School- and student-level characteristics associated with alternative tobacco product use among Canadian students in grades 9 and 10

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

Objective: This study compared the prevalence of use of six ATPs (cigarillos or little cigars, cigars, roll-your-own [RYO] cigarettes, smokeless tobacco [SLT], bidis, and a hookah) among a representative sample of Canadian students in grades 9 and 10, identified between-school variability in the current use of each ATP, and identified the school- and student-level characteristics associated with the use of each ATP.

Methods: This cross-sectional study used nationally representative student data collected from 14,916 students in grades 9 and 10 from 134 secondary schools as part of the 2010-11 Youth Smoking Survey and data from the 2010-11 Enhanced Points of Interest data file. Multilevel regression analyses examined the association between school- and student-level characteristics and the use of each ATP.

Results: Among Canadian students in grades 9 and 10, 15.4% reported currently using a tobacco product (including manufactured cigarettes, cigarillos or little cigars, cigars, RYO cigarettes, SLT, bidis, a hookah, pipe tobacco, or blunt wraps). Cigarillos or little cigars were the most prevalent product (6.3% reported current use) and bidis were the least prevalence product (0.6% reported current use). Between-school random variation in the odds a student currently used each ATP of interest was identified; school-level differences accounted for between 14.1% and 31.2% of the variability in use. Grades 9 and 10 students who attended schools with a high rate of senior students that smoked manufactured cigarettes were significantly more likely to currently use cigarillos or little cigars (AOR 1.79, 95%CI 1.21 to 2.65) and RYO cigarettes (AOR 1.88, 95%CI 1.15 to 3.07). Similarly, grades 9 and 10 students who attended schools with a high rate of senior students that used SLT were significantly more likely to currently use SLT (AOR 4.34, 95%CI 1.62 to 11.60), and students who attended schools with a high rate of senior students that used a hookah were

significantly more likely to currently use a hookah (AOR 1.75, 95%CI 1.03 to 2.97). Grades 9 and 10 students who reported having ever used flavoured tobacco products were significantly more likely to currently use cigarillos or little cigars, cigars, RYO cigarettes, SLT, and a hookah (AOR range 1.87 to 18.40). Finally, grades 9 and 10 students who reported currently using alcohol (AOR range 1.99 to 3.06) or marijuana (AOR range 2.09 to 3.47) were significantly more likely to currently use cigarillos or little cigars, cigars, and a hookah.

Conclusions: ATP use is an important tobacco control issue among Canadian students, as many students reported currently using one or more ATPs. Additionally, these data illustrate that there is a population of students that use ATPs but not manufactured cigarettes who would not typically be classified as current smokers and are not represented in current smoking prevalence estimates. The school environment continues to play an important role in tobacco control as the rate of tobacco use among senior students affects the use of ATPs by younger students. Future tobacco control strategies need to be inclusive of all tobacco products.

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Chapter 1

Introduction and overview

One of the greatest public health gains in North America of the last 50 years has been a decrease in the sale and use of manufactured cigarettes. However, despite this reduction, the sale of alternative tobacco products (ATPs) such as roll-your-own tobacco, small cigars, and moist snuff has increased (Connolly & Alpert, 2008). The public health focus on manufactured cigarettes has left a gap in our understanding where little is known with respect to the long-term health effects of ATPs and few tobacco control policies address their use. ATPs are enticing to individuals because they often cost less, can be purchased in smaller quantities, have an appealing smell or taste, and may last longer than manufactured cigarettes (Richter et al., 2008; Soldz & Dorsey, 2005). These characteristics make ATPs attractive to smoking and non-smoking youth, especially those with more disposable income (Kennedy et al., 2011; Leatherdale & Burkhalter, 2012; Leatherdale et al., 2011a). Additional evidence indicates that adult smokers may substitute ATPs for manufactured cigarettes when the price of manufactured cigarettes increases due to tobacco taxes (Delnevo et al., 2004). Since youth are the most price sensitive population of smokers (Chaloupka et al., 2011), it is likely that this population would also substitute tobacco products to maintain their nicotine addiction. Another concern with ATPs is that the use of any one of them increases the likelihood that a youth will try using additional ATPs (Saunders & Geletko, 2012), increasing the likelihood of tobacco addiction and the risk of negative long-term health effects. As a result, inclusive tobacco control programs and policies need to address the use of ATPs. The current study examined the school- and student-level characteristics associated with the use of six ATPs: cigarillos or little cigars, cigars, roll-your-own (RYO) cigarettes, smokeless tobacco (SLT), bidis, and a hookah.

Chapter 2

Literature review

2.1 Youth smoking in Canada

According to the 2010-11 Youth Smoking Survey, 2.8% of youth in grades 7 to 9 and 10.0% of youth in grades 10 to 12 reported being current smokers, representing a significant decrease from 2008-09 (Health Canada, 2012a). Although there have been significant reductions in tobacco use among youth, 18.4% of youth in grades 7 to 9 and 39.9% of youth in grades 10 to 12 reported having ever tried smoking a manufactured cigarette (Health Canada, 2012b). Furthermore, 20.3% of students in grades 7 to 9 and 45.7% of students in grades 10 to 12 reported having ever tried a tobacco product, including manufactured cigarettes, cigarillos or little cigars, cigars, RYO tobacco, and SLT (Health Canada, 2012b), suggesting that there is a population of youth who use ATPs and do not smoke manufactured cigarettes. These data show that we should be concerned about all youth who use tobacco regardless of whether they use manufactured cigarettes or ATPs, especially since those who begin using tobacco in adolescence are more likely to continue using it into adulthood (Griffin et al., 1999).

2.2 Introduction to alternative tobacco products

In this research, ATPs include any tobacco product other than manufactured cigarettes. Nicotine is the chemical in both manufactured cigarettes and ATPs that causes addiction (U.S. Department of Health and Human Services [USDHHS], 2012). It is important to study tobacco use among youth because an earlier age of use is not only associated with greater harm during critical periods of development, but it is also associated with a longer period of use, increasing the risk of disease later in life (USDHHS, 2012). Additionally, youth

who use tobacco are more likely to use alcohol, marijuana, and illicit drugs (Leatherdale, Hammond & Ahmed, 2008; USDHHS, 2012). The use of manufactured cigarettes is associated with various cancers, cardiovascular diseases, and pulmonary diseases (USDHHS, 2010) making tobacco use one of the most preventable causes of death globally. Recent research with respect to the use of ATPs indicates that they have similar negative health effects, as outlined in the sections that follow and as summarized below in Table 1.

Table 1: Summary table of prevalence data and known health effects of various alternative tobacco products

Alternative tobacco product	**Prevalence of use among grades 9 to 12 students**		**Known health effects**
	Ever use	Current use	
Cigarillo or little cigar	30.8%[a]	12.9%[a]	-no evidence, however it is expected that the use of these products produce similar negative health effects to manufactured cigarettes given the similarity between products (Health Canada, 2011)
Cigar	22.3%[a]	8.1%[a]	-increased risk of cancers of the lung (Baker et al., 2000; Iribarren et al., 1999; Shapiro, Jacobs & Thun, 2000), oropharynx (Iribarren et al., 1999; Shapiro, Jacobs & Thun, 2000), and upper aerodigestive tract (Iribareen et al., 1999) -increased risk of coronary heart disease (Iribarren et al., 1999) -increased risk of chronic obstructive pulmonary disease (Iribarren et al., 1999)
Roll-your-own cigarettes	54.0%[b]	30.5%[b]	-increased risk of cancers of the oesophagus (Tuyns & Esteve, 1983), lung (Engeland et al., 1996), mouth, pharynx, and larynx (De Stefani et al., 1992)
Smokeless tobacco	13.0%[c]	5.4%[c]	-increased risk of cancer of the pharynx and larynx (Rodu & Jansson, 2004) -increased risk of hypertension (Bolinder, Ahlborg & Lindell, 1992) -increased risk of ischemic heart disease (Bolinder et al., 1994)
Bidi	1.8%[d]	1.0%[d]	-increased risk of oral cancer (Rahman, Sakamoto & Fukui, 2003)
Hookah	10.1%[d]	4.0%[d]	-increased risk of lung cancer, respiratory illness, and periodontal disease (Akl et al., 2010) -reduced lung function (Raad et al., 2011)

[a] Based on 2008-09 Youth Smoking Survey data
[b] Based on 2010-11 Youth Smoking Survey data; prevalence of use among youth smokers only
[c] Based on 2008-09 Youth Smoking Survey data; prevalence of use among male youth only
[d] Based on 2010-11 Youth Smoking Survey data

2.2.1 Prevalence and health effects of cigarillo or little cigar use

Cigarillos are usually longer and slimmer than manufactured cigarettes, with variable tobacco content, while little cigars are smaller cigars that have a lower tobacco content relative to cigarillos (Blank et al., 2011). Figure 1 provides a visual comparison between the size of a typical manufactured cigarette and a typical cigarillo and little cigar. In 2008, 30.8%

of Canadian youth in grades 9 to 12 reported having ever used cigarillos or little cigars and 12.9% reported currently using cigarillos or little cigars (Leatherdale et al., 2011a). The high prevalence of use is concerning because studies indicate that adult smokers do not substitute little cigars for manufactured cigarettes; rather, these adults smoke little cigars in addition to the usual number of manufactured cigarettes (Borawski et al., 2010), resulting in greater harm. Furthermore, the addition of flavouring to cigarillos or little cigars makes them more enticing to youth, and the marketing of smaller packages of cigarillos or little cigars makes them more affordable to youth (Health Canada, 2011). At this time, no studies have examined the use of cigarillos or little cigars to the risk of cancer, cardiovascular disease, or pulmonary disease, but it is expected that cigarillos or little cigars would have similar negative health effects as manufactured cigarettes due to their similar composition (Health Canada, 2011).

Figure 1: Comparison between the size of manufactured cigarettes, cigars, cigarillos, and little cigars. National Cancer Institute Tobacco Control Branch. Retrieved November 29, 2012, from http://www.smokefree.gov/tob-cigarillo.aspx.

2.2.2 Prevalence and health effects of cigar use

Cigars are typically larger than manufactured cigarettes and have a higher tobacco content (Blank et al., 2011). Figure 1 provides a visual comparison between the size of a typical manufactured cigarette and a typical cigar. Cigars "consist of filler (the inner part of the cigar), a binder, and a wrapper, all of which are made with air-cured and fermented tobaccos" (Baker et al., 2000). In 2008, 22.3% of Canadian youth in grades 9 to 12 reported having ever used cigars and 8.1% reported currently using cigars (Leatherdale et al., 2011a). The use of cigars by youth is concerning because evidence indicates that some youth cigar users (e.g., those who smoke the cigar brand "Black & Milds") do not consider them to be tobacco products (Page & Evans, 2003). Therefore, these youth may underestimate the risks of smoking cigars and ignore current tobacco cessation programs.

Similar to manufactured cigarettes, the use of cigars is associated with an increased risk of cancers, including those of the lung (Baker et al., 2000; Iribarren et al., 1999; Shapiro, Jacobs & Thun, 2000), oropharynx (Iribarren et al., 1999; Shapiro, Jacobs & Thun, 2000), and upper aerodigestive tract (Iribarren et al., 1999). Cigar use is also associated with an increased risk of coronary heart disease and chronic obstructive pulmonary disease (Iribarren et al., 1999).

2.2.3 Prevalence and health effects of roll-your-own tobacco use

RYO cigarettes are hand-rolled cigarettes using loose tobacco and cigarette papers that may or may not be smoked with a filter (Li et al., 2010). In 2010, 54.0% of Canadian youth smokers in grades 9 to 12 reported having ever used RYO tobacco and 30.5% reported currently using RYO tobacco (Cole, Leatherdale & Rynard, [Submitted]). International data suggest that RYO tobacco use among youth is on the rise (Li et al., 2010;

Raisamo, 2011). Research indicates that most current adult smokers who use RYO cigarettes do so because they are less expensive (Nosa et al., 2011; Wilson et al., 2009; Young et al., 2010), which allows them to continue smoking despite increasing costs. In fact, according to the Ontario Tobacco Research Unit (OTRU, 2010), loose tobacco for RYO cigarettes is taxed at a lower rate than manufactured cigarettes. Since youth are the most price sensitive population of smokers (Chaloupka et al., 2011), it is important to continue to monitor the prevalence of use in this population.

Similar to manufactured cigarettes, the use of RYO tobacco is associated with many cancers, including oesophageal (Tuyns & Esteve, 1983), lung (Engeland et al., 1996), and mouth, pharyngeal, and laryngeal cancers (De Stefani et al., 1992). At this time, no studies have examined the use of RYO tobacco to the risk of cardiovascular disease or pulmonary disease.

2.2.4 Prevalence and health effects of smokeless tobacco use

SLT refers to a group of tobacco products that are placed in the mouth or nasal passage rather than smoked (Kennedy et al., 2011). There are three main types of SLT: chewing tobacco, moist snuff, and dry snuff (Rodu & Jansson, 2004). The use of chewing tobacco and dry snuff have decreased significantly over the last century, while the use of moist snuff has increased (Rodu & Jansson, 2004). Snus is a type of moist snuff that is popular in Sweden, is flavoured, and is spitless (Digard et al., 2009; McMillen, Maduka & Winickoff, 2012; Rodu & Jansson, 2004). In 2008, 13.0% of Canadian male youth in grades 9 to 12 reported having ever used SLT and 5.4% reported currently using SLT (Kennedy et al., 2011). Although the prevalence of use is low among youth, the addition of flavouring to SLT makes it more appealing to this population (Loukas et al., 2012). The tobacco industry also promotes SLT as a less harmful alternative to smoking (Callery et al., 2011; McMillen,

Maduka & Winickoff, 2012), and markets its use in situations where people cannot smoke (Callery et al., 2011). Although there are fewer negative health effects associated with the use of SLT compared to the use of manufactured cigarettes (Lee & Hamling, 2009), the promotion of these products may encourage youth and adult smokers to continue to use tobacco products rather than quit.

The use of SLT is associated with many cancers (Lee & Hamling, 2009), but most notably oral cancers, including cancer of the pharynx and larynx (Rodu & Jansson, 2004). There is limited evidence that suggests the use of SLT is associated with cardiovascular diseases, including hypertension (Bolinder, Ahlborg & Lindell, 1992) and ischemic heart disease (Bolinder et al., 1994).

2.2.5 Prevalence and health effects of bidi use

Bidis are small, hand-rolled, unfiltered cigarettes that look similar to a marijuana joint, but consist of sun-dried tobacco flakes in a tendu leaf tied together with a string (Delnevo & Hrywna, 2006; Malson et al., 2001). The unfiltered nature of the bidi together with the reduced porosity and combustibility of the wrapper mean that individuals who smoke bidis take in higher levels of carbon monoxide, nicotine, and tar relative to manufactured cigarette smokers (Rahman & Fukui, 2000). In 2010, 1.8% of Canadian youth in grades 9 to 12 reported having ever used a bidi and 1.0% reported currently using a bidi (Czoli, Leatherdale & Rynard, 2013). Although the prevalence of use is low among youth, the addition of flavouring to bidis makes them more appealing to youth (Delnevo & Hrywna, 2006; Malson et al., 2001). This is especially concerning because bidis have less tobacco but a higher concentration of nicotine compared to manufactured cigarettes (Malson et al., 2001), making them more addictive. Furthermore, bidis may be marketed as a herbal alternative to manufactured cigarettes, creating the impression that they are healthier and

do not carry the same risk of cancer as manufactured cigarettes (Yen, Hechavarria & Bostwick, 2000), even though the use of bidis is associated with oral cancer (Rahman, Sakamoto & Fukui, 2003). At this time, no studies have examined the use of bidis to the risk of cardiovascular disease or pulmonary disease.

2.2.6 Prevalence and health effects of hookah use

A hookah (also known as narghile, sheesha, and goza) is a water pipe which consists of a glass bottle filled with water, a tray for tobacco, and a tube for inhaling tobacco smoke after it has been cooled through water (Afifi et al., 2010; McMillen, Maduka & Winickoff, 2012). The use of a hookah is associated with more puffs and more smoke inhalation relative to smoking manufactured cigarettes, resulting in higher blood concentrations of carbon monoxide and nicotine relative to manufactured cigarette smoking (Eissenberg & Shihadeh, 2009; Jacob III et al., 2011). In 2010, 10.1% of Canadian youth in grades 9 to 12 reported having ever used a hookah and 4.0% reported currently using a hookah, representing a significant increase in use between 2006 and 2010, especially among females (Czoli, Leatherdale & Rynard, 2013). The apparent rise in the use of a hookah is concerning, especially since using a hookah is a social behaviour; in many cases, family and friends share the same water pipe (Akl et al., 2010). The use of a hookah is also becoming increasingly socially acceptable, as apparent with the rise in the number of hookah bars and retail locations that sell hookah accessories across the United States and Canada (Noonan, 2010; Non-Smokers' Rights Association [NSRA], 2011). Furthermore, hookah bars are not included in clean indoor air legislation because of their retail classification (Noonan, 2010), making the smoking behaviour appear less harmful to smokers and non-smokers alike.

A recent systematic review found that the use of a hookah is associated with lung cancer, respiratory illness, and periodontal disease (Akl et al., 2010). The use of a hookah also leads to reduced lung function (Raad et al., 2011). At this time, no studies have examined the use of a hookah to the risk of cardiovascular disease.

2.3 Determinants of alternative tobacco product use

The following section presents evidence and support for the examination of the association between factors from multiple levels of influence and tobacco use among youth, as justified through the Theory of Triadic Influence.

2.3.1 The Theory of Triadic Influence

The Theory of Triadic Influence (TTI) is a theory commonly used to understand youth smoking behaviours (Flay, 1999; Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009). Figure 2 provides an overview of this theory. The TTI predicts smoking behaviour through three streams: the personal stream, the social stream, and the environmental stream (Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009). Causal factors within each of these streams in addition to related behaviours influence a youth's decision and intention to begin smoking (Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009). For example, research indicates that those who smoke manufactured cigarettes also engage in other risky behaviours such as using alcohol, marijuana, and illicit drugs (Leatherdale, Hammond & Ahmed, 2008; USDHHS, 2012), highlighting the importance of examining the relationship between numerous risky behaviours. Factors within each of these three streams are further classified based on their level of causation: some factors are proximal to the smoking behaviour while others are more distal (Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009). Within the personal stream, the most immediate predictor of smoking behaviour is a youth's self-

efficacy and behavioural control to resist smoking, while more distal, underlying causes include a youth's biology and personality (Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009). Within the social stream, the most immediate predictors of smoking behaviour are the social normative beliefs regarding smoking behaviour, while more distal, underlying causes include a youth's social situation (Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009). Finally, within the environmental stream, the most immediate predictors of smoking behaviour are a youth's attitudes toward smoking behaviour, while more distal, underlying causes include a youth's cultural environment (Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009). The inclusion of predictors in the environmental stream reinforces the importance of school- and community-level characteristics which are more distal causes of behaviour and which can be used to transmit health information and shape health attitudes (Flay & Petraitis, 1994; Flay, Snyder & Petraitis, 2009).

Consistent with the TTI, the present study examined the effect of school- and student-level characteristics associated with the use of six ATPs among Canadian students in grades 9 and 10. The characteristics that were examined can be classified under multiple streams and multiple levels of causation, although most characteristics are found more distal to the behaviour. Furthermore, the characteristics that were examined in this study are not found within the same level of causation. Therefore, due to these limitations, these characteristics will provide an imperfect test of this theory. School-level characteristics that were examined include predictors found within the social (e.g., senior student tobacco use rate) and environmental streams (e.g., tobacco retailer density). Student-level characteristics that were examined include predictors found within the personal (e.g., age and gender) and social streams (e.g., parents and peers who smoke), as well as related behaviours (e.g., alcohol and marijuana use). Examining multiple predictors from multiple streams at multiple

levels of causation provides the most comprehensive view of factors that influence the use of ATPs among youth.

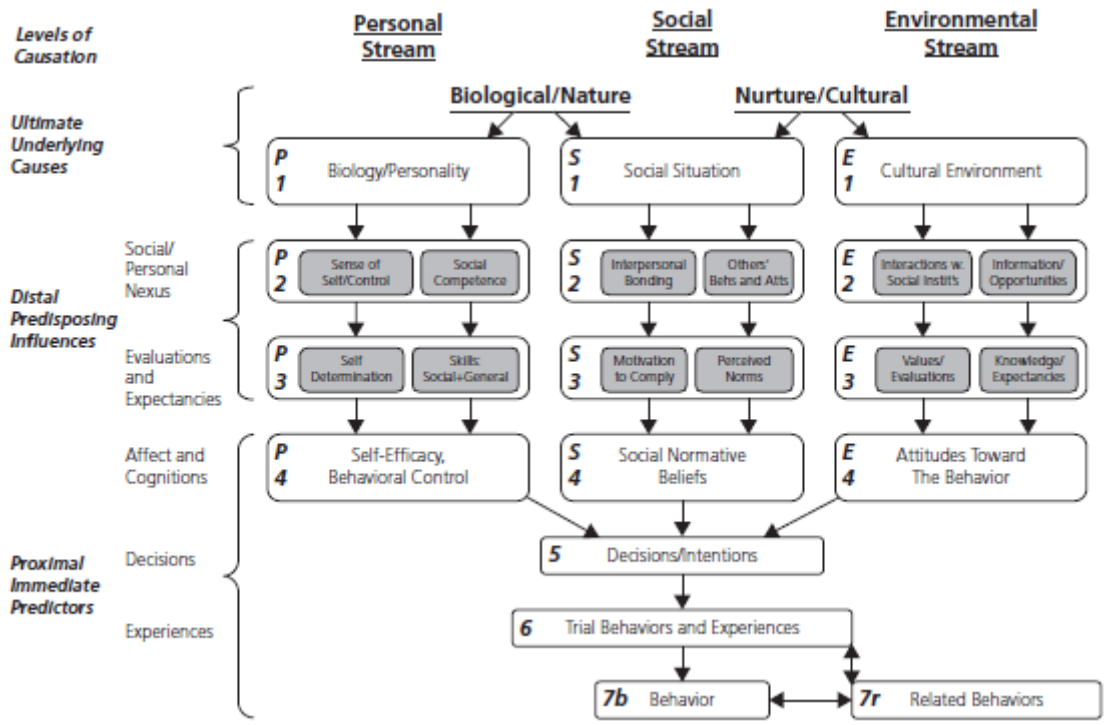


Figure 2: Theory of Triadic Influence. Reprinted from *Emerging Theories in Health Promotion Practice and Research* (Second ed., p. 455), by R. J. DiClemente, M. C. Kegler, and R. A. Crosby (Eds.), 2009, New York: Jossey-Bass. Copyright 2009 by John Wiley and Sons. Reprinted with permission.

