes b. other smokeless tobaccos, c. nicotine replacement therapy)
	PROGRAMMER NOTE: For last four nicotine replacement therapy products... 5. In your opinion, how HARMFUL TO HEALTH is this product… a. Compared to regular cigarettes f. Compared to other types of nicotine replacement therapies (e.g., gum, patch, etc.) b. Compared to smokeless tobacco 01 – A lot less harmful than (a. cigarettes b. smokeless tobacco, c. other nicotine replacement therapies) 02 – Somewhat <u>less harmful</u> 03 – No difference 04 – Somewhat <u>more harmful</u> f) 05 – A lot more harmful than (a. cigarettes b. smokeless tobacco, c. other nicotine replacement therapies)

PROGRAMMER NOTE: Add a screen after the last question of EACH product (e.g., in between the last question of product 1 and the first question of product 2, after the last question of product 2 but before the first question of product 3, etc.) that states: “Here comes the next product. Please take a moment to look at it.”
Keep photo of product on screen with all questions.

APPENDIX D: General Ratings

GENERAL RATINGS	
PROGRAMMER NOTE: Show the following script: Next, you will be asked some general questions about smokeless tobacco and nicotine replacement therapy (e.g. gum, patch, etc.). When answering, please think about smokeless tobacco in general, rather than specific products as you did in the series of questions you just answered.	
Relative Addictiveness Beliefs (Bansai et al., 2004)	3. OVERALL, How addictive are smokeless tobacco products compared to cigarettes? 4. OVERALL, How addictive are smokeless tobacco products compared to NRT? 5. OVERALL, How addictive are NRTs compared to cigarettes? 01 – A <u>lot less addictive</u> than (1. cigarettes, 2. NRT, 3. cigarettes) 02 – A little less addictive 03 – No difference 04 – A little more addictive 05 – A <u>lot more addictive</u> than (1. cigarettes, 2. NRT, 3. cigarettes)
Support for Pictorial HWMs, Support for Relative Risk Information	6. Do you think smokeless tobacco products should have picture health warnings similar to cigarette packages? 01 – Disapprove Strongly 02 – Disapprove 03 – Undecided 04 – Approve 05 – Approve Strongly 7. Are you interested in more information that compares the health risks of using smokeless tobacco to the health risks of smoking cigarettes? 01 – Not at all 02 – Probably not 03 – Undecided 04 – Somewhat 05 – A lot

APPENDIX E: Feedback

FEEDBACK

PROGRAMMER NOTE: Show the following script:
That's everything for today! Thank you very much for your participation. You will be receiving "MarketPoints" in appreciation of your time, according to the e-mail offer you received from GlobalTestMarket. **Click continue to view a summary of the study details and our contact information should you have any questions.**

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SMOKELESS LABELS STUDY - FEEDBACK LETTER

We appreciate your participation in our study, and thank you for spending the time helping us with our research.

As we mentioned earlier, we are interested in people's opinions about smokeless tobacco. For the current study, we were particularly interested in the impact of having picture, text, or no warning labels on packages and how they affect product appeal, intentions to use the product, how the product might be used, as well as perceptions of health risk. We were also interested in the impact and support for a relative risk message about the health risk of smokeless tobacco compared to that of regular cigarettes. Different groups of participants were shown different forms of smokeless tobacco warning labels: whereas some participants were shown packages with no warning, others were shown packages with text or picture warnings. We will compare responses from the different groups to see whether the different forms of warning labels affect their ratings and opinions.

As a reminder, all the information you provided during the survey will be kept strictly confidential. This project has been reviewed by, and received ethics clearance through the Office of Research Ethics at the University of Waterloo. Should you have any questions or concerns about your participation in this study, please contact myself or Dr. Susan Sykes, Director, Office of Research Ethics at the University of Waterloo, at 519-888-4567, Ext. 36005 or by e-mail at ssykes@uwaterloo.ca.

If you would like any further information about the study, including a copy of our findings when they become available, please contact us at the number below. Also, we would be happy to provide you with a list of smoking cessation resources, should you wish.

Thank you again for your help.

Sincerely,

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