2.3.2 School-level characteristics associated with tobacco use

Recent research has examined the association between school-level characteristics and the use of manufactured cigarettes among youth. The school environment is unique because youth spend a considerable amount of time at school where they can be influenced by tobacco control policies (Baillie et al., 2008; Cameron et al., 1999; Leatherdale et al.,

2006; Lovato et al., 2010a; Lovato et al., 2010b; Murnaghan et al., 2008). Evidence indicates that there are school-level characteristics that are associated with youth smoking uptake and progression (Aveyard, Markham & Cheng, 2004; Bernat et al., 2009; Leatherdale et al, 2005a; Leatherdale et al., 2005b; Murnaghan et al., 2007; Murnaghan et al., 2008). In fact, a Canadian study estimated that up to 20% of the difference in smoking prevalence between schools is attributable to school-level characteristics (Lovato et al., 2010b). International data further support these findings; a study of tobacco use in India found that schools that banned the use of various tobacco products on school property, and schools that taught students about the negative health effects of tobacco use had significantly fewer students who reported ever using and currently using SLT and manufactured cigarettes (Sinha et al., 2004). Although many school-based studies of ATP use recognize the importance of the school environment and the need to adjust for multiple levels of analysis (i.e., students nested within schools), only one study to date has reported the school-level variation associated with ATP use. These data suggest that school-level characteristics account for between 1% and 8% of the variation in snus use among youth (Loukas et al., 2012). As such, consistent with the TTI, it is critical that studies include an examination of multiple characteristics from multiple streams at multiple levels of causation in order to gain a full understanding of the characteristics associated with the use of ATPs. Existing evidence from studies of manufactured cigarettes suggests that school-level characteristics of interest include the senior student tobacco use rate, the geographic location of the school (urban vs rural), the tobacco retailer density, and the household income in the neighbourhood surrounding a school.

2.3.2.1 Senior student tobacco use rate

According to the TTI, factors from the social stream such as smoking peers influence a youth's decision to begin smoking (Flay, Snyder & Petraitis, 2009), and evidence supports the influence of peers (Avenevoli & Merikangas, 2003; Kobus, 2003; Tyas & Pederson, 1998). Therefore, it is not surprising that students that attend schools with a higher prevalence of senior students that smoke manufactured cigarettes are more likely to occasionally smoke manufactured cigarettes (Murnaghan et al., 2008). Furthermore, since ATP use is associated with using other types of tobacco products including manufactured cigarettes (e.g., Boyle, Claxton & Forster, 1997; Kennedy et al., 2011; Leatherdale et al., 2011a; Nasim et al., 2012), it is likely that schools with higher rates of manufactured cigarette use will also have higher rates of ATP use among their students. However, there is a lack of evidence to indicate whether the senior student smoking rate at the school is associated with the use of ATPs among younger students.

2.3.2.2 Geographic location

According to the TTI, factors from the environmental stream cause youth to smoke (Flay, Snyder & Petraitis, 2009). The geographic location of a school is a factor distal to the behaviour that influences a youth's attitude to smoking. There is limited evidence for the association between youth smoking and geographic location. A study by Reitsma & Manske (2004) found no significant difference in the rate of manufactured cigarette smoking between urban and rural schools. A review by Aveyard, Markham, and Cheng (2004) also found that the few studies to examine this relationship found no association. There is more evidence for the association between ATP use among youth and geographic location. One study found that those who live in urban areas were more likely to use bidis (Soldz, Huyser &

Dorsey, 2003). In contrast, it is unclear whether those who use SLT are more likely to live in urban areas (Soldz, Huyser & Dorsey, 2003), rural areas (Chaloupka, Tauras & Grossman, 1997), or either (Grotvedt et al., 2008). Beyond the data from these three studies, there is no other evidence to indicate whether the geographic location of the school is associated with the use of ATPs among youth.

2.3.2.3 Tobacco retailer density

According to the TTI, factors from the environmental stream cause youth to smoke (Flay, Snyder & Petraitis, 2009). Similar to the geographic location of a school, the tobacco retailer density surrounding a school would be a factor distal to the behaviour that influences a youth's attitude to smoking by increasing knowledge about different tobacco products. Early research from five Canadian provinces indicate that most schools have at least one tobacco retailer within 1 km of the school, and the average school has 6 tobacco retailers within 1 km of the school (Lovato et al., 2007). Furthermore, numerous studies suggest an association between youth smoking and tobacco retailer density (Chan & Leatherdale, 2011; Henriksen et al., 2008; McCarthy et al., 2009; Novak et al., 2006). Therefore, the density of tobacco retailers surrounding a school can vary, and this variability can influence the smoking risk of students at a school.

There is some evidence to indicate that hookah users are more likely to have knowledge of a hookah lounge in the community (Smith et al., 2011) and hookah users are more likely to visit a hookah lounge (Sterling & Mermelstein, 2011). However, no studies have examined the association between tobacco retailer density and hookah use among youth despite increasing concern about the rising number of hookah retailers (Noonan, 2010; NSRA, 2011).There is a lack of evidence to indicate whether the density of tobacco retailers is associated with the use of ATPs among youth.

2.3.2.4 Neighbourhood household income

According to the TTI, factors from the environmental stream cause youth to smoke (Flay, Snyder & Petraitis, 2009). Similar to the geographic location of a school and the tobacco retailer density, the household income in the neighbourhood surrounding a school is a factor distal to the behaviour that influences a youth's smoking behaviour. It is well researched that an individual's socioeconomic situation influences his or her likelihood of using manufactured cigarettes (Hiscock et al., 2012; Laaksonen et al., 2005). Specifically, evidence demonstrates that those who are at the lowest household income level are more likely to smoke manufactured cigarettes compared to those at higher household income levels (Laaksonen et al., 2005; Virtanen et al., 2007). Additionally, those who live in lower income communities are less likely to quit smoking manufactured cigarettes (Hiscock et al., 2012), increasing the negative health burden in this population. It is evident that the household income in the neighbourhood surrounding a school can vary, and this variability can influence the smoking risk of students at a school. However, there is a lack of evidence to indicate whether the household income in neighbourhoods surrounding a school is associated with the use of ATPs among youth.

2.3.3 Student-level characteristics associated with tobacco use

According to the TTI, factors from the personal and social streams and related behaviours cause youth to smoke. The student-level characteristics identified in this section can be classified under either of these two streams or as related behaviours. Historically, many studies have examined student-level characteristics associated with manufactured cigarette smoking. Reviews indicate that current smokers are equally likely to be male or female, and they are more likely to be older (Tyas & Pederson, 1998). Furthermore, youth

smokers are more likely to have more disposable income (Tyas & Pederson, 1998; Zhang, Cartmill & Ferrence, 2007) and have greater exposure to social sources of tobacco including friends and family members who use tobacco products (Avenevoli & Merikangas, 2003; Kobus, 2003; Tyas & Pederson, 1998). Finally, youth who use manufactured cigarettes are more likely to use alcohol and marijuana, and binge drink (Leatherdale & Ahmed, 2010; Leatherdale, Hammond & Ahmed, 2008). Since many ATP users also use manufactured cigarettes, ATP users share many student-level characteristics in common with manufactured cigarette users, as shown in the sections that follow. Therefore, these characteristics were of the most interest in this study.

2.3.3.1 Student-level characteristics associated with cigarillo or little cigar use

At this time, only one study has examined student-level characteristics associated with cigarillo or little cigar use among youth independent of cigar use. The only other study to examine cigarillo or little cigar use among youth also included cigar use (Tercyak & Audrain, 2002), making it impossible to distinguish differences in characteristics of use. Evidence indicates that youth who use cigarillos or little cigars are more likely to be male, older, and use or try other tobacco products including manufactured cigarettes (Leatherdale et al., 2011a). Evidence also indicates that these youth are more likely to try flavoured tobacco and have more disposable income (Leatherdale et al., 2011a). There is a lack of evidence with respect to the association between youth cigarillo or little cigar use and exposure to social sources of tobacco and alcohol and marijuana use.

2.3.3.2 Student-level characteristics associated with cigar use

Many studies have examined student-level characteristics associated with cigar use among youth. Youth who use cigars are more likely to be male (Delnevo et al., 2002,

Leatherdale et al., 2011a; Saunders & Geletko, 2012; Soldz, Huyser & Dorsey, 2003), older (Frazier et al., 2000; Leatherdale et al., 2011a; Soldz, Huyser & Dorsey, 2003), and use or try other tobacco products (Brooks et al., 2008, Frazier et al., 2000; Leatherdale et al., 2011a) including manufactured cigarettes (Leatherdale et al., 2011a; Nasim et al., 2012). Evidence also indicates that these youth are more likely to use flavoured tobacco (Leatherdale et al., 2011a), have more disposable income (Leatherdale et al., 2011a), and have greater exposure to social sources of tobacco, including friends (Brooks et al., 2008, Frazier et al., 2000) and family members (Frazier et al., 2000) who use tobacco products. Finally, youth who use cigars are more likely to use alcohol and binge drink (Frazier et al., 2000). There is a lack of evidence with respect to the association between youth cigar use and marijuana use.

2.3.3.3 Student-level characteristics associated with roll-your-own tobacco use

There are few studies that have examined the student-level characteristics associated with RYO tobacco use among youth. These studies indicate that youth who use RYO tobacco are more likely to be male and older (Leatherdale & Burkhalter, 2012; Raisamo, 2011), although one study found that older youth are less likely to use RYO tobacco (Cole, Leatherdale & Rynard, [Submitted]). Additionally, these youth are more likely to have less disposable income (Cole, Leatherdale & Rynard, [Submitted]; Leatherdale & Burkhalter, 2012) and greater exposure to social sources of tobacco, such as friends who smoke (Cole, Leatherdale & Rynard, [Submitted]). Finally, youth who use RYO tobacco are more likely to use alcohol (Cole, Leatherdale & Rynard, [Submitted]) and marijuana (Cole, Leatherdale & Rynard, [Submitted]; Leatherdale & Burkhalter, 2012). There is a lack of evidence with respect to the association between youth RYO tobacco use and other tobacco products, flavoured tobacco use, and exposure to family members who smoke.

2.3.3.4 Student-level characteristics associated with smokeless tobacco use

Numerous studies have examined the association between student-level characteristics and SLT use among youth. Youth who use SLT are more likely to be male (Grotvedt et al., 2008; Kennedy et al., 2011; Loukas et al., 2012; Saunders & Geletko, 2012; Tercyak & Audrain, 2002), older (Kennedy et al., 2011; Loukas et al., 2012; Nasim et al., 2012), and use or try other tobacco products (Creath, Wright & Wisniewski, 1992; Loukas et al., 2012; Martinsen & Sundgot-Borgen, 2012) including manufactured cigarettes (Boyle, Claxton & Forster, 1997; Creath, Wright & Wisniewski, 1992; Kennedy et al., 2011; Nasim et al., 2012; Tercyak & Audrain, 2002). Evidence also indicates that these youth have more disposable income (Kennedy et al., 2011) and greater exposure to social sources of tobacco, including friends (Boyle, Claxton & Forster, 1997; Tercyak & Audrain, 2002) and family members (Creath, Wright & Wisniewski, 1992; Tercyak & Audrain, 2002) who use tobacco products. Finally, youth who use SLT are more likely to use alcohol (Creath, Wright & Wisniewski, 1992; Galanti, Wickholm & Gilljam, 2001; Loukas et al., 2012; Martinsen & Sundgot-Borgen, 2012; Rantao & Ayo-Yusuf, 2012) and marijuana (Rantao & Ayo-Yusuf, 2012). There is a lack of evidence with respect to the association between youth SLT use and flavoured tobacco use.

2.3.3.5 Student-level characteristics associated with bidi use

Many studies have examined the association between student-level characteristics and bidi use among youth. Youth who use bidis are more likely to be male (Chan et al., 2011; Czoli, Leatherdale & Rynard, 2013; Delnevo & Hrywna, 2006; Hrywna et al., 2004; Soldz, Huyser & Dorsey, 2003; Taylor & Biener, 2001; Tercyak & Audrain, 2002), older (Soldz, Huyser & Dorsey, 2003), and use or try other tobacco products (Delnevo & Hrywna,

2006; Hrywna et al., 2004) including manufactured cigarettes (Chan et al., 2011; Czoli, Leatherdale & Rynard, 2013; Delnevo & Hrywna, 2006; Hrywna et al., 2004; Nasim et al., 2012; Taylor & Biener, 2001; Tercyak & Audrain, 2002). Evidence also indicates that these youth have greater exposure to social sources of tobacco, including friends and family members who use tobacco products (Tercyak & Audrain, 2002). Finally, youth who use bidis are more likely to use alcohol (Chan et al., 2011) and marijuana (Chan et al., 2011; Czoli, Leatherdale & Rynard, 2013; Delnevo & Hrywna, 2006). There is a lack of evidence with respect to the association between youth bidi use and flavoured tobacco use and the amount of disposable income.

2.3.3.6 Student-level characteristics associated with hookah use

Many studies have examined the association between student-level characteristics and hookah use among youth. Youth who use a hookah are more likely to be male (Barnett et al., 2009; Bover Manderski, Hrywna & Delnevo, 2012; Chan et al., 2011; Czoli, Leatherdale & Rynard, 2013; Primack et al., 2009; Sterling & Mermelstein, 2011), although some studies have not found a gender difference (Jordan & Delnevo, 2010; Smith et al., 2011). Youth who use a hookah are also more likely to be older (Barnett et al., 2009; Jordan & Delnevo, 2010; Primack et al., 2009), and use or try other tobacco products (Bover Manderski, Hrywna & Delnevo, 2012; Jordan & Delnevo, 2010) including manufactured cigarettes (Afifi et al., 2010; Barnett et al., 2009; Bover Manderski, Hrywna & Delnevo, 2012; Chan et al., 2011; Czoli, Leatherdale & Rynard, 2013; Jordan & Delnevo, 2010; Smith et al., 2011). Evidence also indicates that these youth have greater exposure to social sources of tobacco, including friends and family members who use tobacco products (Afifi et al., 2010). Finally, youth who use a hookah are more likely to use alcohol and marijuana (Chan et al., 2011; Czoli, Leatherdale & Rynard, 2013; Sterling & Mermelstein, 2011). There is a lack of

evidence with respect to the association between youth hookah use and flavoured tobacco use and the amount of disposable income.

2.3.4 Summary

The prevalence of ATP use is lower than that of manufactured cigarettes, but ATPs cause many of the same negative health effects including cancers and cardiovascular diseases. Few studies have examined the association between school-level characteristics and the use of ATPs among youth. In contrast, current research generally shows that youth who use ATPs are more likely to be male, older, and use or try other tobacco products including manufactured cigarettes. Evidence also confirms that youth who use ATPs generally have more disposable income and greater exposure to social sources of tobacco, including friends and family members who use tobacco products. Finally, youth who use ATPs are generally more likely to use alcohol and marijuana. In contrast, there is a lack of evidence with respect to the use of ATPs and flavoured tobacco.

Chapter 3

Study rationale and research questions

3.1 Study rationale

Generally, research to date has focused on student-level characteristics associated with the use of ATPs, leading to a knowledge gap with respect to the association between school-level characteristics and the use of ATPs among youth. Given that school-level characteristics are associated with the use of manufactured cigarettes among youth (Aveyard, Markham & Cheng, 2004; Bernat et al., 2009; Leatherdale et al, 2005a; Leatherdale et al., 2005b; Murnaghan et al., 2007), it is likely that factors in the school environment are also associated with the use of ATPs among youth. Data illustrating the prevalence of ATP use among Canadian youth is critical to understanding the scope of this problem in this vulnerable population. Additionally, knowledge of school-level characteristics that create high risk environments for use are important for developing tobacco control programs and policies.

3.2 Research questions

This research project answered the following questions:

1. What is the prevalence of (a) ever use and (b) current use of (i) cigarillos or little cigars, (ii) cigars, (iii) roll-your-own cigarettes, (iv) smokeless tobacco, (v) bidis, and (vi) a hookah among Canadian students in grades 9 and 10?
2. Is there significant between-school variability in the current use of (i) cigarillos or little cigars, (ii) cigars, (iii) roll-your-own cigarettes, (iv) smokeless tobacco, (v) bidis, and (vi) a hookah?

3. What school-level characteristics are associated with the current use of (i) cigarillos or little cigars, (ii) cigars, (iii) roll-your-own cigarettes, (iv) smokeless tobacco, (v) bidis, and (vi) a hookah?
4. What student-level characteristics are associated with the current use of (i) cigarillos or little cigars, (ii) cigars, (iii) roll-your-own cigarettes, (iv) smokeless tobacco, (v) bidis, and (vi) a hookah?

3.3 Hypotheses

I expected the following outcomes related to each alternative tobacco product following analysis of the data:

1. Consistent with previous studies, I expected (i) the prevalence of cigarillo or little cigar ever use to be about 20% and the prevalence of cigarillo or little cigar current use to be about 8%; (ii) the prevalence of cigar ever use to be about 12% and the prevalence of cigar current use to be about 5%; (iii) the prevalence of RYO cigarette ever use to be about 7% and the prevalence of RYO cigarette current use to be about 5%; (iv) the prevalence of SLT ever use to be about 5% and the prevalence of SLT current use to be about 2%; (v) the prevalence of bidi ever use to be about 1% and the prevalence of bidi current use to be about 0.5%; and, (vi) the prevalence of hookah ever use to be about 6% and the prevalence of hookah current use to be about 3%.
2. I expected to find significant between-school variability in the current use of cigarillos or little cigars, cigars, RYO cigarettes, SLT, and a hookah. I did not expect to find significant between-school variability in the current use of bidis due to the low prevalence of use.

3. I expected that the senior student tobacco use rate and the tobacco retailer density would be positively associated with the current use of cigarillos or little cigars, cigars, RYO cigarettes, and a hookah – schools with a higher prevalence of current manufactured cigarette smokers would also have a higher prevalence of current ATP users, and schools with a higher number of tobacco retailers within a 1 km radius would also have a higher prevalence of current ATP users. In contrast, I expected that the senior student manufactured cigarette smoking rate would be negatively associated with the current use of SLT, while the tobacco retailer density would be positively associated with the current use of SLT. Geographic location would also be associated with the current use of a hookah – those who live in urban areas would be more likely to use a hookah compared to those who live in rural areas.
4. Across all ATPs of interest, I expected that those who are male and older would be more likely to use ATPs relative to those who are female and younger. Furthermore, those with more disposable income, with parents who smoke cigarettes, with siblings who smoke cigarettes, and with more friends who smoke cigarettes would be more likely to use ATPs relative to those with less disposable income, with parents who do not smoke cigarettes, with siblings who do not smoke cigarettes, and with fewer friends who smoke cigarettes. Finally, those who smoke manufactured cigarettes, who have ever used flavoured tobacco, who currently binge drink, and who currently use marijuana would be more likely to use ATPs relative to those who do not smoke manufactured cigarettes, who have never used flavoured tobacco, who do not binge drink, and who do not use marijuana.

Chapter 4

Methods

4.1 Data sources

The current study analyzed data from Canadian students in grades 9 and 10 collected during the 2010-11 Youth Smoking Survey (YSS). The 2010-11 YSS module B questionnaire is included in Appendix A. Student-level data from the YSS were linked to school-level data provided by the YSS, and Digital Mapping Technologies Inc. (DMTI)-Spatial Enhanced Points of Interest (EPOI). Consistent with previous research (Murnaghan et al., 2008), the prevalence of current use of each tobacco product (e.g., manufactured cigarettes, cigarillos or little cigars, cigars, etc.) among grade 11 and 12 students at each school was calculated for each school using YSS data; these data produced the school's senior student tobacco use rate. The school's postal code (provided in the YSS dataset) was used to identify the geographic location of the school. Population and population density data from the Statistics Canada website for the area captured by the school's postal code were used to categorize schools as rural, suburban, or urban. EPOI data was used to calculate the density of tobacco retailers within a 1 km radius of each participating school. Finally, the first three digits of the school's postal code (provided in the YSS dataset) were used to identify the median household income in the neighbourhood surrounding each school, as provided by 2006 Canadian Census data. Descriptive statistics provided prevalence estimates for each ATP and regression analyses examined the school- and student-level characteristics associated with the use of each ATP.

4.1.1 The 2010-11 Youth Smoking Survey

The YSS is a nationally representative classroom-based survey of students in grades 6 to 12 that provides national and provincial tobacco use prevalence data (University of Waterloo, 2011). This cross-sectional survey provides valuable information regarding smoking behaviours,

social and demographic factors associated with tobacco use, and attitudes and beliefs regarding tobacco use (University of Waterloo, 2011). The YSS dataset also provides postal code information and median household income data for each participating school.

4.1.1.1 Sample selection

The 2010-11 YSS used a stratified single stage design which stratified based on health region smoking rate and type of school. The target population consisted of all young Canadian residents in grades 9 to 12 attending public, private and Catholic secondary schools in 9 of the 10 Canadian provinces. While New Brunswick participated in all prior cycles of the YSS, the provincial government chose not to participate in 2010/2011. Youth living in New Brunswick, Yukon, Nunavut, and the Northwest Territories were excluded from the target population, as were youth living in institutions or on First Nation Reserves and youth attending special schools or schools on military bases.

In the first stratum, public, private, and independent schools in all provinces with the exception of Quebec were divided into “high” and “low” smoking rate schools based on the median smoking rate for 15 to 19 year olds in the health region in which the school is located using data from the Canadian Community Health Survey. Schools in Ontario and Alberta were additionally stratified as “urban” schools if they were part of the urban areas of Toronto (Ontario) and Calgary/Edmonton (Alberta). Elementary schools in Quebec were stratified into “underprivileged” and “normal/privileged” schools based on the Socio-Economic Background Index for each school.

In the second stratum, public, private, and independent schools in all provinces were divided into “elementary” or “secondary” schools based on school enrolment. Secondary schools were defined as schools where the total enrolment of secondary grades (grades 9 to 12, or Secondary I to V in Quebec) was greater than the total enrolment of the elementary grades (grades 6 to 8, or grade 6 in Quebec). All other schools were classified as elementary

schools. With the exception of Prince Edward Island, schools within each stratum were selected based on simple random sampling; all 61 public schools in Prince Edward Island were included in the sample. Detailed information about sample selection for the 2010/2011 YSS is available online (www.yss.uwaterloo.ca).

4.1.1.2 Participant selection and recruitment

The 2010-11 YSS includes data collected from 31,396 Canadian students in grades 9 to 12 from 149 secondary schools. All grades 9 to 12 students in all sampled participating schools in all provinces with the exception of Quebec were eligible for participation. In Quebec, one mandatory class per grade was randomly selected for participation in secondary schools.

Sampled schools were recruited for participation following approval by the required school boards. A combination of active information – passive permission and active permission protocols were used to recruit students. Active information – passive permission protocols required that parents call a toll-free number if they did not want their child to participate in the study after they had read an information letter detailing the project, whereas active permission protocols required that students return a signed permission form, allowing participation in the survey. Students also had the opportunity to decline participation on the day of data collection. The University of Waterloo Office of Research Ethics and appropriate School Board and Public Health Ethics committees approved all procedures, including passive consent. Detailed information about participant selection and recruitment for the 2010-11 YSS is available online (www.yss.uwaterloo.ca).

4.1.1.3 Survey protocols

The 2010-11 YSS included two modules to collect data: the Module B questionnaire was completed by students in grades 9 to 12. This module included 32 questions (89 items) that assessed youth tobacco use and behaviours directly; 7 questions (7 items) that assessed

measures predictive of or related to youth tobacco use; 7 questions (24 items) that assessed physical activity and eating behaviours; 7 questions (20 items) on participant demographics; 5 questions (10 items) regarding students and their school; and 8 questions (40 items) that assessed alcohol, marijuana, and other drug use.

The 2010-11 YSS was administered by teachers during a designated class period between October 2010 and June 2011. The questionnaire took approximately 35 minutes for students to complete. Teachers were provided with detailed instructions for implementing the survey to ensure consistency across sites and to protect student confidentiality. A trained staff person was also present in a central location in the school to oversee the data collection. Participants were not provided compensation; however, schools were given $100 honorarium to offset data collection costs in addition to a customized *School Health Profile* provided 8-10 weeks after the data collection. Detailed information about survey protocols for the 2010-11 YSS is available online (www.yss.uwaterloo.ca).

4.1.2 Digital Mapping Technologies Inc. Spatial-Enhanced Points of Interest

Digital Mapping Technologies Inc. (DMTI) Spatial-Enhanced Points of Interest (EPOI) provides validated and standardized addresses for over 1.6 million business and recreational points of interest across Canada (DMTI Spatial, 2012). Data from the 2010-11 EPOI file provided the number of tobacco retailers within 1 km of the school. A 1 km circular buffer is consistent with previous smoking literature (Chan & Leatherdale, 2011), as well as physical activity literature (Hobin et al., 2012; Leatherdale et al., 2011b). Furthermore, this distance is believed to approximate the maximum distance most students would actively commute to school (McCarthy et al., 2009). Consistent with previous research (Pouliou & Elliott, 2010), these data were linked to YSS student-level data through three steps: (1) geocoding the address for each YSS school; (2) creating 1 km circular buffers (i.e., bounded areas surrounding each school in which the number of tobacco retailers were quantified); and (3) linking the

school-level tobacco retailer density for each school to the student-level data from each school. Arcview 3.3 software was used to geocode the school addresses and to create the 1 km buffers (Environmental Systems Research Institute, 2002). Detailed information about DMTI-EPOI is available online (www.dmtispatial.com).

4.2 Measures

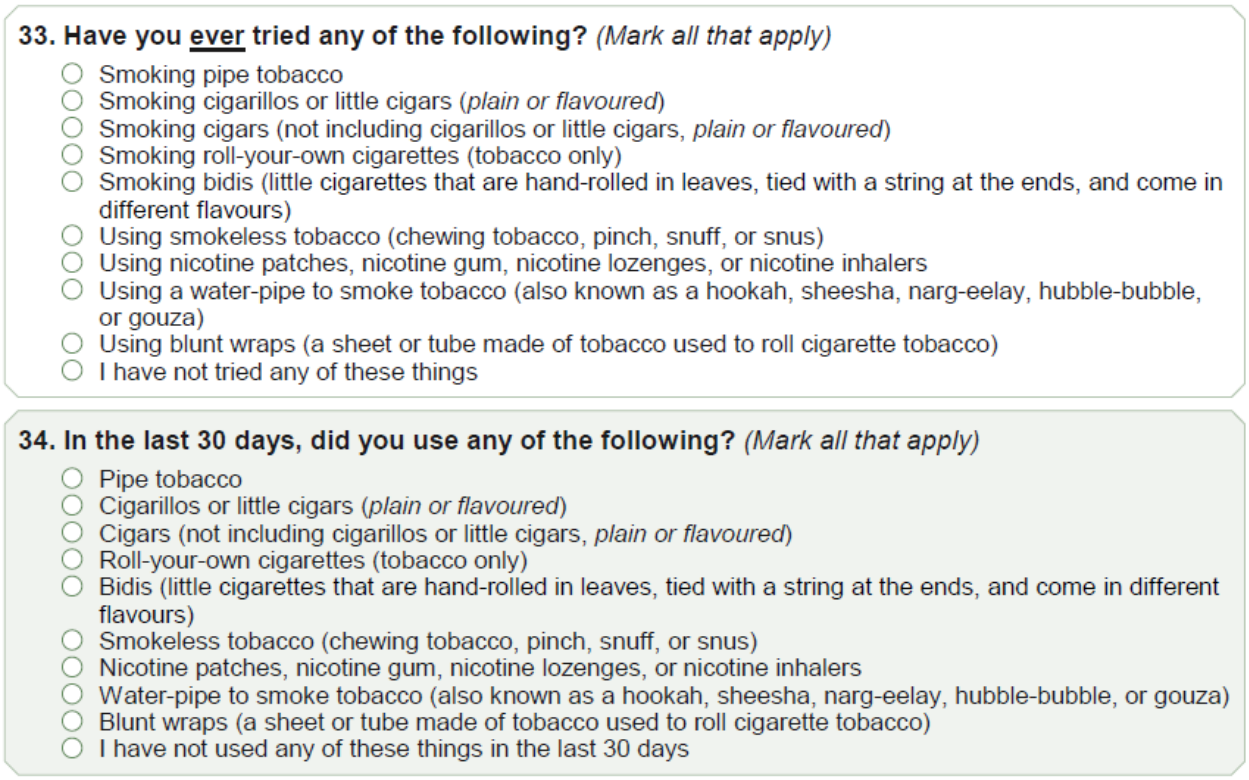
The following sections describe the response and explanatory variables of interest and the coding of these variables.

4.2.1 Response variables

Cigarillo or little cigar, cigar, RYO cigarette, SLT, bidi, and hookah use were measured on the YSS using two multi-item questions on alternate tobacco use, as illustrated in Figure 3. The first question measured *ever use* of each ATP among respondents: "Have you ever tried any of the following? (Mark all that apply)," followed by a list of forms of tobacco other than cigarettes. Respondents who have ever used a specific ATP (e.g., cigars) were coded as “1”, while all other respondents were coded as “0”. Responses for each ATP of interest (cigarillos or little cigars, cigars, RYO cigarettes, SLT, bidis, a hookah, pipe tobacco, and blunt wraps) were coded in this way.

Similarly, the second question measured *current use* of each ATP among respondents: "In the last 30 days, did you use any of the following? (Mark all that apply)." Respondents who currently use a specific ATP (e.g., cigars) were coded as “1”, while all other respondents were coded as “0”. Responses for each ATP of interest (cigarillos or little cigars, cigars, RYO cigarettes, SLT, bidis, a hookah, pipe tobacco, and blunt wraps) were coded in this way. For this analysis, any respondents with all items missing from any one question, including the responses “I have not tried any of these things” or “I have not used any of these things in the last 30 days”

had ATP use set to missing (376 respondents for ever use and 621 respondents for current use).



33. Have you ever tried any of the following? *(Mark all that apply)*

- ○ Smoking pipe tobacco
- ○ Smoking cigarillos or little cigars (*plain or flavoured*)
- ○ Smoking cigars (not including cigarillos or little cigars, *plain or flavoured*)
- ○ Smoking roll-your-own cigarettes (tobacco only)
- ○ Smoking bidis (little cigarettes that are hand-rolled in leaves, tied with a string at the ends, and come in different flavours)
- ○ Using smokeless tobacco (chewing tobacco, pinch, snuff, or snus)
- ○ Using nicotine patches, nicotine gum, nicotine lozenges, or nicotine inhalers
- ○ Using a water-pipe to smoke tobacco (also known as a hookah, sheesha, narg-eelay, hubble-bubble, or gouza)
- ○ Using blunt wraps (a sheet or tube made of tobacco used to roll cigarette tobacco)
- ○ I have not tried any of these things

34. In the last 30 days, did you use any of the following? *(Mark all that apply)*

- ○ Pipe tobacco
- ○ Cigarillos or little cigars (*plain or flavoured*)
- ○ Cigars (not including cigarillos or little cigars, *plain or flavoured*)
- ○ Roll-your-own cigarettes (tobacco only)
- ○ Bidis (little cigarettes that are hand-rolled in leaves, tied with a string at the ends, and come in different flavours)
- ○ Smokeless tobacco (chewing tobacco, pinch, snuff, or snus)
- ○ Nicotine patches, nicotine gum, nicotine lozenges, or nicotine inhalers
- ○ Water-pipe to smoke tobacco (also known as a hookah, sheesha, narg-eelay, hubble-bubble, or gouza)
- ○ Blunt wraps (a sheet or tube made of tobacco used to roll cigarette tobacco)
- ○ I have not used any of these things in the last 30 days

Figure 3: 2010-11 YSS questionnaire measures used to determine ATP use

4.2.2 School-level explanatory variables

Senior student manufactured cigarette smoking rate: Consistent with previous definitions (Elton Marshall et al., 2011), *current smokers* had smoked at least 100 manufactured cigarettes in their lifetime and at least one whole manufactured cigarette during the last 30 days preceding the survey. The senior student manufactured cigarette smoking rate for each school was calculated based on the number of current manufactured cigarette smokers in grades 11 and 12 in the school, divided by the total number of students in grades 11 and 12 in the school. Therefore, all regression analyses only included students in grades 9 and 10. In this analysis, schools were classified as high (coded as “1”) or low (coded as “0”) rate schools based on the

overall average senior student manufactured cigarette smoking rate for all participating secondary schools.

Senior student cigarillo or little cigar smoking rate: *Current cigarillo or little cigar smokers* had used a cigarillo or little cigar during the last 30 days preceding the survey. The senior student cigarillo or little cigar smoking rate for each school was calculated based on the number of current cigarillo or little cigar smokers in grades 11 and 12 in the school, divided by the total number of students in grades 11 and 12 in the school. Therefore, all regression analyses only included students in grades 9 and 10. In this analysis, schools were classified as high (coded as "1") or low (coded as "0") rate schools based on the overall average senior student cigarillo or little cigar smoking rate for all participating secondary schools.

Senior student cigar smoking rate: *Current cigar smokers* had used a cigar during the last 30 days preceding the survey. The senior student cigar smoking rate for each school was calculated based on the number of current cigar smokers in grades 11 and 12 in the school, divided by the total number of students in grades 11 and 12 in the school. Therefore, all regression analyses only included students in grades 9 and 10. In this analysis, schools were classified as high (coded as "1") or low (coded as "0") rate schools based on the overall average senior student cigar smoking rate for all participating secondary schools.

Senior student roll-your-own cigarette smoking rate: *Current RYO cigarette smokers* had used a RYO cigarette during the last 30 days preceding the survey. The senior student RYO cigarette smoking rate for each school was calculated based on the number of current RYO cigarette smokers in grades 11 and 12 in the school, divided by the total number of students in grades 11 and 12 in the school. Therefore, all regression analyses only included students in grades 9 and 10. In this analysis, schools were classified as high (coded as "1") or low (coded as "0") rate schools based on the overall average senior student RYO cigarette smoking rate for all participating secondary schools.

Senior student smokeless tobacco use rate: *Current SLT users* had used SLT during the last 30 days preceding the survey. The senior student SLT use rate for each school was calculated based on the number of current SLT users in grades 11 and 12 in the school, divided by the total number of students in grades 11 and 12 in the school. Therefore, all regression analyses only included students in grades 9 and 10. In this analysis, schools were classified as high (coded as "1") or low (coded as "0") rate schools based on the overall average senior student SLT use rate for all participating secondary schools.

Senior student bidi smoking rate: *Current bidi smokers* had used a bidi during the last 30 days preceding the survey. The senior student bidi smoking rate for each school was calculated based on the number of current bidi smokers in grades 11 and 12 in the school, divided by the total number of students in grades 11 and 12 in the school. Therefore, all regression analyses only included students in grades 9 and 10. In this analysis, schools were classified as high (coded as "1") or low (coded as "0") rate schools based on the overall average senior student bidi smoking rate for all participating secondary schools.

Senior student hookah use rate: *Current hookah users* had used a hookah during the last 30 days preceding the survey. The senior student hookah use rate for each school was calculated based on the number of current hookah users in grades 11 and 12 in the school, divided by the total number of students in grades 11 and 12 in the school. Therefore, all regression analyses only included students in grades 9 and 10. In this analysis, schools were classified as high (coded as "1") or low (coded as "0") rate schools based on the overall average senior student hookah use rate for all participating secondary schools.

Geographic location: According to Statistics Canada, population centers are geographic areas with a population of at least 1,000 people and a population density of at least 400 people per square kilometer (Matier, 2008). Based on this definition, urban populations were large urban population centers with more than 100,000 people and a population density of at least 400 people per square kilometer and suburban populations were small or medium population

centers with between 1,000 and 99,999 people and a population density of at least 400 people per square kilometer. Rural populations included territories lying outside population centers with less than 1,000 people and a population density less than 400 people per square kilometer. Therefore, all participating schools were classified as either rural, suburban, or urban according to the population and population density data obtained from the Statistics Canada website using the school's postal code. In this analysis, rural schools were coded as "0" and acted as the reference group. Suburban schools were coded as "1" while urban schools were coded as "2".

Tobacco retailer density: Consistent with previous research (Chan & Leatherdale, 2011), data from the 2010-11 EPOI file provided the number of tobacco retailers within 1 km of the school. Tobacco stores, tobacco & tobacco product wholesalers, other gasoline stations, and convenience stores were all assumed to sell tobacco products. Additionally, during the 2010-11 YSS, tobacco products were still sold in pharmacies in Manitoba, Saskatchewan, and British Columbia; therefore, pharmacies were included as tobacco retailers in these provinces.

Neighbourhood household income: Consistent with previous research (Shearer et al., 2012), the median household income in neighbourhoods surrounding schools was used as a proxy for socioeconomic status. The median household income in neighbourhoods surrounding schools was then divided into quartiles, and the second and third quartiles were collapsed together, creating low, average, and high income categories (Virtanen et al., 2007). These data were obtained from the YSS dataset.

4.2.3 Student-level explanatory variables

The YSS also collects sociodemographic and behavioural information which was used to determine student-level characteristics associated with the use of each ATP. Detailed information about each sociodemographic and behavioural characteristic is outlined below. The coding for each characteristic was consistent with previous research in Canada (e.g., Chan et al., 2011; Kennedy et al., 2011; Leatherdale & Burkhalter, 2012; Leatherdale et al., 2011a).

4.2.3.1 Sociodemographic characteristics

Region: The YSS collected data that was representative of each province. Due to low response numbers in some provinces, five geographic regions were created: “Atlantic” (including Newfoundland and Labrador, Prince Edward Island, and Nova Scotia), “Ontario”, “Quebec”, “Prairies” (including Manitoba, Saskatchewan, and Alberta), and “British Columbia”. The “Atlantic” region was coded as “0” and acted as the reference group. “Ontario” was coded as “1”, “Quebec” was coded as “2”, the “Prairies” was coded as “3”, and “British Columbia” was coded as “4”.

Gender: One question on the YSS asked about gender: “Are you...” followed by a female and male response option. Respondents that selected “female” were coded as “0” and acted as the reference group, while those that selected “male” were coded as “1”.

Grade: One question on the YSS asked about grade: “What grade are you in?” followed by a list of relevant grades. Respondents that selected “grade 9” were coded as “0” and acted as the reference group, while those that selected “grade 10” were coded as “1”.

Ethnicity: One question on the YSS asked about ethnicity: “How would you describe yourself? (Mark all that apply)” followed by a list of ethnicities. Based on the number of students that selected each response, respondents that selected “White” were coded as “0” and acted as the reference group. Respondents that selected “Asian” were coded as “1”, “Other” were coded as “2”, “Aboriginal (First Nations, Métis, Inuit)” were coded as “3”, “Black” were coded as “4”, and “Latin American/Hispanic” were coded as “5”.

Disposable income: One question on the YSS asked about disposable income: “About how much money do you usually get each week to spend on yourself or to save? (Remember to include all money from allowances and jobs like babysitting, delivering papers...)”. Due to low response numbers, some categories were grouped together in this analysis. Respondents that selected “$0” were coded as “0” and acted as the reference group. Respondents that selected

between $1 and $20 were coded as “1”, those that selected “$21 to $40” were coded as “2”, “$41 to $100” were coded as “3”, “more than $100” were coded as “4”, and “I do not know how much money I get each week” were coded as “5”.

Social sources of tobacco: Three questions on the YSS asked about social sources of tobacco, including parents, siblings, and friends who smoke cigarettes. The first question asked about parental smoking behaviour: “Do any of your parents, step-parents, or guardians smoke cigarettes?” Respondents that selected “no” or “I do not know” were coded as “0” and acted as the reference group, while those that selected “yes” were coded as “1”.

The second question asked about sibling smoking behaviour: “Do any of your brothers or sisters smoke cigarettes?” Respondents that selected “no”, “I do not know”, or “I have no brothers or sisters” were coded as “0” and acted as the reference group, while those that selected “yes” were coded as “1”.

The final question asked about friends smoking behaviour: “Your closest friends are the friends you like to spend the most time with. How many of your closest friends smoke cigarettes?” Due to low response numbers, some categories were grouped together in this analysis. Respondents that selected “none” were coded as “0” and acted as the reference group. Respondents that selected “1 friend” or “2 friends” were coded as “1”, while those that selected “3 friends”, “4 friends”, or “5 or more friends” were coded as “2”.

4.2.3.2 Behavioural characteristics

Manufactured cigarettes smoking status: Current manufactured cigarette smoking status was measured on the YSS by asking respondents if they have ever smoked 100 or more whole manufactured cigarettes in their lifetime, and on how many of the last 30 days they smoked one or more manufactured cigarettes. Consistent with Health Canada’s definitions of smoking status for the YSS (Elton-Marshall, et al., 2011), *current daily smokers* had smoked at least 100 manufactured cigarettes in their lifetime and at least one whole manufactured cigarette on each

of last 30 days preceding the survey, *current occasional smokers* had smoked at least 100 manufactured cigarettes in their lifetime and at least one whole manufactured cigarettes during the last 30 days preceding the survey but not every day, *former daily smokers* had smoked at least 100 manufactured cigarettes in their lifetime and had smoked at least seven days in a row but did not smoke during the last 30 days preceding the survey, *former occasional smokers* had smoked at least 100 manufactured cigarettes in their lifetime but not seven days in a row and did not smoke during the last 30 days preceding the survey, *experimental smokers* had smoked at least one whole manufactured cigarette during the last 30 days preceding the survey but had not smoked 100 manufactured cigarettes in their lifetime, *past experimental smokers* had smoked at least one whole manufactured cigarette but not during the last 30 days preceding the survey and had not smoked 100 manufactured cigarettes in their lifetime, *puffers* had ever tried smoking but had not smoked a whole manufactured cigarette, and *never smokers* had never tried a manufactured cigarette, not even a few puffs. Due to low response numbers, former daily smokers and former occasional smokers were grouped together and identified as “former smokers” in this analysis. “Never smokers” were coded as “0” and acted as the reference group. “Current daily smokers” were coded as “1”, “current occasional smokers” were coded as “2”, “former smokers” were coded as “3”, “experimental smokers” were coded as “4”, “past experimental smokers” were coded as “5”, and “puffers” were coded as “6”.

Use of alternative tobacco products: As previously stated in Section 4.2.1, cigarillo or little cigar, cigar, RYO cigarette, SLT, bidi, hookah, pipe tobacco, and blunt wrap use were measured on the YSS using two multi-item questions. The first question measured *ever use* of each ATP among respondents: "Have you ever tried any of the following? (Mark all that apply)," followed by a list of forms of tobacco other than cigarettes. Respondents that had ever used a specific ATP (e.g., cigars) were coded as “1”, while all other respondents were coded as “0”. Responses for each ATP of interest (cigarillos or little cigars, cigars, RYO cigarettes, SLT, bidis, a hookah, pipe tobacco, and blunt wraps) were coded in this way.

Similarly, the second question measured *current use* of each ATP among respondents: "In the last 30 days, did you use any of the following? (Mark all that apply)." Respondents that currently use a specific ATP (e.g., cigars) were coded as “1”, while all other respondents were coded as “0”. Responses for each ATP of interest (cigarillos or little cigars, cigars, RYO cigarettes, SLT, bidis, a hookah, pipe tobacco, and blunt wraps) were coded in this way. For this analysis, any respondents with all items missing from any one question, including the responses “I have not tried any of these things” or “I have not used any of these things in the last 30 days” had ATP use set to missing (376 respondents for ever use and 621 respondents for current use).

Ever use of flavoured tobacco: One question on the YSS measured *ever use* of flavoured tobacco products among respondents: “Have you ever used flavoured tobacco products (menthol, cherry, strawberry, vanilla, etc.)?” Respondents that selected “no” were coded as “0” and acted as the reference group, while those that selected “yes” were coded as “1”.

Binge drinking status: One question on the YSS measured binge drinking among those who indicated they have ever had a drink of alcohol: “In the last 12 months, how often did you have 5 drinks of alcohol or more on one occasion?” Responses were collapsed across categories to differentiate between those who have never had 5 or more drinks on one occasion from those who have had 5 or more drinks on one occasion, and to identify those who have had 5 or more drinks on one occasion within the last month. Respondents that selected “I have never done this” were identified as *non-binge drinkers*, were coded as “0”, and acted as the reference group. Respondents that selected “I did not have 5 or more drinks on one occasion in the last 12 months” or “less than once a month” were identified as *non-current binge drinkers* and were coded as “1”. Respondents that selected “once a month”, “2 to 3 times a month”, “once a week”, “2 to 5 times a week”, or “daily or almost daily” were identified as *current binge drinkers* and were coded as “2”. Respondents that selected “I do not know” were set to missing

in the analysis as this was not a valid response (University of Waterloo, 2011). Furthermore, any respondents who did not indicate alcohol use in the previous year had binge drinking set to missing.

Marijuana use status: One question on the YSS measured marijuana use: “In the last 12 months, how often did you use marijuana or cannabis? (a joint, pot, weed, hash...)”. Responses were collapsed across categories to differentiate between those who have never used marijuana from those who have used marijuana, and to identify those who have used marijuana within the last month. Respondents that selected “I have never used marijuana” were identified as *non-marijuana users*, were coded as “0”, and acted as the reference group. Respondents that selected “I have used marijuana but not in the last 12 months” or “less than once a month” were identified as *non-current marijuana users* and were coded as “1”. Respondents that selected “once a month”, “2 or 3 times a month”, “once a week”, “2 or 3 times a week”, “4 to 6 times a week”, or “every day” were identified as *current marijuana users* and were coded as “2”. Respondents that selected “I do not know” were set to missing in the analysis as this was not a valid response (University of Waterloo, 2011).

Chapter 5

Statistical analysis

5.1 Survey data weighting

The YSS provides weighted student-level data which were used in the descriptive statistics to adjust for differential response rates across regions or groups. The development of the survey weight was accomplished in two stages. In the first stage a weight (W_{1j}) was created to account for the school selection within health region and school strata. A second weight (W_{2jg}) was calculated to adjust for student non-response. The weights were then calibrated to the provincial gender and grade distribution so that the total of the survey weights by gender, grade, and province would equal the actual enrolments in those groups. Additional details on the YSS weighting procedure are available online in the 2010-11 YSS Microdata User Guide (www.yss.uwaterloo.ca).

The use of survey weights allowed population estimates to be derived. However, when performing statistical tests and multilevel regression modelling, the use of these survey weights incorrectly inflated the sample size. Therefore, the survey weights were rescaled so that the average weight was one, and the rescaled weights were used when performing statistical tests and multilevel regression modelling. Although these new weights did not take into account the stratification and clustering of the design of the sample, they took into account the unequal probability of selection.

The coefficient of variation was also calculated for all descriptive statistics to determine the quality level of all estimates. All estimates were reported according to the release guidelines provided in the 2010-11 YSS Microdata User Guide. All analyses were performed using SAS version 9.2 (SAS Institute Inc., 2008).

5.2 Descriptive statistics

The following sections outline the descriptive statistics and the significance tests that were done.

5.2.1 Descriptive statistics for relevant student-level characteristics

Weighted YSS data were used to describe student-level explanatory variables and response variables. Chi-squared tests were performed to test for significant differences in student-level explanatory variables for each response variable. These results were used to answer research question 1.

5.2.2 Descriptive statistics for relevant school-level characteristics

Unweighted YSS data were used to describe the senior student tobacco use rate for each school and the overall average and range of senior student tobacco use rates. YSS data were used to identify the number and percentage of schools classified as urban, suburban, or rural according to region, and unweighted chi-squared statistics tested for significant differences. EPOI data were used to describe the tobacco retailer density for each school and the overall mean and range of tobacco retailers within 1 km of schools. Unweighted analysis of variance statistics tested for significant differences in school tobacco retailer density according to region, geographic classification, and median household income in neighbourhoods surrounding schools. YSS data were used to describe the household income in neighbourhoods surrounding each school and to create household income quartiles. The number and percentage of schools in each household income quartile were described according to region and unweighted chi-squared statistics tested for significant differences. Correlation statistics tested for intercorrelation among school-level characteristics to determine whether all school-level variables were necessary in the multilevel models.

5.3 Regression analyses

The present analysis used multilevel data collected from students (level 1, micro-level) nested within schools (level 2, macro-level). Multilevel analyses provided numerous advantages to multiple logistic regression analyses when there is the possibility that observations are clustered into macro-level units (Guo & Zhao, 2000). Firstly, multilevel analyses provide a systematic framework for examining how macro-level characteristics influence a response at the micro-level (Guo & Zhao, 2000). Additionally, multilevel models provide more precise parameter estimates, standard errors, confidence intervals, and significance tests because they account for clustering within the data (Guo & Zhao, 2000). Finally, multilevel analyses provide researchers with estimates for the amount of variation attributable to each level of the data (Guo & Zhao, 2000). Since schools are a potential source of variability, it is important to first determine whether ATP use is variable across schools. If such school-level variability exists, it indicates that student responses are not independent within a single school, meaning that characteristics of the school environment influence individuals such that they are more similar to each other (Guo & Zhao, 2000; Snijders & Bosker, 1999). In this analysis, multiple logistic regression analyses were not appropriate due to the multilevel nature of the data and multilevel logistic regression analyses were performed to first determine the association between the use of each ATP and school-level characteristics, followed by the addition of student-level characteristics.

5.3.1 Multilevel regression analyses for the association between school- and student-level characteristics and the use of each alternative tobacco product

Similar to previous research (Leatherdale et al., 2005a; Leatherdale et al., 2005b), a three-step modelling procedure was used to test whether the use of each ATP among youth varies significantly ($p<0.05$) across schools and if so, identify student- and school-level characteristics associated with the use of each ATP. Step 1 investigated whether random

variability between schools accounted for variability in the odds a youth used an ATP (e.g., cigars) through calculation of the intraclass correlation coefficient (ICC). An ICC value that is close to 1 indicates that the variability between individuals within a group is low, meaning that individuals within a group are very similar to each other and school-level characteristics are important predictors of behaviour. In contrast, an ICC value that is close to 0 indicates that the variability between individuals within a group is high, meaning that individuals within a group are not very similar to each other and student-level characteristics are important predictors of behaviour. The formula that was used to calculate the ICC for these binomial variables is illustrated in Figure 4. The ICC was used to answer research question 2. Step 2 investigated the association between school-level characteristics and the use of each ATP (e.g., cigars) while modelling for between-school random variation using PROC GLIMMIX in SAS. The final model included all school-level variables of interest and controlled for a respondent's province of residence. Step 3 investigates the associated between school- and student-level characteristics and the use of each ATP (e.g., cigars) while modelling for between-school random variation using PROC GLIMMIX in SAS. The final model included all school- and student-level variables of interest and controlled for a respondent's province of residence. Results of steps 2 and 3 were used to answer research questions 3 and 4, respectively. This three step modeling process was used to identify school- and student-level characteristics associated with ever use and current use of each ATP of interest (cigarillos or little cigars, cigars, RYO cigarettes, SLT, bidis, and hookah).

$$\rho_I = \frac{population\ variance\ between\ macro-units}{total\ variance} = \frac{\sigma_{\mu 0}^2}{\sigma_{\mu 0}^2 + \frac{\pi^2}{3}}$$

Figure 4: Formula to calculate the intraclass correlation coefficient for binomial variables

Chapter 6

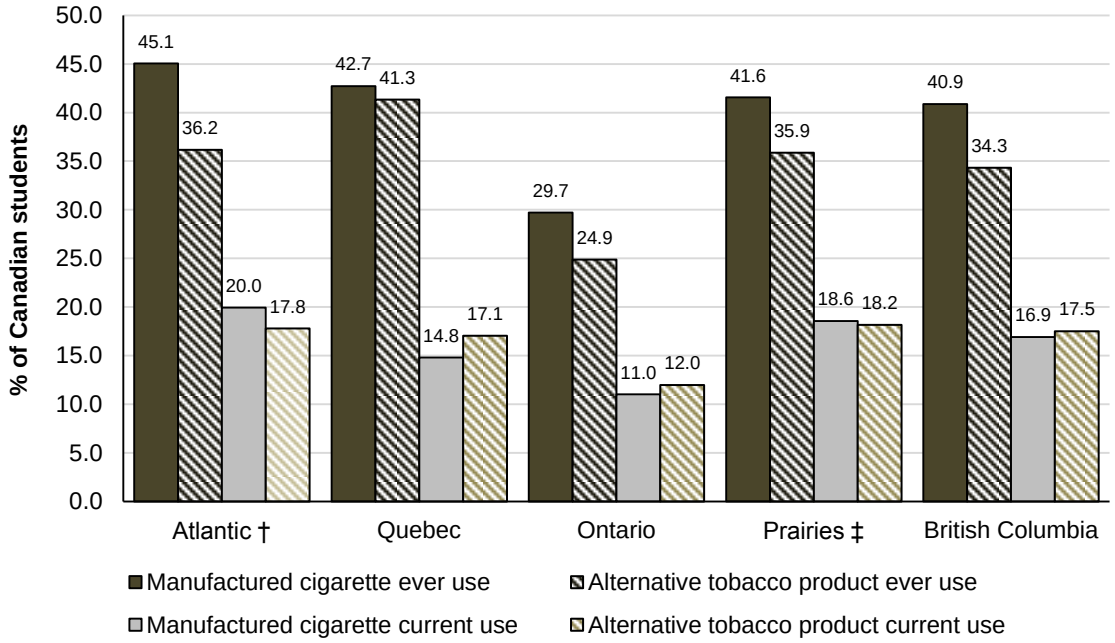
Results

6.1 Descriptive results for relevant student-level characteristics

The following sections present the descriptive results for relevant student-level characteristics. Beginning with overall ATP ever and current use, each section outlines the results for one of the ATPs studied. The final sample contained a total of 14,916 students in grades 9 and 10 from 134 secondary schools.

6.1.1 Descriptive result for ever and current use of alternative tobacco products among Canadian students (grades 9 and 10)

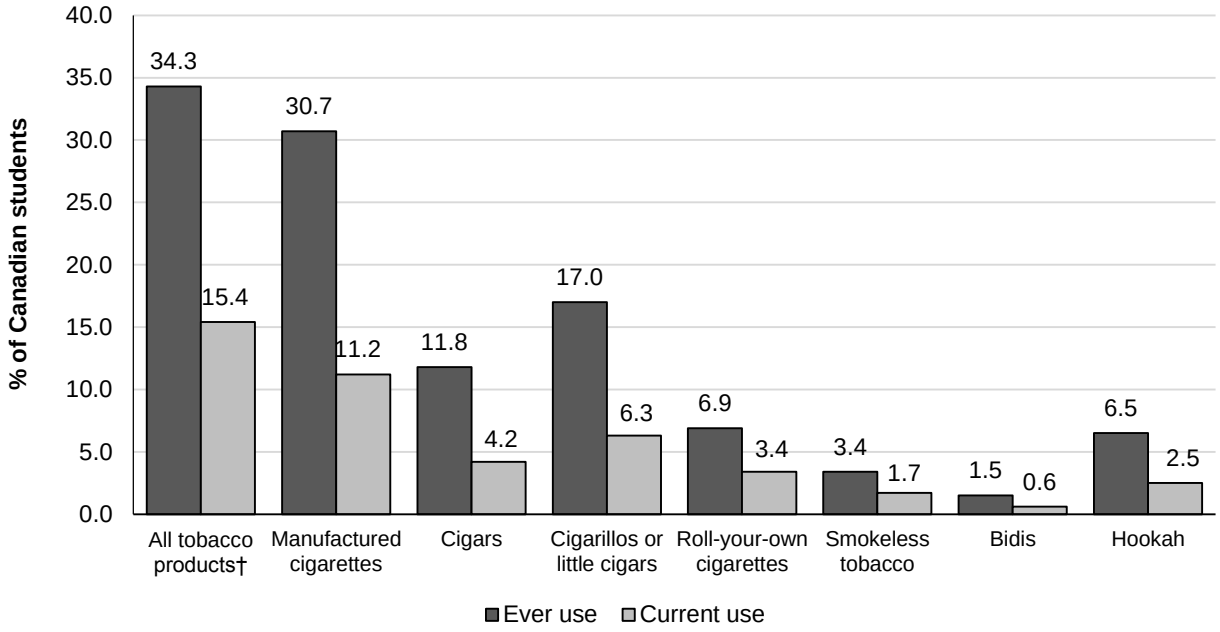
An estimated 181,600 Canadian students in grades 9 and 10 (24.5%) reported having ever used one or more ATPs (including cigarillos or little cigars, cigars, roll-your-own cigarettes, smokeless tobacco, bidis, a hookah, pipe tobacco, or blunt wraps), while an estimated 83,600 students (11.5%) reported currently using one or more ATPs. As presented in Figure 5, the Atlantic region had the highest prevalence of grade 9 and 10 students who reported having ever used manufactured cigarettes, while Quebec had the highest prevalence of students who reported having ever used ATPs. Similarly, the Atlantic region had the highest prevalence of students who reported currently using manufactured cigarettes, while the Prairie region had the highest prevalence of students who reported currently using ATPs.



[a] Including cigarillos or little cigars, cigars, roll-your-own cigarettes, smokeless tobacco, bidis, a hookah, pipe tobacco, or blunt wraps.
† Atlantic region includes Newfoundland and Labrador, Prince Edward Island, and Nova Scotia
‡ Prairie region includes Manitoba, Saskatchewan, and Alberta

Figure 5: Prevalence of manufactured cigarette and alternative tobacco product[a] ever and current use among Canadian students (grades 9 and 10), by region, 2010-11 Youth Smoking Survey, Canada.

Figure 6 presents the prevalence of ever and current use of various tobacco products among Canadian students (grades 9-10). Table 2 and Table ***3*** illustrate the percent of ever and current use of various tobacco products by demographic and behavioural predictor variables among Canadian students (grades 9-10). Finally, Figure 7 through Figure ***12*** illustrate the prevalence of ever and current use of various tobacco products by various demographic predictor variables.



† Including manufactured cigarettes, cigarillos or little cigars, cigars, roll-your-own cigarettes, smokeless tobacco, bidis, a hookah, pipe tobacco, or blunt wraps

Figure 6: Prevalence of tobacco product ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada

Table 2: Weighted percent of ever use of various tobacco products by demographic and behavioural predictor variables among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Manufactured cigarettes	Cigars	Cigarillos or little cigars	Roll-your-own cigarettes	Smokeless tobacco	Bidis	Hookah
		% of students						
Gender	Female	29.3	9.3	14.7	6.0	1.4	0.7	5.6
	Male	31.9	14.1	19.2	7.7	5.3	2.3	7.2
Grade	9	27.2	9.7	13.4	5.7	2.4	1.3	5.3.
	10	33.5	13.5	19.9	7.8	4.2	1.7	7.4
Disposable income	Zero	24.9	7.9	11.0	3.7	1.9	1.2	4.7
	$1 to $20	27.6	10.8	15.4	6.2	3.0	1.3	6.2
	$21 to $40	38.7	14.4	20.1	8.8	3.3	#	8.2
	$41 to $100	34.9	15.0	21.4	7.8	4.8	#	7.0
	More than $100	46.4	20.4	32.5	13.9	7.9	4.9	11.0
	I do not know how much money I get each week	25.3	10.2	15.6	5.6	2.7	#	4.6
Parents who smoke	Yes	44.3	16.8	23.9	11.4	4.4	2.5	7.7
	No / I don't know	22.0	8.5	12.7	3.9	2.6	0.8	5.5
Siblings who smoke	Yes	59.1	24.2	32.1	17.6	5.7	4.9	13.9
	No / I don't know / I don't have any brothers or sisters	24.7	9.2	13.9	4.6	2.9	0.8	4.8
Friends who smoke	None	14.7	4.5	6.6	1.1	1.3	0.4*	2.7
	1 or 2 friends	42.2	13.6	25.0	5.2	4.0	#	6.6
	3 or more friends	70.9	33.9	43.0	27.6	9.5	6.2	18.6
Manufactured cigarette smoking status	Currently smokes daily	100.0	65.1	79.4	69.5	24.6	24.8	43.6
	Currently smokes occasionally	100.0	49.2	68.2	46.9	15.5	5.5*	28.2
	Formerly smoked	100.0	43.2	75.0	44.8	#	#	#
	Experimentally smokes (beginning)	100.0	43.0	57.0	25.2	9.9	2.3*	22.1
	Experimentally smoked in the past	100.0	33.6	57.8	13.7	6.6	#	12.5
	Puffs	100.0	20.3	27.8	4.1	3.5	#	7.9
	Never tried	0.0	1.5	2.5	#	1.0	#	1.7
Ever used flavoured tobacco products	Yes	89.1	45.8	66.3	29.6	14.1	6.6	25.6
	No	16.5	3.5	5.0	1.3	0.8	0.3*	1.8
Binge drinking status[a]	Non-binge drinker	13.4	2.6	4.1	1.8	0.8	0.4	2.1
	Non-current binge drinker	42.3	14.1	23.9	6.9	3.3	#	7.3
	Current binge drinker	68.9	37.3	47.9	22.3	11.6	5.2	19.1
Marijuana use status[b]	Non-marijuana user	13.9	2.7	4.9	0.9	1.0	#	1.5
	Non-current marijuana user	67.1	24.6	39.1	11.7	6.4	#	9.8
	Current marijuana user	80.3	44.6	57.7	30.8	12.0	8.1	27.8

* Moderate sampling variability; interpret with caution

\# Data suppressed due to high sampling variability

[a] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.

[b] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.

Table 3: Weighted percent of current use of various tobacco products by demographic and behavioural predictor variables among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

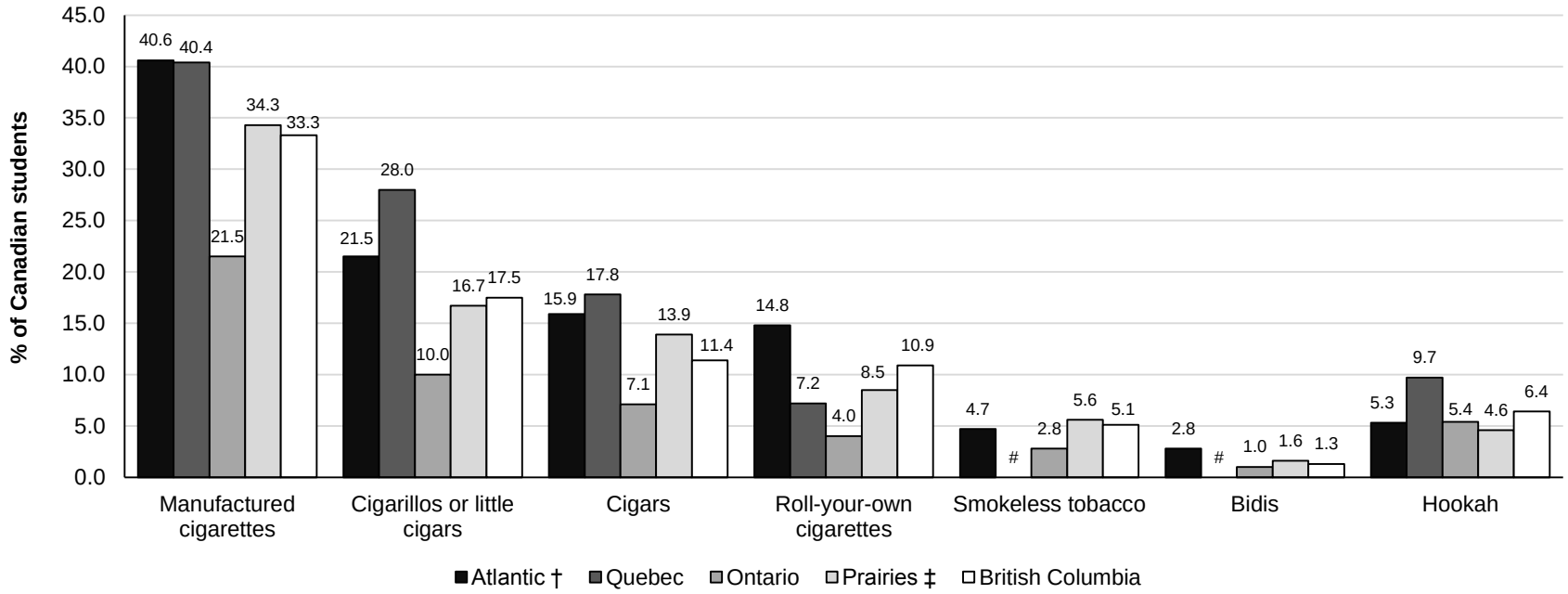
Parameters		Manufactured cigarettes	Cigars	Cigarillo or little cigars	Roll-your-own cigarettes	Smokeless tobacco	Bidis	Hookah
		% of students						
Gender	Female	10.7	2.6	4.2	2.5	0.7	0.3*	1.7
	Male	11.6	5.6	8.3	4.3	2.6	0.8	3.2
Grade	9	9.8	3.7	5.5	2.9	1.3	0.6	1.8
	10	12.3	4.5	7.0	3.9	2.0	0.6	3.0
Disposable income	Zero	8.5	2.1	3.1	1.8	0.7*	#	1.0*
	$1 to $20	9.7	3.1	5.9	3.0	1.2	#	1.9
	$21 to $40	13.8	5.0	8.5	4.7	1.5	#	5.0
	$41 to $100	16.4	3.9	6.3	3.2	2.3*	#	2.8*
	More than $100	18.1	11.8	15.4	7.4	5.3	3.1	5.5
	I do not know how much money I get each week	7.8	3.8	3.8	2.6	#	#	#
Parents who smoke	Yes	18.7	6.0	9.8	6.5	2.6	1.1	3.2
	No / I don't know	6.4	2.9	4.0	1.4	1.0	0.2	1.9
Siblings who smoke	Yes	28.3	10.4	14.6	10.8	3.5	2.4	6.1
	No / I don't know / I don't have any brothers or sisters	7.6	2.8	4.5	1.8	1.3	0.2	1.6
Friends who smoke	None	1.7	0.7	1.1	0.3*	0.5	#	0.8
	1 or 2 friends	10.9	3.5	7.8	1.7	2.2	#	2.3
	3 or more friends	43.3	15.9	21.4	15.2	4.9	2.3	8.1
Smoking status	Currently smokes daily	100.0	39.7	53.3	53.9	16.0	9.8	22.5
	Currently smokes occasionally	100.0	26.8	37.2	28.6	6.8	#	11.9
	Formerly smoked	0.0	#	#	#	#	#	#
	Experimentally smokes (beginning)	100.0	18.2	29.7	9.6	4.9	#	9.1
	Experimentally smoked in the past	0.0	5.2	9.5	#	#	#	#
	Puffs	0.0	3.8	6.4	#	2.2*	#	2.5*
	Never tried	0.0	0.6	0.8	#	0.6	#	0.6*
Ever used flavoured tobacco products	Yes	45.9	18.1	26.6	15.6	7.4	2.3	10.6
	No	2.7	0.8	1.4	0.4	0.3*	#	0.5
Binge drinking status[a]	Non-binge drinker	3.1	0.9	1.3	0.7	0.5	0.2*	0.7
	Non-current binge drinker	11.6	2.3	6.3	2.1	1.2*	#	2.3
	Current binge drinker	36.4	17.1	21.7	13.1	6.1	1.9	8.7
Marijuana use status[b]	Non-marijuana user	2.1	0.6	1.1	0.3	0.4	#	0.4*
	Non-current marijuana user	21.5	5.7	10.2	4.0	1.7*	#	#
	Current marijuana user	45.1	19.2	27.8	17.6	7.1	2.9	12.7

* Moderate sampling variability; interpret with caution

Data suppressed due to high sampling variability

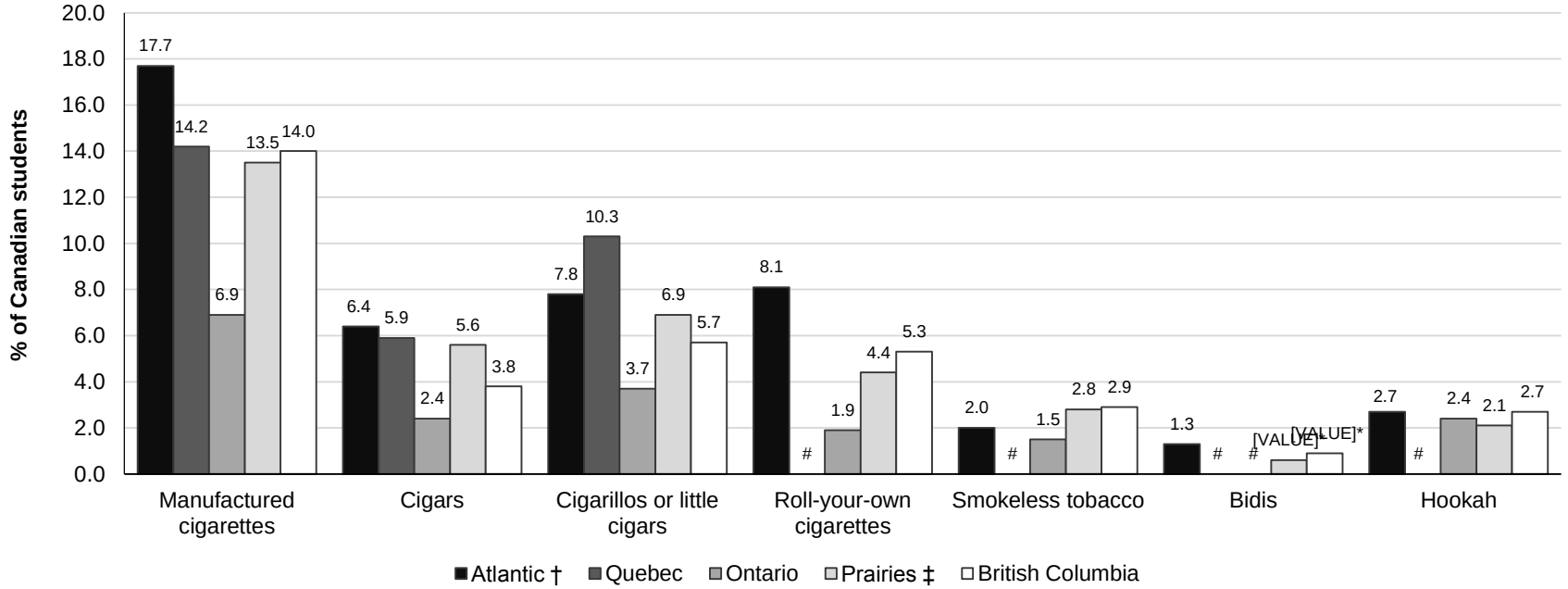
[a] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.

[b] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.



Data suppressed due to high sampling variability
† Atlantic region includes Newfoundland and Labrador, Prince Edward Island, and Nova Scotia
‡ Prairie region includes Manitoba, Saskatchewan, and Alberta

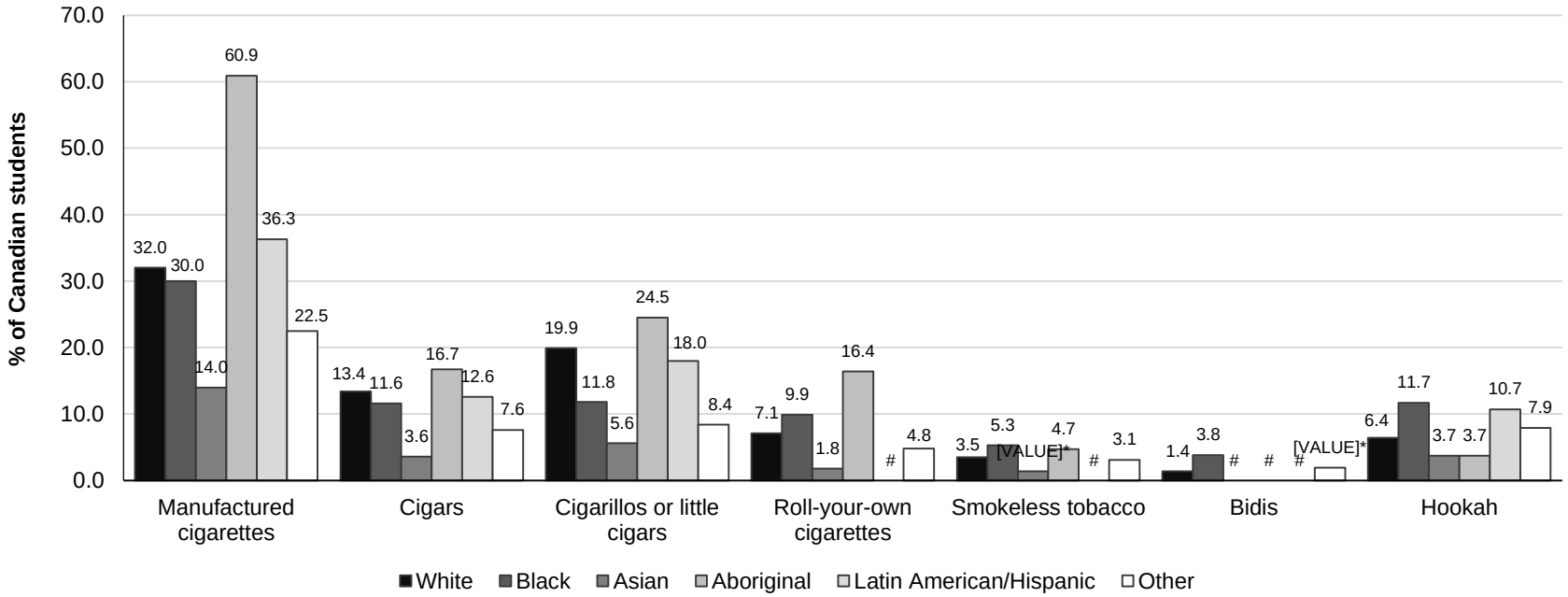
Figure 7: Prevalence of ever use of various tobacco products among Canadian students (grades 9 and 10), by region, 2010-11 Youth Smoking Survey, Canada.



* Moderate sampling variability; interpret with caution
\# Data suppressed due to high sampling variability
† Atlantic region includes Newfoundland and Labrador, Prince Edward Island, and Nova Scotia
‡ Prairie region includes Manitoba, Saskatchewan, and Alberta

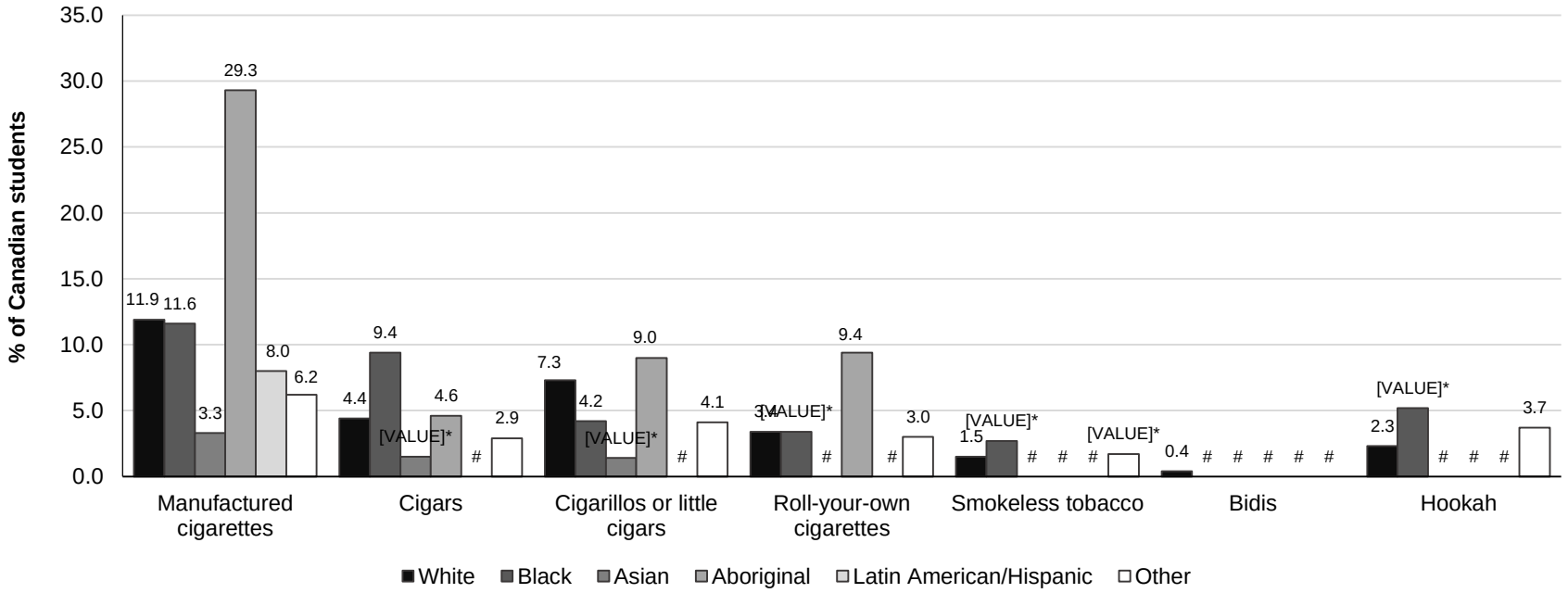
Figure 8: Prevalence of current use of various tobacco products among Canadian students (grades 9 and 10), by region, 2010-11

Youth Smoking Survey, Canada



§ Respondents were able to select more than one answer
* Moderate sampling variability; interpret with caution
# Data suppressed due to high sampling variability

Figure 9: Prevalence of ever use of various tobacco products among Canadian students (grades 9 and 10), by self-reported ethnicity[§], 2010-11 Youth Smoking Survey, Canada.



§ Respondents were able to select more than one answer
* Moderate sampling variability; interpret with caution
# Data suppressed due to high sampling variability

Figure 10: Prevalence of current use of various tobacco products among Canadian students (grades 9 and 10), by self-reported ethnicity[§], 2010-11 Youth Smoking Survey, Canada

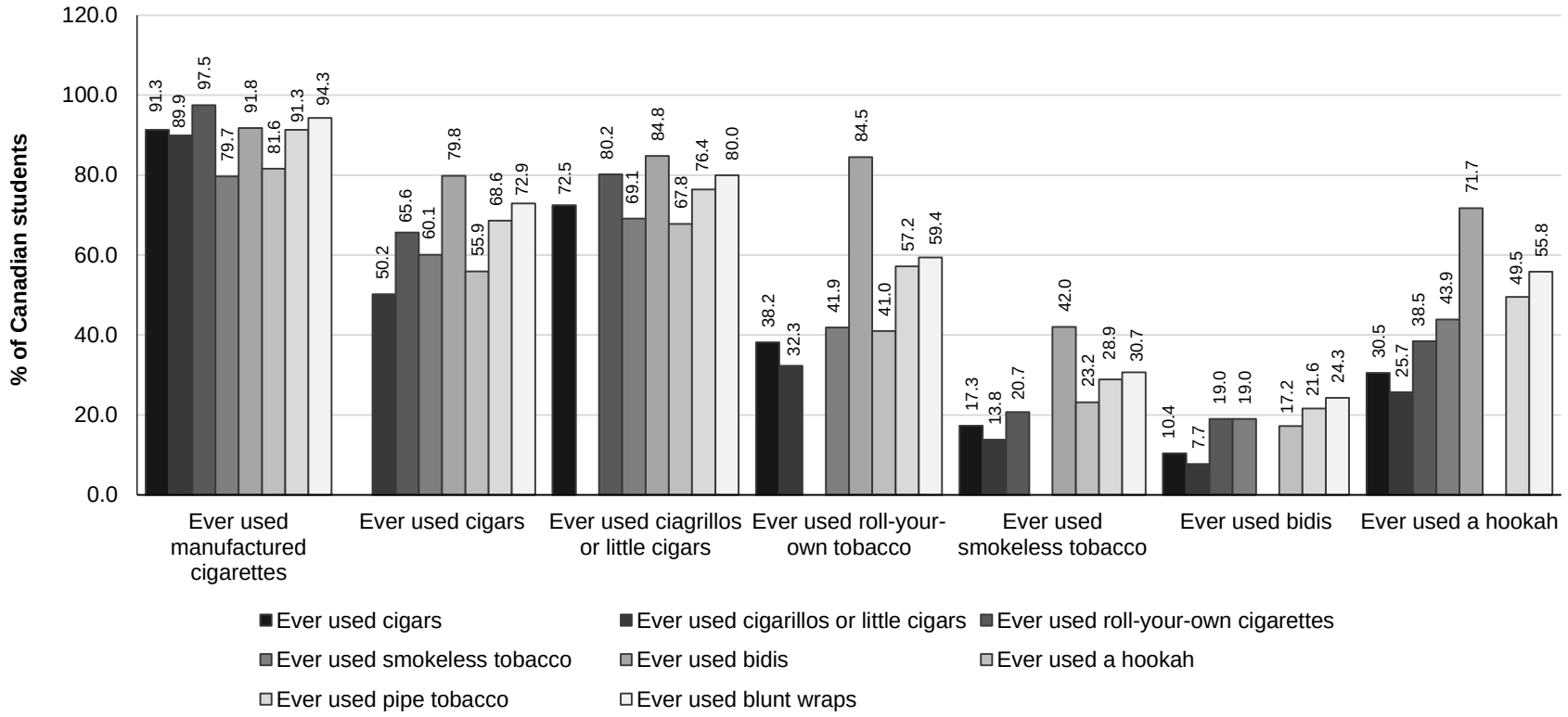


Figure 11: Prevalence of ever use of various tobacco products among Canadian students (grades 9 and 10), by alternative tobacco product, 2010-11 Youth Smoking Survey, Canada

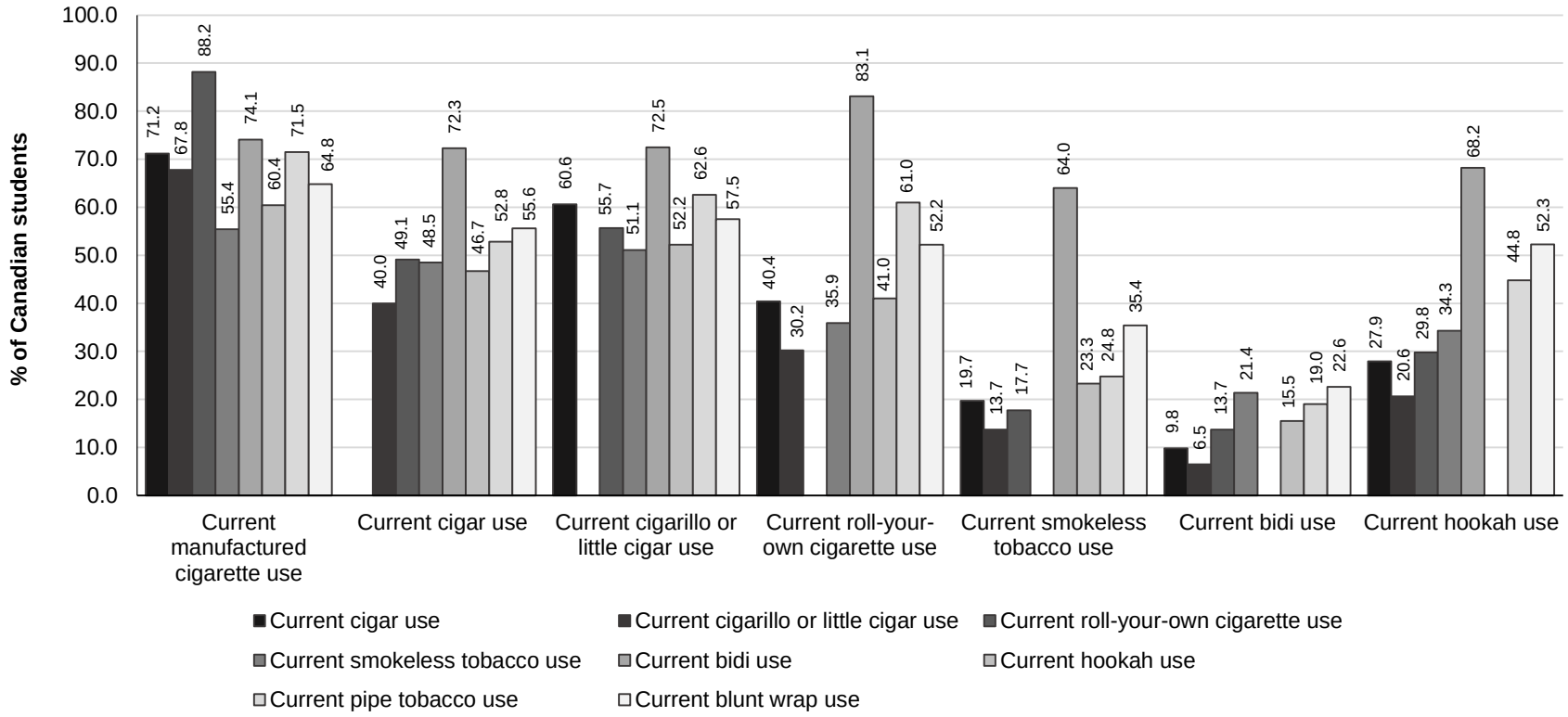


Figure 12: Prevalence of current use of various tobacco products among Canadian students (grades 9 and 10), by alternative tobacco product, 2010-11 Youth Smoking Survey, Canada

6.1.2 Descriptive results for ever and current use of cigarillos or little cigars among Canadian students (grades 9 and 10)

An estimated 126,200 Canadian students in grades 9 and 10 reported having ever used cigarillos or little cigars, representing a prevalence rate of 17.0% (as shown in Figure 6). Table 2 provides weighted results of the descriptive statistics for cigarillo or little cigar ever use among Canadian students in grades 9 and 10. More male students reported having ever used cigarillos or little cigars compared to female students (χ^2=51.1, df=1, p<0.001), and more students in grade 10 reported having ever used cigarillos or little cigars compared to students in grade 9 (χ^2=106.7, df=1, p<0.001). Furthermore, ever use of cigarillos or little cigars was higher among students with a higher disposable income (χ^2=319.1, df=5, p<0.001), with parents who smoked (χ^2=305.3, df=1, p<0.001), with siblings who smoked (χ^2=478.4, df=1, p<0.001), or with friends who smoked (χ^2=2089.7, df=2, p<0.001). Finally, ever use of cigarillos or little cigars was higher among students who currently smoked manufactured cigarettes (χ^2=5996.1, df=6, p<0.001), who reported using flavoured tobacco (χ^2=6077.1, df=1, p<0.001), who reported binge drinking (χ^2=2846.3, df=2, p<0.001), or who reported using marijuana (χ^2=4172.2, df=2, p<0.001).

An estimated 45,800 Canadian students in grades 9 and 10 reported currently using cigarillos or little cigars, representing a prevalence rate of 6.3% (as shown in Figure 6) Table 3 provides weighted results of the descriptive statistics for current cigarillo or little cigar use among Canadian students in grades 9 and 10. More male students reported currently using cigarillos or little cigars compared to female students (χ^2=99.3, df=1, p<0.001), and more students in grade 10 reported currently using cigarillos or little cigars compared to students in grade 9 (χ^2=13.9, df=1, p<0.001). Furthermore, current use of cigarillos or little cigars was higher among students with a higher disposable income (χ^2=250.6, df=5, p<0.001), with

parents who smoked (χ^2=192.9, df=1, p<0.001), with siblings who smoked (χ^2=352.7, df=1, p<0.001), or with friends who smoked (χ^2=1428.0, df=2, p<0.001). Finally, current use of cigarillos or little cigars was higher among students who currently smoked manufactured cigarettes (χ^2=3504.5, df=6, p<0.001), who reported using flavoured tobacco (χ^2=2406.8, df=1, p<0.001), who reported binge drinking (χ^2=1362.1, df=2, p<0.001), or who reported using marijuana (χ^2=2213.8, df=2, p<0.001).

As indicated in Figure 7 and Figure 8, among grades 9 and 10 students in Canada, Quebec had the highest prevalence of reported ever use and current use of cigarillos or little cigars, while Ontario had the lowest prevalence. Additionally, Figure 9 and Figure 10 illustrate that the highest prevalence of students in grades 9 and 10 who reported having ever used or currently using cigarillos or little cigars described themselves as Aboriginal, while the lowest prevalence described themselves as Asian. Figure 11 confirms that most students in grades 9 and 10 who reported having ever used other ATPs also reported having ever used cigarillos or little cigars. Similarly, Figure 12 confirms that many students in grades 9 and 10 who reported currently using other ATPs, most notably bidis, also reported currently using cigarillos or little cigars.

6.1.3 Descriptive results for ever and current use of cigars among Canadian students (grades 9 and 10)

An estimated 87,500 Canadian students in grades 9 and 10 reported having ever used cigars, representing a prevalence rate of 11.8% (as shown in Figure 6). Table 2 provides weighted results of the descriptive statistics for cigar ever use among Canadian students in grades 9 and 10. More male students reported having ever used cigars compared to female students (χ^2=78.8, df=1, p<0.001), and more students in grade 10 reported having ever used cigars compared to students in grade 9 (χ^2=51.1, df=1, p<0.001).

Furthermore, ever use of cigars was higher among students with a higher disposable income (χ^2=162.1, df=5, p<0.001), with parents who smoked (χ^2=227.3, df=1, p<0.001), with siblings who smoked (χ^2=444.5, df=1, p<0.001), or with friends who smoked (χ^2=1723.2, df=2, p<0.001). Finally, ever use of cigars was higher among students who currently smoked manufactured cigarettes (χ^2=4209.3, df=6, p<0.001), who reported using flavoured tobacco (χ^2=3941.2, df=1, p<0.001), who reported binge drinking (χ^2=2311.5, df=2, p<0.001), or who reported using marijuana (χ^2=3336.0, df=2, p<0.001).

An estimated 30,200 Canadian students in grades 9 and 10 reported currently using cigars, representing a prevalence rate of 4.2% (as shown in Figure 6). Table 3 provides weighted results of the descriptive statistics for current cigar use among Canadian students in grades 9 and 10. More male students reported currently using cigars compared to female students (χ^2=81.0, df=1, p<0.001), and more students in grade 10 reported currently using cigars compared to students in grade 9 (χ^2=4.8, df=1, p<0.05). Furthermore, current use of cigars was higher among students with a higher disposable income (χ^2=222.7, df=5, p<0.001), with parents who smoked (χ^2=83.3, df=1, p<0.001), with siblings who smoked (χ^2=296.5, df=1, p<0.001), or with friends who smoked (χ^2=1187.8, df=2, p<0.001). Finally, current use of cigars was higher among students who currently smoked manufactured cigarettes (χ^2=2615.5, df=6, p<0.001), who reported using flavoured tobacco (χ^2=1669.4, df=1, p<0.001), who reported binge drinking (χ^2=1317.0, df=2, p<0.001), or who reported using marijuana (χ^2=1560.5, df=2, p<0.001).

As indicated in Figure 7, among grades 9 and 10 students in Canada, Quebec had the highest prevalence of reported ever use of cigars, while Ontario had the lowest prevalence. Figure 8 indicates that in Canada, the Atlantic region had the highest prevalence of reported current use of cigars, while Ontario had the lowest prevalence.

Additionally, Figure 9 illustrates that the highest prevalence of students in grades 9 and 10 who reported having ever used cigars described themselves as Aboriginal, while the lowest prevalence described themselves as Asian. Figure 10 illustrates that the highest prevalence of students in grades 9 and 10 who reported currently using cigars described themselves as Black, while the lowest prevalence described themselves as Asian. Figure 11 confirms that most students in grades 9 and 10 who reported having ever used other ATPs also reported having ever used cigars. Similarly, Figure 12 confirms that many students in grades 9 and 10 who reported currently using other ATPs, most notably bidis, also reported currently using cigars.

6.1.4 Descriptive results for ever and current use of roll-your-own cigarettes among Canadian students (grades 9 and 10)

An estimated 50,900 Canadian students in grades 9 and 10 reported having ever used RYO cigarettes, representing a prevalence rate of 6.9% (as shown in Figure 6). Table 2 provides weighted results of the descriptive statistics for RYO ever use among Canadian students in grades 9 and 10. More male students reported having ever used RYO cigarettes compared to female students (χ^2=16.5, df=1, p<0.001), and more students in grade 10 reported having ever used RYO cigarettes compared to students in grade 9 (χ^2=27.0, df=1, p<0.001). Furthermore, RYO ever use was higher among students with a higher disposable income (χ^2=159.8, df=5, p<0.001), with parents who smoked (χ^2=305.4, df=1, p<0.001), with siblings who smoked (χ^2=543.2, df=1, p<0.001), or with friends who smoked (χ^2=2285.0, df=2, p<0.001). Finally, RYO ever use was higher among students who currently smoked manufactured cigarettes (χ^2=5316.9, df=6, p<0.001), who reported using flavoured tobacco (χ^2=2867.4, df=1, p<0.001), who reported binge drinking (χ^2=1310.1, df=2, p<0.001), or who reported using marijuana (χ^2=2620.6, df=2, p<0.001).

An estimated 24,900 Canadian students in grades 9 and 10 reported currently using RYO cigarettes, representing a prevalence rate of 3.4% (as shown in Figure 6). Table 3 provides weighted results of the descriptive statistics for current RYO use among Canadian students in grades 9 and 10. More male students reported currently using RYO cigarettes compared to female students (χ^2=34.1, df=1, p<0.001), and more students in grade 10 reported currently using RYO cigarettes compared to students in grade 9 (χ^2=11.0, df=1, p<0.001). Furthermore, current RYO use was higher among students with a higher disposable income (χ^2=96.8, df=5, p<0.001), with parents who smoked (χ^2=274.1, df=1, p<0.001), with siblings who smoked (χ^2=510.6, df=1, p<0.001), or with friends who smoked (χ^2=1411.1, df=2, p<0.001). Finally, RYO current use was higher among students who currently smoked manufactured cigarettes (χ^2=4547.7, df=6, p<0.001), who reported using flavoured tobacco (χ^2=1563.4, df=1, p<0.001), who reported binge drinking (χ^2=940.6, df=2, p<0.001), or who reported using marijuana (χ^2=1650.5, df=2, p<0.001).

As indicated in Figure 7 and Figure 8, among grades 9 and 10 students in Canada, the Atlantic region had the highest prevalence of reported ever use and current use of RYO cigarettes, while Ontario had the lowest prevalence. Additionally, Figure 9 illustrates that the highest prevalence of students in grades 9 and 10 who reported having ever used RYO cigarettes described themselves as Aboriginal, while the lowest prevalence described themselves as Asian. Figure 10 illustrates that the highest prevalence of students in grades 9 and 10 who reported currently using RYO cigarettes described themselves as Aboriginal, while the lowest prevalence described themselves as other. Figure 11 confirms that many students in grades 9 and 10 who reported having ever used other ATPs, most notably bidis, also reported having ever used RYO cigarettes. Similarly, Figure 12 confirms that many

students in grades 9 and 10 who reported currently using other ATPs, most notably bidis, also reported currently using RYO cigarettes.

6.1.5 Descriptive results for ever and current use of smokeless tobacco among Canadian students (grades 9-10)

An estimated 25,200 Canadian students in grades 9 and 10 reported having ever used SLT, representing a prevalence rate of 3.4% (as shown in Figure 6). Table 2 provides weighted results of the descriptive statistics for SLT ever use among Canadian students in grades 9 and 10. More male students reported having ever used SLT compared to female students (χ^2=173.5, df=1, p<0.001), and more students in grade 10 reported having ever used SLT compared to students in grade 9 (χ^2=35.3, df=1, p<0.001). Furthermore, SLT ever use was higher among students with a higher disposable income (χ^2=105.9, df=5, p<0.001), with parents who smoked (χ^2=34.0, df=1, p<0.001), with siblings who smoked (χ^2=52.3, df=1, p<0.001), or with friends who smoked (χ^2=433.9, df=2, p<0.001). Finally, SLT ever use was higher among students who currently smoked manufactured cigarettes (χ^2=1128.2, df=6, p<0.001), who reported using flavoured tobacco (χ^2=1241.1, df=1, p<0.001), who reported binge drinking (χ^2=690.2, df=2, p<0.001), or who reported using marijuana (χ^2=727.5, df=2, p<0.001).

An estimated 12,300 Canadian students in grades 9 and 10 reported currently using SLT, representing a prevalence rate of 1.7% (as shown in Figure 6). Table 3 provides weighted results of the descriptive statistics for current SLT use among Canadian students in grades 9 and 10. More male students reported currently using SLT compared to female students (χ^2=82.8, df=1, p<0.001), and more students in grade 10 reported currently using SLT compared to students in grade 9 (χ^2=12.1, df=1, p<0.001). Furthermore, current use of SLT was higher among students with a higher disposable income (χ^2=123.7, df=5, p<0.001),

with parents who smoked (χ^2=50.2, df=1, p<0.001), with siblings who smoked (χ^2=61.4, df=1, p<0.001), or with friends who smoked (χ^2=258.0, df=2, p<0.001). Finally, current SLT use was higher among students who currently smoked manufactured cigarettes (χ^2=712.4, df=6, p<0.001), who reported using flavoured tobacco (χ^2=678.1, df=1, p<0.001), who reported binge drinking (χ^2=380.4, df=2, p<0.001), or who reported using marijuana (χ^2=492.3, df=2, p<0.001).

As indicated in Figure 7, among grades 9 and 10 students in Canada, the Prairie region had the highest prevalence of reported ever use of SLT, while Ontario had the lowest prevalence. Figure 8 indicates that in Canada, British Columbia had the highest prevalence of reported current use of SLT, while Ontario had the lowest prevalence. Additionally, Figure 9 illustrates that the highest prevalence of students in grades 9 and 10 who reported having ever used SLT described themselves as Black, while the lowest prevalence described themselves as Asian. Figure 10 illustrates that the highest prevalence of students in grades 9 and 10 who reported currently using SLT described themselves as Black, while the lowest prevalence described themselves as White. Figure 11 confirms that some students in grades 9 and 10 who reported having ever used other ATPs, most notably bidis, also reported having ever used SLT. Similarly, Figure 12 confirms that some students in grades 9 and 10 who reported currently using other ATPs, most notably bidis, also reported currently using SLT.

6.1.6 Descriptive results for ever and current use of bidis among Canadian students (grades 9 and 10)

An estimated 11,400 Canadian students in grades 9 and 10 reported having ever used bidis, representing a prevalence rate of 1.5% (as shown in Figure 6). Table 2 provides weighted results of the descriptive statistics for bidi ever use among Canadian students in

grades 9 and 10. More male students reported having ever used bidis compared to female students (χ^2=65.6, df=1, p<0.001), and more students in grade 10 reported having ever used bidis compared to students in grade 9 (χ^2=4.4, df=1, p<0.05). Furthermore, bidi ever use was higher among students with a higher disposable income (χ^2=110.8, df=5, p<0.001), with parents who smoked (χ^2=76.8, df=1, p<0.001), with siblings who smoked (χ^2=229.4, df=1, p<0.001), or with friends who smoked (χ^2=485.3, df=2, p<0.001). Finally, bidi ever use was higher among students who currently smoked manufactured cigarettes (χ^2=1690.9, df=6, p<0.001), who reported using flavoured tobacco (χ^2=612.4, df=1, p<0.001), who reported binge drinking (χ^2=302.4, df=2, p<0.001), or who reported using marijuana (χ^2=746.6, df=2, p<0.001).

An estimated 4,100 Canadian students in grades 9 and 10 reported currently using bidis, representing a prevalence rate of 0.6% (as shown in Figure 6). Table 3 provides weighted results of the descriptive statistics for current bidi use among Canadian students in grades 9 and 10. More male students reported currently using bidis compared to female students (χ^2=15.3, df=1, p<0.001); however, current bidi use did not vary across grade (χ^2=0.0, df=1, p>0.05). Ever use of bidis was higher among students with a higher disposable income (χ^2=171.1, df=5, p<0.001), with parents who smoked (χ^2=45.5, df=1, p<0.001), with siblings who smoked (χ^2=186.5, df=1, p<0.001), or with friends who smoked (χ^2=179.0, df=2, p<0.001). Finally, current bidi use was higher among students who currently smoked manufactured cigarettes (χ^2=709.7, df=6, p<0.001), who reported using flavoured tobacco (χ^2=197.1, df=1, p<0.001), who reported binge drinking (χ^2=112.2, df=2, p<0.001), or who reported using marijuana (χ^2=305.9, df=2, p<0.001).

As indicated in Figure 7, among grades 9 and 10 students in Canada, the Atlantic region had the highest prevalence of reported ever use of bidis, while Ontario had the lowest

prevalence. Figure 8 indicates that in Canada, the Atlantic region had the highest prevalence of reported current use of bidis, while the Prairie region had the lowest prevalence. Additionally, Figure 9 illustrates that the highest prevalence of students in grades 9 and 10 who reported having ever used bidis described themselves as Black, while the lowest prevalence described themselves as White. Figure 10 illustrates that the prevalence of bidi current use was low across reported ethnicities. Figure 11 indicates that few students in grades 9 and 10 who reported having ever used other ATPs also reported having ever used bidis. Similarly, Figure 12 illustrates that few students in grades 9 and 10 who reported currently using other ATPs also reported currently using bidis.

6.1.7 Descriptive results for ever and current use of a hookah among Canadian students (grades 9 and 10)

An estimated 47,800 Canadian students in grades 9 and 10 reported having ever used a hookah, representing a prevalence rate of 6.5% (as shown in Figure 6). Table 2 provides weighted results of the descriptive statistics for hookah ever use among Canadian students in grades 9 and 10. More male students reported having ever used a hookah compared to female students (χ^2=16.5, df=1, p<0.001), and more students in grade 10 reported having ever used a hookah compared to students in grade 9 (χ^2=26.9, df=1, p<0.001). Furthermore, ever use of a hookah was higher among students with a higher disposable income (χ^2=78.3, df=5, p<0.001), with parents who smoked (χ^2=26.9, df=1, p<0.001), with siblings who smoked (χ^2=289.3, df=1, p<0.001), or with friends who smoked (χ^2=853.6, df=2, p<0.001). Finally, ever use of a hookah was higher among students who currently smoked manufactured cigarettes (χ^2=2108.9, df=6, p<0.001), who reported using flavoured tobacco (χ^2=2153.8, df=1, p<0.001), who reported binge drinking (χ^2=935.2, df=2, p<0.001), or who reported using marijuana (χ^2=2070.9, df=2, p<0.001).

An estimated 18,100 Canadian students in grades 9 and 10 reported currently using a hookah, representing a prevalence rate of 2.5% (as shown in Figure 6). Table 3 provides weighted results of the descriptive statistics for current use of a hookah among Canadian students in grades 9 and 10. More male students reported currently using a hookah compared to female students (χ^2=32.1, df=1, p<0.001), and more students in grade 10 reported currently using a hookah compared to students in grade 9 (χ^2=19.6, df=1, p<0.001). Furthermore, current use of a hookah was higher among students with a higher disposable income (χ^2=146.9, df=5, p<0.001), with parents who smoked (χ^2=23.9, df=1, p<0.001), with siblings who smoked (χ^2=174.2, df=1, p<0.001), or with friends who smoked (χ^2=462.8, df=2, p<0.001). Finally, current use of a hookah was higher among students who currently smoked manufactured cigarettes (χ^2=1152.4, df=6, p<0.001), who reported using flavoured tobacco (χ^2=939.4, df=1, p<0.001), who reported binge drinking (χ^2=507.9, df=2, p<0.001), or who reported using marijuana (χ^2=1111.8, df=2, p<0.001).

As indicated in Figure 7, among grades 9 and 10 students in Canada, Quebec had the highest prevalence of reported ever use of a hookah, while the Prairie region had the lowest prevalence. Figure 8 indicates that in Canada, the Atlantic region and British Columbia had the highest prevalence of reported current use of a hookah, while the Prairie region had the lowest prevalence. Additionally, Figure 9 illustrates that the highest prevalence of students in grades 9 and 10 who reported having ever used a hookah described themselves as Black, while the lowest prevalence described themselves as Asian or Aboriginal. Figure 10 illustrates that the highest prevalence of students in grades 9 and 10 who reported currently using a hookah described themselves as Black, while the lowest prevalence described themselves as White. Figure 11 confirms that many students in grades 9 and 10 who reported having ever used other ATPs, most notably bidis, also

reported having ever used a hookah. Similarly, Figure 12 confirms that many students in grades 9 and 10 who reported currently using other ATPs, most notably bidis, also reported currently using a hookah.

6.2 Descriptive results for relevant school-level characteristics

The following sections outline the descriptive results for the school senior smoking rate among students in grades 11 and 12, the school geographic classification, the tobacco retailer density, and the neighbourhood household income. A total of 139 schools with senior students (grades 11 or 12) were identified and included when calculating the overall average school senior student tobacco use rate. This overall rate was then used to classify schools as low or high risk. The final sample contained a total of 134 secondary schools, as defined according to the YSS Microdata User Guide (University of Waterloo, 2011), that included junior students (grades 9 or 10).

6.2.1 Descriptive results for the school senior student tobacco use rate (grades 11 and 12)

Table 4 provides a summary of the calculated school senior student tobacco use rates based on the number of current tobacco users in grades 11 and 12 at each school. Current manufactured cigarette users had smoked at least 100 cigarettes in their lifetime and smoked at least one whole cigarette during the past 30 days; all other current tobacco users had used the respective tobacco product at least once during the past 30 days. With the exception of bidis, over half of schools sampled had senior students that reported currently using each tobacco product. The mean school senior student tobacco use rate ranged from a low of 2.2% (±1.8%) of senior students currently using bidis to a high of 15.6% (±11.0%) of senior students currently using manufactured cigarettes.

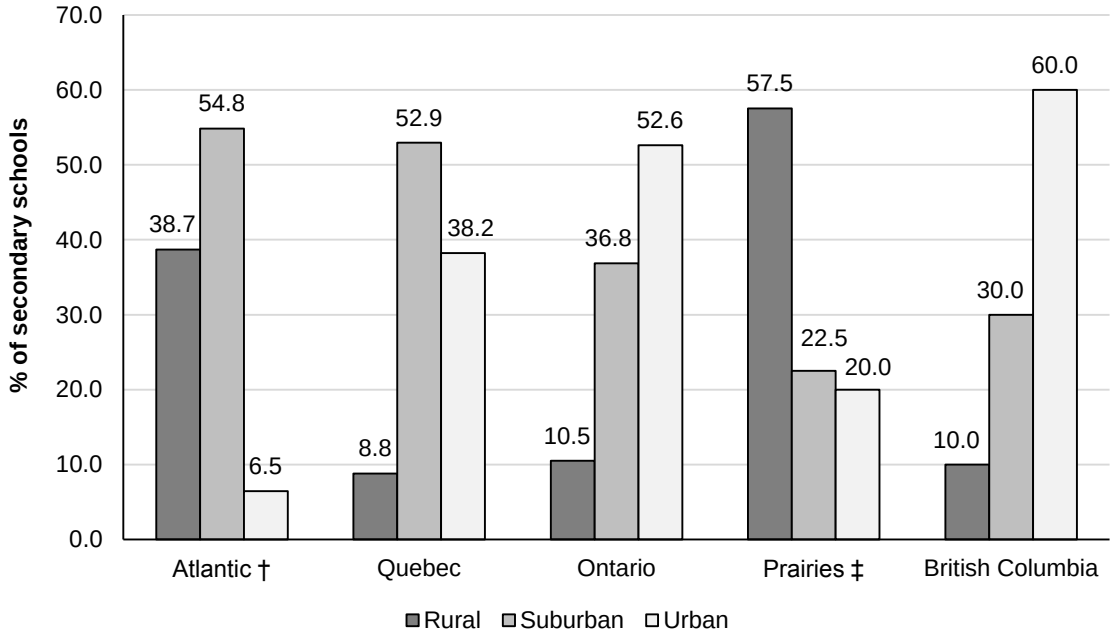
Table 4: Summary of school senior student tobacco use rates (grades 11 and 12), 2010-11 Youth Smoking Survey, Canada

Tobacco product	Percent of schools with senior current users[a]	Senior student tobacco use rate (%)[b]		
		Mean (Std. Dev.)	Minimum	Maximum
Manufactured cigarettes	90.6	15.6 (±11.0)	1.9	100.0
Cigars	78.4	9.7 (±10.5)	1.0	100.0
Cigarillos or little cigars	90.6	12.1 (±6.9)	1.7	33.3
Roll-your-own cigarettes	75.5	7.1 (±4.5)	0.5	20.4
Smokeless tobacco	59.7	5.9 (±5.0)	0.2	27.3
Bidis	43.9	2.2 (±1.8)	0.4	9.1
Hookah	66.2	5.5 (±4.0)	0.7	28.6

[a] 139 schools were identified with senior students (grades 11 or 12). Current manufactured cigarette users had smoked at least 100 cigarettes in their lifetime and smoked at least one whole cigarette during the past 30 days; all other current tobacco users had used the respective tobacco product at least once during the past 30 days.
[b] Excludes schools with no senior current users

6.2.2 Descriptive results for the school geographic classification

Figure 13 presents the proportion of secondary schools classified as rural, suburban, or urban, by region. Overall, 30.6% of secondary schools were classified as rural, 40.3% as suburban, and 29.1% as urban. A higher number of schools were classified as urban in Ontario and British Columbia, while a higher number of schools were classified as rural in the Prairie and the Atlantic regions (χ^2=40.2, df=8, p<0.001). The Prairie region had the largest proportion of secondary schools classified as rural, while Quebec had the smallest. The Atlantic region had the largest proportion of secondary schools classified as suburban, while the Prairie region had the smallest. Finally, British Columbia had the largest proportion of secondary schools classified as urban, while the Atlantic region had the smallest.



[a] Based on data from 134 secondary schools
† Atlantic region includes Newfoundland and Labrador, Prince Edward Island, and Nova Scotia
‡ Prairie region includes Manitoba, Saskatchewan, and Alberta

Figure 13: Proportion of schools[a] in each geographic classification, by region, 2010-11 Youth Smoking Survey, Canada

6.2.3 Descriptive results for tobacco retailer density

Table 5 indicates that the average secondary school had 2.9 (±4.5) tobacco retailers within a 1km radius, with a maximum of 39 tobacco retailers within a 1km radius. Tobacco stores, tobacco & tobacco product wholesalers, other gasoline stations, and convenience stores were all assumed to sell tobacco products. Overall, 29.9% of secondary schools did not have any tobacco retailers within a 1km radius of the school, with a range of 10.0% of schools in British Columbia to 51.6% of schools in the Atlantic region. The mean tobacco retailer density did not vary significantly across region ($F(4,129)=1.28$, $p>0.05$).

Table 5: Summary of tobacco retailer density within 1km of secondary schools, by region, 2010-11 Youth Smoking Survey, Canada.

Region	Percent of schools with no tobacco retailers	Tobacco retailer density		
		Mean (Std. Dev.)	Minimum	Maximum
Overall (N=134)	29.9 (N=40)	2.9 (±4.5)	0	39
Atlantic† (N=31)	51.6 (N=16)	1.4 (±2.2)	0	9
Quebec (N=34)	32.4 (N=11)	3.4 (±7.3)	0	39
Ontario (N=19)	15.8 (N=3)	3.5 (±2.9)	0	10
Prairies‡ (N=40)	22.5 (N=9)	2.9 (±2.8)	0	13
British Columbia (N=10)	10.0 (N=1)	4.3 (±5.0)	0	16

† Atlantic region includes Newfoundland and Labrador, Prince Edward Island, and Nova Scotia
‡ Prairie region includes Manitoba, Saskatchewan, and Alberta

Table 6 indicates that the mean tobacco retailer density was lower for secondary schools in rural and suburban areas compared to secondary schools in urban areas. In fact, the mean tobacco retailer density varied significantly across geographic classification ($F(2,131)=5.11$, $p<0.01$); schools in urban areas, on average, had significantly more tobacco retailers than schools in suburban or rural areas.

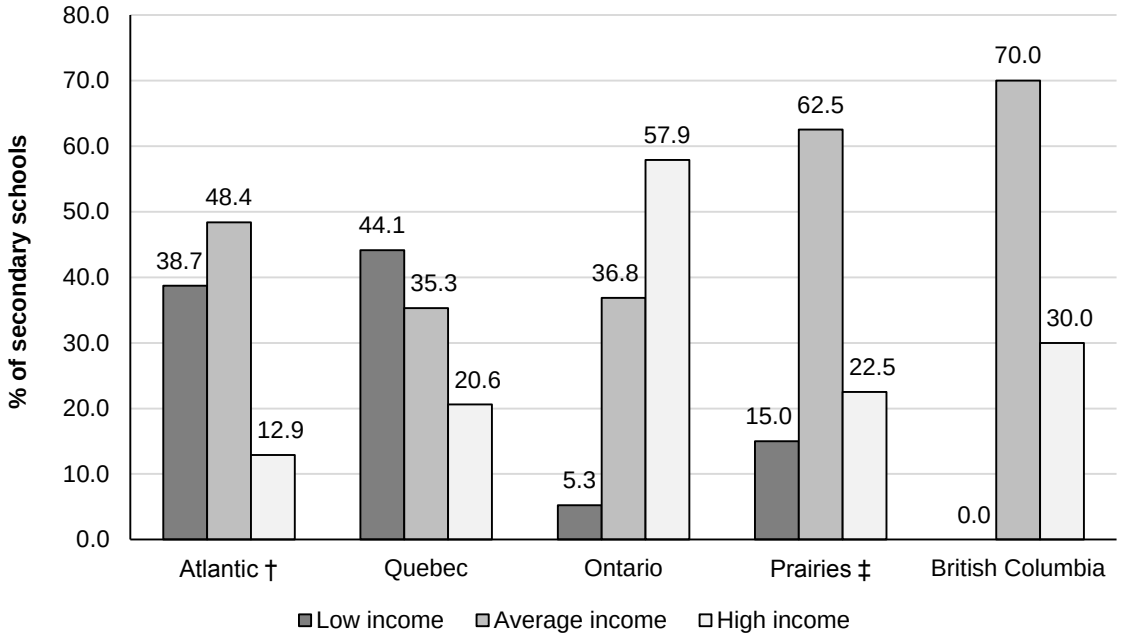
Table 6: Summary of tobacco retailer density within 1km of secondary schools, by geographic classification, 2010-11 Youth Smoking Survey, Canada.

Geographic classification	Percent of schools with no tobacco retailers	Tobacco retailer density		
		Mean (Std. Dev.)	Minimum	Maximum
Overall (N=134)	29.9 (N=40)	2.9 (±4.5)	0	39
Rural (N=41)	39.0 (N=16)	2.0 (±2.7)	0	13
Suburban (N=54)	29.6 (N=16)	2.2 (±2.5)	0	10
Urban (N=39)	20.5 (N=8)	4.7 (±7.0)	0	39

6.2.4 Descriptive results for neighbourhood household income

The mean household income in neighbourhoods surrounding secondary schools was $49,663.33 (±$16,871.19), with a minimum of $0.00, a lower quartile of $40,391.00, an upper quartile of $55,368.00, and a maximum of $172,016.00. Three household income

categories were created: low income schools were in neighbourhoods where the median household income was less than or equal to $40,391.00, average income schools were in neighbourhoods where the median household income was between $40,392.00 and $55,367.00, and high income schools were in neighbourhoods where the median household income was greater than or equal to $55,368.00. Figure 14 presents the proportion of secondary schools in each income level for each region. Overall, 25.4% of secondary schools were classified as low income, 49.3% as average income, and 25.4% as high income. A higher number of schools were classified as high income in Ontario, while a higher number of schools were classified as low income in Quebec and the Atlantic region (χ^2=28.7, df=8, p<0.001). Quebec had the largest proportion of secondary schools classified as low income, while British Columbia had the smallest. British Columbia had the largest proportion of secondary schools classified as average income, while Quebec had the smallest. Finally, Ontario had the largest proportion of secondary schools classified as high income, while the Atlantic region had the smallest. The mean tobacco retailer density did not vary significantly across neighbourhood household income categories (results not shown; F(2,131)=1.46, p>0.05).



[a] Based on data from 134 secondary schools
[b] Low income = median household income less than or equal to $40,391.00; average income = median household income between $40,392.00 and $55,367.00; high income = median household income greater than or equal to $55,368.00
† Atlantic region includes Newfoundland and Labrador, Prince Edward Island, and Nova Scotia
‡ Prairie region includes Manitoba, Saskatchewan, and Alberta

Figure 14: Proportion of secondary schools[a] in each income level[b], by region, 2010-11 Youth Smoking Survey, Canada

6.2.5 Intercorrelations among the school-level characteristics

Table 7 presents correlation statistics for the school-level characteristics examined and indicates that about half of the correlations were statistically significant and none of the school-level characteristics were strongly correlated with each other. Therefore, all school-level characteristics were included in the multilevel models.

Table 7: Intercorrelations among school-level characteristics[a]

	School's senior student tobacco use rate	Geographic classification	Tobacco retailer density	Neighbourhood household income
School's senior student tobacco use rate		**-0.32*** **	-0.08	-0.06
Geographic classification	**-0.32*** **		**0.23** **	**0.28*** **
Tobacco retailer density	-0.08	**0.23** **		0.02
Neighbourhood household income	-0.06	**0.28*** **	0.02	

[a] Based on data from 134 secondary schools
* p<0.05 **p<0.01 ***p<0.001

6.3 Multilevel regression model results for relevant school- and student-level characteristics associated with ever and current use of ATPs

The sections that follow present the intraclass correlation coefficients, the multilevel regression model results for school-level characteristics, and the multilevel regression model results for school- and student-level characteristics associated with ever and current use of various ATPs among grade 9 and 10 students in Canada. The final sample contained a total of 14,916 students in grades 9 and 10 from 134 secondary schools. Binge drinking and marijuana use responses were missing from one secondary school; this school was excluded only from the multilevel regression model results for school- and student-level factors associated with ever use of each ATP.

Table 8 presents a summary of the intraclass correlation coefficients for reported ever use of each ATP, while Table 9 presents a summary of the intraclass correlation coefficients for reported current use of each ATP. The intraclass correlation coefficients

were calculated using the formula shown in Figure 4. School-level differences accounted for between 11.6% and 24.4% of the variability in ATP ever use, and 14.1% and 31.2% of the variability in ATP current use.

Table 8: Intraclass correlation coefficients for ever use of various alternative tobacco products, among Canadian students (grades 9-10) and secondary schools[a], 2010-11 Youth Smoking Survey, Canada

Alternative tobacco product	$\sigma^2_{\mu 0}$	**Intraclass Correlation Coefficient**
Cigarillos or little cigars	0.432 (0.068)	0.116
Cigars	0.450 (0.081)	0.120
Roll-your-own cigarettes	0.578 (0.107)	0.149
Smokeless tobacco	1.060 (0.223)	0.244
Bidis	0.895 (0.224)	0.214
Hookah	0.528 (0.103)	0.138

[a] All models based on data from 134 secondary schools

Table 9: Intraclass correlation coefficients for current use of various alternative tobacco products, among Canadian students (grades 9-10) and secondary schools[a], 2010-11 Youth Smoking Survey, Canada

Alternative tobacco product	$\sigma^2_{\mu 0}$	**Intraclass Correlation Coefficient**
Cigarillos or little cigars	0.572 (0.109)	0.148
Cigars	0.539 (0.119)	0.141
Roll-your-own cigarettes	0.960 (0.195)	0.226
Smokeless tobacco	1.460 (0.332)	0.307
Bidis	1.494 (0.401)	0.312
Hookah	0.678 (0.162)	0.171

[a] All models based on data from 134 secondary schools

6.3.1 Factors associated with ever use of cigarillos or little cigars among grades 9 and 10 students in Canada

As shown in Table 8, between-school random variation in the odds a student ever used cigarillos or little cigars was identified [$\sigma^2_{\mu 0}$=0.432 (0.068)]; school-level differences accounted for 11.6% of the variability in cigarillo or little cigar ever use.

6.3.1.1 School-level characteristics associated with ever use of cigarillos or little cigars among grade 9 and 10 students in Canada

Table 10 presents adjusted odds ratios (AOR) for school-level characteristics associated with ever use of cigarillos or little cigars (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=6.80, df=8, p<0.001) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently smoked manufactured cigarettes were significantly more likely to report having ever used cigarillos or little cigars compared to students who attended a school with a low rate of senior students that currently smoked manufactured cigarettes (AOR 1.31, 95%CI 1.01 to 1.72). In addition, grades 9 and 10 students who attended schools in urban areas were significantly less likely to report having ever used cigarillos or little cigars relative to those who attended schools in rural areas (AOR 0.66, 95%CI 0.46 to 0.95).

Variables that were not significantly associated with cigarillo or little cigar ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student cigarillo or little cigar smoking rate, the tobacco retailer density, and the neighbourhood household income.

Table 10: Multilevel logistic regression models examining school-level characteristics associated with cigarillo or little cigar ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Cigarillo or little cigar ever use**	Model 2 **Cigarillo or little cigar current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	**1.31 (1.01, 1.72)***	**1.79 (1.21, 2.65)****
School's senior student cigarillo or little cigar smoking rate	Low	1.00	1.00
	High	1.22 (0.95, 1.55)	1.00 (0.70, 1.43)
Geographic classification	Rural	1.00	1.00
	Suburban	1.07 (0.77, 1.49)	1.02 (0.63, 1.65)
	Urban	**0.66 (0.46, 0.95)***	0.63 (0.37, 1.07)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	0.97 (0.72, 1.29)	0.90 (0.58, 1.38)
	3 or 4	1.00 (0.72, 1.40)	0.97 (0.59, 1.59)
	5 or more	0.90 (0.64, 1.26)	0.77 (0.47, 1.26)
Neighbourhood household income	Below average	1.00	1.00
	Average	0.96 (0.70, 1.32)	0.79 (0.49, 1.28)
	Above average	0.99 (0.69, 1.42)	0.85 (0.50, 1.45)

Model 1: 1 = Ever used cigarillos or little cigars (n=2,387), 0 = Never used cigarillos or little cigars (n=12,153); based on data from 134 secondary schools
Model 2: 1 = Currently uses cigarillos or little cigars (n=853), 0 = Does not currently use cigarillos or little cigars (n=13,442); based on data from 134 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
* p<0.05 **p<0.01 ***p<0.001

6.3.1.2 School- and student-level characteristics associated with ever use of cigarillos or little cigars among grades 9 and 10 students in Canada

Table 11 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with ever use of cigarillos or little cigars (Model 1) among grades 9 and 10 students in Canada. After controlling for province ($F=3.40$, $df=8$, $p<0.01$) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that smoked cigarillos or little cigars

were significantly more likely to report having ever used cigarillos or little cigars relative to students who attended a school with a low rate of senior students that smoked cigarillos or little cigars (AOR 1.40, 95%CI 1.03 to 1.91).

Model 1 illustrates that after controlling for province and adjusting for all other variables in the model, male students and grade 10 students were significantly more likely to report having ever used cigarillos or little cigars compared to female students and grade 9 students, respectively (AOR 1.42, 95%CI 1.21 to 1.65; and AOR 1.46, 95%CI 1.24 to 1.72, respectively). Compared to those who described themselves as White, students who described themselves as other, Aboriginal, or Black were significantly less likely to report having ever used cigarillos or little cigars (AOR 0.45, 95%CI 0.32 to 0.63; AOR 0.65, 95%CI 0.47 to 0.90; and AOR 0.43, 95%CI 0.27 to 0.67, respectively). Additionally, students who got between $1 and $20 (AOR 1.67, 95%CI 1.33 to 2.10), $21 and $40 (AOR 1.53, 95%CI 1.18 to 1.98), $41 and $100 (AOR 2.00, 95%CI 1.51 to 2.65), more than $100 (AOR 2.55, 95%CI 1.93 to 3.38), or who did not know how much money they got each week (AOR 2.70, 95%CI 2.03 to 3.59) were significantly more likely to report having ever used cigarillos or little cigars compared to students who did not get any money. Students with siblings that smoked manufactured cigarettes were significantly less likely to report having ever used cigarillos or little cigars relative to students without siblings that smoked (AOR 0.70, 95%CI 0.58 to 0.85), whereas students with 1 or 2 friends that smoked manufactured cigarettes were significantly more likely to report having ever used cigarillos or little cigars relative to students with no friends that smoked (AOR 1.58, 95%CI 1.31 to 1.92). Furthermore, compared to those who have never tried smoking manufactured cigarettes, grades 9 or 10 students who puff (AOR 5.04, 95%CI 4.04 to 6.29), experimentally smoked in the past (AOR 11.53, 95%CI 8.92, 14.90), experimentally smoke (AOR 7.19, 95%CI 5.32 to 9.71), formerly

smoked (AOR 10.27, 95%CI 5.79 to 18.23), currently smoke occasionally (AOR 5.93, 95%CI 4.13 to 8.51), or currently smoke daily (AOR 6.94, 95%CI 4.36 to 11.04) were significantly more likely to report having ever used cigarillos or little cigars. Additionally, grades 9 or 10 students who reported having ever used cigars (AOR 2.26, 95%CI 1.88 to 2.73), RYO cigarettes (AOR 2.26, 95%CI 1.73 to 2.97), pipe tobacco (AOR 2.13, 95%CI 1.57 to 2.91), or blunt wraps (AOR 2.00, 95%CI 1.39 to 2.86) were significantly more likely to report having ever used cigarillos or little cigars compared to those who did not report ever using each of these products. Similarly, grades 9 or 10 students who reported having ever used flavoured tobacco products were significantly more likely to report having ever used cigarillos or little cigars compared to those who reported never using flavoured tobacco products (AOR 5.08, 95%CI 4.27 to 6.05). Compared to non-binge drinkers, grades 9 or 10 students who were non-current or current binge drinkers were significantly more likely to report having ever used cigarillos or little cigars (AOR 1.86, 95%CI 1.51 to 2.29; and AOR 2.07, 95%CI 1.65 to 2.60, respectively). Finally, compared to non-marijuana users, grades 9 or 10 students who were non-current or current marijuana users were significantly more likely to report having ever used cigarillos or little cigars (AOR 2.23, 95%CI 1.81 to 2.74; and AOR 2.63, 95%CI 2.12 to 3.28, respectively).

Variables that were not significantly associated with cigarillo or little cigar ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, parent's smoking status, ever use of SLT, ever use of bidis, and ever use of a hookah.

Table 11: Multilevel logistic regression models examining school- and student-level characteristics associated with cigarillo or little cigar ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Cigarillo or little cigar ever use**	Model 2 **Cigarillo or little cigar current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	0.77 (0.55, 1.07)	1.10 (0.64, 1.87)
School's senior student cigarillo or little cigar smoking rate	Low	1.00	1.00
	High	**1.40 (1.03, 1.91)***	1.07 (0.66, 1.73)
Geographic classification	Rural	1.00	1.00
	Suburban	1.07 (0.69, 1.66)	1.12 (0.57, 2.19)
	Urban	0.96 (0.60, 1.55)	0.88 (0.42, 1.84)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	1.12 (0.78, 1.62)	0.97 (0.54, 1.72)
	3 or 4	0.92 (0.60, 1.40)	0.75 (0.39, 1.46)
	5 or more	0.96 (0.63, 1.47)	0.66 (0.34, 1.29)
Neighbourhood household income	Below average	1.00	1.00
	Average	1.00 (0.66, 1.51)	0.88 (0.46, 1.67)
	Above average	1.07 (0.68, 1.68)	0.78 (0.38, 1.61)
Student-level characteristics			
Gender	Female	1.00	1.00
	Male	**1.42 (1.21, 1.65)*****	**1.98 (1.60, 2.46)*****
Grade	9	1.00	1.00
	10	**1.46 (1.24, 1.72)*****	1.16 (0.93, 1.46)
Ethnicity	White	1.00	1.00
	Asian	0.70 (0.47, 1.03)	**0.47 (0.22, 0.99)***
	Other	**0.45 (0.32, 0.63)*****	0.95 (0.60, 1.52)
	Aboriginal	**0.65 (0.47, 0.90)****	**0.45 (0.29, 0.71)*****
	Black	**0.43 (0.27, 0.67)*****	**0.30 (0.15, 0.58)*****
	Latin American/Hispanic	0.95 (0.61, 1.49)	1.44 (0.78, 2.64)
Amount of money respondents usually get <u>each week</u> to spend on themselves or to save	$0	1.00	1.00
	$1-20	**1.67 (1.33, 2.10)*****	**1.61 (1.15, 2.26)****
	$21-40	**1.53 (1.18, 1.98)****	**1.52 (1.04, 2.23)***
	$41-100	**2.00 (1.51, 2.65)*****	1.29 (0.85, 1.97)
	More than $100	**2.55 (1.93, 3.38)*****	**2.18 (1.50, 3.18)*****

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Cigarillo or little cigar ever use**	Model 2 **Cigarillo or little cigar current use**
	I don't know how much I get each week	**2.70 (2.03, 3.59)*** **	1.40 (0.90, 2.19)
Respondents with parents, step-parents, or guardians who smoke	No	1.00	1.00
	Yes	1.03 (0.88, 1.21)	**1.40 (1.11, 1.75)** **
Respondents with siblings that smoke	No	1.00	1.00
	Yes	**0.70 (0.58, 0.85)*** **	0.81 (0.64, 1.04)
Number of close friends that smoke cigarettes	0	1.00	1.00
	1-2	**1.58 (1.31, 1.92)*** **	**2.33 (1.69, 3.22)*** **
	3 or more	1.01 (0.81, 1.25)	**2.76 (1.97, 3.87)*** **
Respondent's smoking status (manufactured cigarettes)	Never tried	1.00	1.00
	Puffs	**5.04 (4.04, 6.29)*** **	**2.10 (1.41, 3.12)*** **
	Experimentally smoked in the past	**11.53 (8.92, 14.90)*** **	**1.85 (1.18, 2.91)** **
	Experimentally smokes (beginning)	**7.19 (5.32, 9.71)*** **	**6.31 (4.14, 9.63)*** **
	Formerly smoked	**10.27 (5.79, 18.23)*** **	1.03 (0.41, 2.58)
	Currently smoked occasionally	**5.93 (4.13, 8.51)*** **	**5.30 (3.30, 8.52)*** **
	Currently smokes daily	**6.94 (4.36, 11.04)*** **	**5.89 (3.42, 10.13)*** **
Used cigars[b]	No	1.00	1.00
	Yes	**2.26 (1.88, 2.73)*** **	**3.72 (2.77, 5.01)*** **
Used roll-your-own cigarettes[b]	No	1.00	1.00
	Yes	**2.26 (1.73, 2.97)*** **	1.19 (0.83, 1.71)
Used smokeless tobacco[b]	No	1.00	1.00
	Yes	1.17 (0.85, 1.62)	**1.69 (1.03, 2.76)***
Used bidis[b]	No	1.00	1.00
	Yes	0.97 (0.53, 1.78)	1.39 (0.48, 3.97)
Used a hookah[b]	No	1.00	1.00
	Yes	1.25 (0.96, 1.61)	1.50 (1.00, 2.25)
Used pipe tobacco[b]	No	1.00	1.00
	Yes	**2.13 (1.57, 2.91)*** **	**2.47 (1.55, 3.93)*** **
Used blunt wraps[b]	No	1.00	1.00
	Yes	**2.00 (1.39, 2.86)*** **	1.51 (0.94, 2.43)
Ever used flavoured tobacco products	No	1.00	1.00
	Yes	**5.08 (4.27, 6.05)*** **	**3.01 (2.28, 3.98)*** **
Respondent's binge drinking status[c]	Non-binge drinker	1.00	1.00
	Non-current binge drinker	**1.86 (1.51, 2.29)*** **	**1.65 (1.17, 2.34)** **
	Current binge drinker	**2.07 (1.65, 2.60)*** **	**1.99 (1.40, 2.84)*** **
Respondent's marijuana use	Non-marijuana user	1.00	1.00

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Cigarillo or little cigar ever use**	Model 2 **Cigarillo or little cigar current use**
status[d]	Non-current marijuana user	**2.23 (1.81, 2.74)*** **	**2.08 (1.49, 2.90)*** **
	Current marijuana user	**2.63 (2.12, 3.28)*** **	**3.14 (2.29, 4.29)*** **

Model 1: 1 = Ever used cigarillos or little cigars (n=2,041), 0 = Never used cigarillos or little cigars (n=10,881); based on data from 133 secondary schools
Model 2: 1 = Currently uses cigarillos or little cigars (n=718), 0 = Does not currently use cigarillos or little cigars (n=12,031); based on data from 133 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
[b] Model 1 examined ever use of each product, while Model 2 examined current use of each product.
[c] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.
[d] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.
* p<0.05 **p<0.01 ***p<0.001

6.3.2 Factors associated with current use of cigarillos or little cigars among grades 9 and 10 students in Canada

As shown in Table 9, between-school random variation in the odds a student ever used cigarillos or little cigars was identified [$\sigma^2_{\mu 0}$=0.572 (0.109)]; school-level differences accounted for 14.8% of the variability in cigarillo or little cigar ever use.

6.3.2.1 School-level characteristics associated with current use of cigarillos or little cigars among grades 9 and 10 students in Canada

Table 10 presents adjusted odds ratios (AOR) for school-level characteristics associated with current use of cigarillos or little cigars (Model 2) among grades 9 and 10 students in Canada. After controlling for province (F=1.14, df=8, p>0.05) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently smoked manufactured cigarettes were significantly more likely to report currently using cigarillos or little cigars compared to students who attended a school with a low rate of senior students that currently smoked manufactured cigarettes (AOR 1.79, 95%CI 1.21 to 2.65).

Variables that were not significantly associated with cigarillo or little cigar current use after controlling for province and adjusting for all other variables in the model included: the school's senior student cigarillo or little cigar smoking rate, the school's geographic classification, the tobacco retailer density, and the neighbourhood household income.

6.3.2.2 School- and student-level characteristics associated with current use of cigarillos or little cigars among grades 9 and 10 students in Canada

Table 11 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with current use of cigarillos or little cigars (Model 2) among grades 9 and 10 students in Canada. After controlling for province ($F=0.91$, $df=8$, $p>0.05$) and adjusting for all other variables in the model, none or the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported currently using cigarillos or little cigars.

Model 2 illustrates that after controlling for province and adjusting for all other variables in the model, male students were significantly more likely to report currently using cigarillos or little cigars compared to female students (AOR 1.98, 95%CI 1.60 to 2.46). Compared to those who described themselves as White, students who described themselves as Asian, Aboriginal, or Black were significantly less likely to report currently using cigarillos or little cigars (AOR 0.47, 95%CI 0.22 to 0.99; AOR 0.45, 95%CI 0.29 to 0.71; and AOR 0.30, 95%CI 0.15 to 0.58, respectively). Grades 9 or 10 students who got between $1 and $20 (AOR 1.61, 95%CI 1.15 to 2.26), $21 and $40 (AOR 1.52, 95%CI 1.04 to 2.23), or more than $100 per week (AOR 2.18, 95%CI 1.50 to 3.18) were significantly more likely to report currently using cigarillos or little cigars compared to those who did not get any money each week. Compared to those with no parents (including step-parents or guardians) who smoked manufactured cigarettes, grades 9 or 10 students with parents who

smoked manufactured cigarettes were significantly more likely to report currently using cigarillos or little cigars (AOR 1.40, 95%CI 1.11 to 1.75). Similarly, grades 9 or 10 students with 1 or 2, or 3 or more close friends that smoked manufactured cigarettes were significantly more likely to report currently using cigarillos or little cigars relative to students with no close friends that smoked (AOR 2.33, 95%CI 1.69 to 3.22; and AOR 2.76, 95%CI 1.97 to 3.87, respectively). Furthermore, compared to those who have never tried smoking manufactured cigarettes, grades 9 or 10 students who puff (AOR 2.10, 95%CI 1.41 to 3.12), experimentally smoked in the past (AOR 1.85, 95%CI 1.18 to 2.91), experimentally smoke (AOR 6.31, 95%CI 4.14 to 9.63), currently smoke occasionally (AOR 5.30, 95%CI 3.30 to 8.52), or currently smoke daily (AOR 5.89, 95%CI 3.42 to 10.13) were significantly more likely to report currently using cigarillos or little cigars. Additionally, grades 9 or 10 students who reported currently using cigars (AOR 3.72, 95%CI 2.77 to 5.01), SLT (AOR 1.69, 95%CI 1.03 to 2.76), and pipe tobacco (AOR 2.47, 95%CI 1.55 to 3.93) were significantly more likely to report currently using cigarillos or little cigars compared to those who did not report currently using each of these products. Similarly, grades 9 or 10 students who reported having ever used flavoured tobacco products were significantly more likely to report currently using cigarillos or little cigars compared to those who reported never using flavoured tobacco products (AOR 3.01, 95%CI 2.28 to 3.98). Compared to non-binge drinkers, grades 9 or 10 students who were non-current or current binge drinkers were significantly more likely to report currently using cigarillos or little cigars (AOR 1.65, 95%CI 1.17 to 2.34; and AOR 1.99, 95%CI 1.40 to 2.84, respectively). Finally, compared to non-marijuana users, grades 9 or 10 students who were non-current or current marijuana users were significantly more likely to report currently using cigarillos or little cigars (AOR 2.08, 95%CI 1.49 to 2.90; and AOR 3.14, 95%CI 2.29 to 4.29).

Variables that were not significantly associated with cigarillo or little cigar current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student cigar smoking rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, grade, sibling's smoking status, current use of RYO cigarettes, current use of bidis, current use of a hookah, and current use of blunt wraps.

6.3.3 Factors associated with ever use of cigars among grades 9 and 10 students in Canada

As shown in Table 8, between-school random variation in the odds a student ever used cigars was identified [$\sigma^2_{\mu 0}$=0.450 (0.081)]; school-level differences accounted for 12.0% of the variability in cigar ever use.

6.3.3.1 School-level characteristics associated with ever use of cigars among grades 9 and 10 students in Canada

Table 12 presents adjusted odds ratios (AOR) for school-level characteristics associated with ever use of cigars (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=3.80, df=8, p<0.001) and adjusting for all other variables in the model, grades 9 and 10 students who attended schools in urban areas were significantly less likely to report having ever used cigars compared to those who attended schools in rural areas (AOR 0.62, 95%CI 0.41 to 0.93).

Variables that were not significantly associated with cigar ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student cigar smoking rate, the tobacco retailer density, and the neighbourhood household income.

Table 12: Multilevel logistic regression models examining school-level characteristics associated with cigar ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Cigar ever use**	Model 2 **Cigar current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	1.33 (0.99, 1.80)	1.31 (0.86, 1.99)
School's senior student cigar smoking rate	Low	1.00	1.00
	High	1.20 (0.89, 1.62)	1.21 (0.79, 1.85)
Geographic classification	Rural	1.00	1.00
	Suburban	0.99 (0.68, 1.43)	0.84 (0.50, 1.42)
	Urban	**0.62 (0.41, 0.93)***	0.63 (0.36, 1.10)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	1.04 (0.74, 1.43)	0.92 (0.57, 1.47)
	3 or 4	1.10 (0.75, 1.59)	1.27 (0.75, 2.14)
	5 or more	0.96 (0.66, 1.40)	0.94 (0.55, 1.60)
Neighbourhood household income	Below average	1.00	1.00
	Average	0.91 (0.64, 1.30)	0.69 (0.41, 1.14)
	Above average	1.04 (0.70, 1.54)	0.85 (0.49, 1.48)

Model 1: 1 = Ever used cigars (n=1,718), 0 = Never used cigars (n=12,822); based on data from 134 secondary schools
Model 2: 1 = Currently uses cigars (n=649), 0 = Does not currently use cigars (n=13,646), based on data from 134 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
* p<0.05 **p<0.01 ***p<0.001

6.3.3.2 School- and student-level characteristics associated with ever use of cigars among grades 9 and 10 students in Canada

Table 13 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with ever use of cigars (Model 1) among grades 9 and 10 students in Canada. After controlling for province ($F=1.45$, $df=8$, $p>0.05$) and adjusting for all other variables in the model, none of the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported having ever used cigars.

Model 1 illustrates that after controlling for province and adjusting for all other variables in the model, male students were significantly more likely to report having ever used cigars compared to female students (AOR 1.40, 95%CI 1.19 to 1.64). Compared to those who described themselves as White, those who described themselves as Aboriginal were significantly less likely to report having ever used cigars (AOR 0.60, 95%CI 0.43 to 0.84). Furthermore, compared to those who have never tried smoking manufactured cigarettes, grades 9 or 10 students who puff (AOR 5.57, 95%CI 4.30 to 7.23), experimentally smoked in the past (AOR 4.74, 95%CI 3.51 to 6.40), experimentally smoke (AOR 6.09, 95%CI 4.41 to 8.40), formerly smoked (AOR 3.91, 95%CI 2.28 to 6.71), currently smoke occasionally (AOR 3.70, 95%CI 2.54 to 5.38), or currently smoke daily (AOR 4.85, 95%CI 3.09 to 7.63) were significantly more likely to have ever used cigars. Additionally, grades 9 or 10 students who reported having ever used cigarillos or little cigars (AOR 2.29, 95%CI 1.90 to 2.76), RYO cigarettes (AOR 1.80, 95%CI 1.43 to 2.29), SLT (AOR 1.64, 95%CI 1.22 to 2.19), a hookah (AOR 1.36, 95%CI 1.08 to 1.72), pipe tobacco (AOR 2.21, 95%CI 1.72 to 2.85), or blunt wraps (AOR 1.51 to 1.11 to 2.04) were significantly more likely to report having ever used cigars compared to those who did not report ever using each of these products. Similarly, grades 9 or 10 students who reported having ever used flavoured tobacco products were significantly more likely to report having ever used cigars compared to those who reported never using flavoured tobacco products (AOR 2.46, 95%CI 2.03 to 3.00). Compared to non-binge drinkers, grades 9 or 10 students who were non-current or current binge drinkers were significantly more likely to report having ever used cigars (AOR 1.51, 95%CI 1.19 to 1.91; and AOR 2.39, 95%CI 1.88 to 3.05, respectively). Finally, compared to non-marijuana users, grades 9 or 10 students who were non-current or current marijuana users were significantly more likely to report having

ever used cigars (AOR 1.93, 95% 1.55 to 2.42; and AOR 2.82, 95%CI 2.25 to 3.54, respectively).

Variables that were not significantly associated with cigar ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student cigar smoking rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, grade, a youth's disposable income, parent's smoking status, sibling's smoking status, friend's smoking status, and ever use of bidis.

Table 13: Multilevel logistic regression models examining school- and student-level characteristics associated with cigar ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		**Adjusted Odds Ratio[a] (95% CI)** Model 1 **Cigar ever use**	Model 2 **Cigar current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	0.94 (0.68, 1.35)	1.05 (0.56, 1.96)
School's senior student cigar smoking rate	Low	1.00	1.00
	High	1.28 (0.91, 1.80)	0.74 (0.39, 1.40)
Geographic classification	Rural	1.00	1.00
	Suburban	0.91 (0.58, 1.41)	0.70 (0.32, 1.54)
	Urban	0.67 (0.41, 1.09)	0.43 (0.18, 1.00)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	1.22 (0.84, 1.77)	1.11 (0.55, 2.23)
	3 or 4	1.09 (0.71, 1.66)	1.42 (0.65, 3.12)
	5 or more	1.18 (0.77, 1.81)	0.89 (0.39, 1.99)
Neighbourhood household income	Below average	1.00	1.00
	Average	1.15 (0.77, 1.74)	0.72 (0.34, 1.55)
	Above average	1.29 (0.83, 2.01)	1.78 (0.51, 2.71)
Student-level characteristics			
Gender	Female	1.00	1.00
	Male	**1.40 (1.19, 1.64)*** **	**2.19 (1.64, 2.92)*** **

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Cigar ever use**	Model 2 **Cigar current use**
Grade	9	1.00	1.00
	10	1.14 (0.96, 1.34)	**0.64 (0.48, 0.86)****
Ethnicity	White	1.00	1.00
	Asian	0.77 (0.49, 1.19)	1.26 (0.59, 2.71)
	Other	1.12 (0.81, 1.55)	1.20 (0.66, 2.16)
	Aboriginal	**0.60 (0.43, 0.84)****	0.55 (0.30, 1.02)
	Black	1.22 (0.81, 1.84)	**7.50 (4.59, 12.25)*****
	Latin American/Hispanic	1.10 (0.66, 1.83)	0.49 (0.18, 1.33)
Amount of money respondents usually get each week to spend on themselves or to save	$0	1.00	1.00
	$1-20	1.06 (0.85, 1.34)	1.07 (0.69, 1.67)
	$21-40	0.90 (0.69, 1.18)	1.18 (0.72, 1.93)
	$41-100	1.15 (0.86, 1.53)	1.02 (0.60, 1.74)
	More than $100	0.76 (0.56, 1.01)	**2.09 (1.29, 3.40)****
	I don't know how much I get each week	1.20 (0.89, 1.61)	**3.32 (1.99, 5.55)*****
Respondents with parents, step-parents, or guardians who smoke	No	1.00	1.00
	Yes	1.04 (0.88, 1.23)	**0.54 (0.40, 0.72)*****
Respondents with siblings that smoke	No	1.00	1.00
	Yes	0.93 (0.77, 1.11)	1.02 (0.75, 1.39)
Number of close friends that smoke cigarettes	0	1.00	1.00
	1-2	0.82 (0.67, 1.01)	**1.72 (1.13, 2.63)***
	3 or more	1.22 (0.98, 1.51)	**1.83 (1.20, 2.78)****
Respondent's smoking status (manufactured cigarettes)	Never tried	1.00	1.00
	Puffs	**5.57 (4.30, 7.23)*****	**2.81 (1.65, 4.80)*****
	Experimentally smoked in the past	**4.74 (3.51, 6.40)*****	**2.19 (1.19, 4.03)***
	Experimentally smokes (beginning)	**6.09 (4.41, 8.40)*****	**6.77 (3.86, 11.89)*****
	Formerly smoked	**3.91 (2.28, 6.71)*****	1.07 (0.23, 5.01)
	Currently smoked occasionally	**3.70 (2.54, 5.38)*****	**5.26 (2.84, 9.75)*****
	Currently smokes daily	**4.85 (3.09, 7.63)*****	**6.71 (3.35, 13.44)*****
Used cigarillos or little cigars[b]	No	1.00	1.00
	Yes	**2.29 (1.90, 2.76)*****	**4.48 (3.33, 6.03)*****
Used roll-your-own cigarettes[b]	No	1.00	1.00
	Yes	**1.80 (1.43, 2.29)*****	**2.61 (1.72, 3.95)*****
Used smokeless tobacco[b]	No	1.00	1.00
	Yes	**1.64 (1.22, 2.19)****	**2.66 (1.53, 4.64)*****
Used bidis[b]	No	1.00	1.00
	Yes	1.21 (0.73, 2.02)	2.66 (0.70, 10.13)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Cigar ever use**	Model 2 **Cigar current use**
Used a hookah[b]	No	1.00	1.00
	Yes	**1.36 (1.08, 1.72)***	**2.20 (1.41, 3.44)*****
Used pipe tobacco[b]	No	1.00	1.00
	Yes	**2.21 (1.72, 2.85)*****	0.94 (0.56, 1.58)
Used blunt wraps[b]	No	1.00	1.00
	Yes	**1.51 (1.11, 2.04)****	**2.52 (1.50, 4.26)*****
Ever used flavoured tobacco products	No	1.00	1.00
	Yes	**2.46 (2.03, 3.00)*****	**2.60 (1.79, 3.77)*****
Respondent's binge drinking status[c]	Non-binge drinker	1.00	1.00
	Non-current binge drinker	**1.51 (1.19, 1.91)*****	0.95 (0.59, 1.54)
	Current binge drinker	**2.39 (1.88, 3.05)*****	**3.06 (1.94, 4.81)*****
Respondent's marijuana use status[d]	Non-marijuana user	1.00	1.00
	Non-current marijuana user	**1.93 (1.55, 2.42)*****	1.54 (0.98, 2.42)
	Current marijuana user	**2.82 (2.25, 3.54)*****	**2.09 (1.36, 3.22)*****

Model 1: 1 = Ever used cigars (n=1,458), 0 = Never used cigars (n=11,464); based on data from 133 secondary schools
Model 2: 1 = Currently uses cigars (n=539), 0 = Does not currently use cigars (n=12,210); based on data from 133 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
[b] Model 1 examined ever use of each product, while Model 2 examined current use of each product.
[c] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.
[d] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.
* p<0.05 **p<0.01 ***p<0.001

6.3.4 Factors associated with current use of cigars among grades 9 and 10 students in Canada

As shown in Table 8, between-school random variation in the odds a student currently uses cigars was identified [$\sigma^2_{\mu 0}$=0.539 (0.119)]; school-level differences accounted for 14.1% of the variability in cigar current use.

6.3.4.1 School-level characteristics associated with current use of cigars among grades 9 and 10 students in Canada

Table 12 presents adjusted odds ratios for school-level characteristics associated with current use of cigars (Model 2) among grades 9 and 10 students in Canada. After controlling for province ($F=1.70$, $df=8$, $p>0.05$) and adjusting for all other variables in the model, none of the school-level characteristics examined were significantly associated the odds that a grade 9 or 10 student reported currently using cigars.

Variables that were not significantly associated with cigar current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student cigar smoking rate, the school's geographic classification, the tobacco retailer density, and the neighbourhood household income.

6.3.4.2 School- and student-level characteristics associated with current use of cigars among grades 9 and 10 students in Canada

Table 13 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with current use of cigars (Model 2) among grades 9 and 10 students in Canada. After controlling for province ($F=1.21$, $df=8$, $p>0.05$) and adjusting for all other variables in the model, none of the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported currently using cigars.

Model 2 illustrates that after controlling for province and adjusting for all other variables in the model, male students were significantly more likely to report currently using cigars compared to female students (AOR 2.19, 95%CI 1.64 to 2.92). Compared to grade 9

students, those in grade 10 were significantly less likely to report currently using cigars (AOR 0.64, 95%CI 0.48 to 0.86). Compared to those who described themselves as White, those who described themselves as Black were significantly more likely to report currently using cigars (AOR 7.50, 95%CI 4.59 to 12.25). Grades 9 or 10 students who did not know how much money they get each week and who got more than $100 per week were significantly more likely to report currently using cigars compared to those who did not get any money each week (AOR 3.32, 95%CI 1.99 to 5.55; and AOR 2.09, 95%CI 1.29 to 3.40, respectively). Compared to those with no parents (including step-parents or guardians) who smoked manufactured cigarettes, grades 9 or 10 students with parents who smoked manufactured cigarettes were significantly less likely to report currently using cigars (AOR 0.54, 95%CI 0.40 to 0.72). In contrast, grades 9 or 10 students with 1 or 2, or 3 or more close friends that smoked manufactured cigarettes were significantly more likely to report currently using cigars (AOR 1.72, 95%CI 1.13 to 2.63; and AOR 1.83, 95%CI 1.20 to 2.78, respectively). Furthermore, compared to those who have never tried smoking manufactured cigarettes, grades 9 or 10 students who puff (AOR 2.81, 95%CI 1.65 to 4.80), experimentally smoked in the past (AOR 2.19, 95%CI 1.19 to 4.03), experimentally smoke (AOR 6.77, 95%CI 3.86 to 11.89), currently smoke occasionally (AOR 5.26, 95%CI 2.84 to 9.75), or currently smoke daily (AOR 6.71, 95%CI 3.35 to 13.44) were significantly more likely to report currently using cigars. Additionally, grades 9 or 10 students who reported currently using cigarillos or little cigars (AOR 4.48, 95%CI 3.33 to 6.03), RYO cigarettes (AOR 2.61, 95%CI 1.72 to 3.95), SLT (AOR 2.66, 95%CI 1.53 to 4.64), a hookah (AOR 2.20, 95%CI 1.41 to 3.44), or blunt wraps (AOR 2.52, 95%CI 1.50 to 4.26) were significantly more likely to report currently using cigars compared to those who did not report currently using each of these products. Similarly, grades 9 or 10 students who reported having ever

used flavoured tobacco products were significantly more likely to report currently using cigars compared to those who reported never using flavoured tobacco products (AOR 2.60, 95%CI 1.79 to 3.77). Compared to non-binge drinkers, grades 9 or 10 students who were current binge drinkers were significantly more likely to report currently using cigars (AOR 3.06, 95%CI 1.94 to 4.81). Finally, compared to non-marijuana users, grades 9 or 10 students who were current marijuana users were significantly more likely to report currently using cigars (AOR 2.09, 95%CI 1.36 to 3.22).

Variables that were not significantly associated with cigar current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student cigar smoking rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, sibling's smoking status, current use of bidis, and current use of pipe tobacco.

6.3.5 Factors associated with ever use of RYO cigarettes among grades 9 and 10 students in Canada

As shown in Table 8, between-school random variation in the odds a student ever used RYO cigarettes was identified [$\sigma^2_{\mu 0}$=0.578 (0.107)]; school-level differences accounted for 14.9% of the variability in RYO ever use.

6.3.5.1 School-level characteristics associated with ever use of RYO cigarettes among grades 9 and 10 students in Canada

Table 14 presents adjusted odds ratios (AOR) for school-level characteristics associated with ever use of RYO cigarettes (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=1.31, df=8, p>0.05) and adjusting for all other

variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently smoked manufactured cigarettes were significantly more likely to report having ever used RYO cigarettes compared to students who attended a school with a low rate of senior students that currently smoked manufactured cigarettes (AOR 1.49, 95%CI 1.04 to 2.12). In contrast, students who attended a secondary school in a neighbourhood with an average or above average household income were significantly less likely to report having ever used RYO cigarettes relative to students who attended a secondary school in a neighbourhood with a below average household income (AOR 0.62, 95%CI 0.41 to 0.93; and AOR 0.51, 95%CI 0.31 to 0.82, respectively).

Variables that were not significantly associated with RYO ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student RYO cigarette smoking rate, the school's geographic classification, and the tobacco retailer density.

Table 14: Multilevel logistic regression models examining school-level characteristics associated with roll-your-own cigarette ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		**Adjusted Odds Ratio[a] (95% CI)** Model 1 **Roll-your-own cigarette ever use**	Model 2 **Roll-your-own cigarette current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	**1.49 (1.04, 2.12)***	**1.88 (1.15, 3.07)***
School's senior student roll-your-own cigarette smoking rate	Low	1.00	1.00
	High	1.14 (0.78, 1.65)	1.44 (0.85, 2.45)
Geographic classification	Rural	1.00	1.00
	Suburban	0.98 (0.64, 1.51)	0.85 (0.47, 1.56)
	Urban	0.71 (0.44, 1.14)	0.79 (0.40, 1.54)
Tobacco retailer density	None	1.00	1.00

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Roll-your-own cigarette ever use**	Model 2 **Roll-your-own cigarette current use**
within 1km of the school	1 or 2	0.75 (0.50, 1.12)	0.83 (0.46, 1.49)
	3 or 4	1.02 (0.65, 1.60)	1.17 (0.61, 2.23)
	5 or more	1.13 (0.72, 1.76)	1.37 (0.73, 2.58)
Neighbourhood household income	Below average	1.00	1.00
	Average	**0.62 (0.41, 0.93)***	**0.49 (0.27, 0.88)***
	Above average	**0.51 (0.31, 0.82)****	**0.46 (0.23, 0.92)***

Model 1: 1 = Ever used roll-your-own cigarettes (n=1,233), 0 = Never used roll-your-own cigarettes (n=13,307); based on data from 134 secondary schools
Model 2: 1 = Currently uses roll-your-own cigarettes (n=596), 0 = Does not currently use roll-your-own cigarettes (n=13,699); based on data from 134 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
* p<0.05 **p<0.01 ***p<0.001

6.3.5.2 School- and student-level characteristics associated with ever use of RYO cigarettes among grades 9 and 10 students in Canada

Table 15 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with ever use of RYO cigarettes (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=2.75, df=8, p<0.01) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with 1 or 2 tobacco retailers within 1km of the school were significantly less likely to report having ever used RYO cigarettes relative to those with no tobacco retailers around the school (AOR 0.56, 95%CI 0.31 to 0.99). Additionally, grades 9 and 10 students who attended a secondary school in a neighbourhood with an above average household income were significantly less likely to report having ever used RYO cigarettes relative to those who attended a secondary school in a neighbourhood with a below average household income (AOR 0.34, 95%CI 0.17 to 0.68).

Model 1 illustrates that after controlling for province and adjusting for all other variables in the model, male students and grade 10 students were significantly less likely to report having ever used RYO cigarettes compared to female students and grade 9 students,

respectively (AOR 0.64, 95%CI 0.50 to 0.81; and AOR 0.72, 95%CI 0.56 to 0.92, respectively). Compared to those who described themselves as White, those who described themselves as Asian were significantly less likely to report having ever used RYO cigarettes (AOR 0.46, 95%CI 0.24 to 0.90). In contrast, students who got more than $100 each week were significantly more likely to report having ever used RYO cigarettes compared to students who did not get any money (AOR 1.91, 95%CI 1.26 to 2.90). Students with 1 or 2, or 3 or more friends that smoked manufactured cigarettes were significantly more likely to report having ever used RYO cigarettes compared to students with no friends that smoked manufactured cigarettes (AOR 1.66, 95%CI 1.14 to 2.42; and AOR 3.28 95%CI 2.32 to 4.65, respectively). Furthermore, compared to those who have never tried smoking manufactured cigarettes, grades 9 or 10 students who puff (AOR 17.30, 95%CI 8.14 to 36.79), experimentally smoked in the past (AOR 39.54, 95%CI 18.24 to 85.71), experimentally smoke (AOR 52.14, 95%CI 24.02 to 113.18), formerly smoked (AOR 295.74, 95%CI 122.27 to 715.32), currently smoke occasionally (AOR 144.33, 95%CI 65.16 to 319.70), or currently smoke daily (AOR 155.12, 95%CI 66.84 to 359.98) were significantly more likely to report having ever used RYO cigarettes. Similarly, grades 9 or 10 students who reported having ever used cigarillos or little cigars (AOR 2.55, 95%CI 1.94 to 3.36), cigars (AOR 2.03, 95%CI 1.59 to 2.60), bidis (AOR 16.74, 95%CI 8.62 to 32.50), pipe tobacco (AOR 3.54, 95%CI 2.60 to 4.80), and blunt wraps (AOR 1.47, 95%CI 1.04 to 2.10) were significantly more likely to have ever used RYO cigarettes compared to those who did not report ever using each of these products. Compared to non-binge drinkers, grades 9 or 10 students who were current binge drinkers were significantly less likely to report having ever used RYO cigarettes (AOR 0.62, 95%CI 0.43 to 0.89). Finally, compared to non-marijuana users, grades 9 or 10 students who were non-current or current marijuana users were significantly

more likely to report having ever used RYO cigarettes (AOR 2.04, 95%CI 1.42 to 2.93; and AOR 2.41, 95%CI 1.69 to 3.43, respectively).

Variables that were not significantly associated with RYO ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student RYO cigarette smoking rate, the school's geographic classification, parent's smoking status, sibling's smoking status, ever use of SLT, ever use of a hookah, and ever use of flavoured tobacco.

Table 15: Multilevel logistic regression models examining school- and student-level characteristics associated with roll-your-own cigarette ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		**Adjusted Odds Ratio[a] (95% CI)** Model 1 **Roll-your-own cigarette ever use**	Model 2 **Roll-your-own cigarette current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	0.79 (0.47, 1.32)	0.78 (0.39, 1.56)
School's senior student roll-your-own cigarette smoking rate	Low	1.00	1.00
	High	1.09 (0.63, 1.89)	1.34 (0.64, 2.84)
Geographic classification	Rural	1.00	1.00
	Suburban	0.67 (0.35, 1.28)	0.51 (0.22, 1.19)
	Urban	0.95 (0.47, 1.93)	1.14 (0.44, 2.92)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	**0.56 (0.31, 0.99)***	0.72 (0.31, 1.64)
	3 or 4	0.58 (0.30, 1.12)	0.80 (0.32, 1.98)
	5 or more	0.98 (0.52, 1.86)	1.07 (0.44, 2.63)
Neighbourhood household income	Below average	1.00	1.00
	Average	0.65 (0.36, 1.20)	0.51 (0.22, 1.19)
	Above average	**0.34 (0.17, 0.68)****	**0.20 (0.07, 0.54)****
Student-level characteristics			
Gender	Female	1.00	1.00

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Roll-your-own cigarette ever use**	Model 2 **Roll-your-own cigarette current use**
	Male	**0.64 (0.50, 0.81)*** **	1.38 (0.98, 1.94)
Grade	9	1.00	1.00
	10	**0.72 (0.56, 0.92)** **	**0.63 (0.44, 0.89)** **
Ethnicity	White	1.00	1.00
	Asian	**0.46 (0.24, 0.90)***	0.43 (0.12, 1.46)
	Other	1.04 (0.64, 1.69)	1.67 (0.84, 3.29)
	Aboriginal	1.15 (0.77, 1.70)	1.06 (0.64, 1.78)
	Black	1.66 (0.94, 2.93)	0.42 (0.17, 1.04)
	Latin American/Hispanic	0.76 (0.34, 1.69)	1.40 (0.44, 4.46)
Amount of money respondents usually get each week to spend on themselves or to save	$0	1.00	1.00
	$1-20	1.28 (0.90, 1.82)	1.23 (0.70, 2.14)
	$21-40	1.02 (0.69, 1.52)	1.22 (0.67, 2.24)
	$41-100	1.08 (0.70, 1.66)	1.08 (0.56, 2.10)
	More than $100	**1.91 (1.26, 2.90)** **	1.33 (0.70, 2.53)
	I don't know how much I get each week	1.27 (0.80, 2.01)	0.72 (0.35, 1.50)
Respondents with parents, step-parents, or guardians who smoke	No	1.00	1.00
	Yes	0.85 (0.66, 1.08)	1.34 (0.92, 1.94)
Respondents with siblings that smoke	No	1.00	1.00
	Yes	0.99 (0.77, 1.26)	1.12 (0.79, 1.59)
Number of close friends that smoke cigarettes	0	1.00	1.00
	1-2	**1.66 (1.14, 2.42)** **	**2.21 (1.07, 4.59)***
	3 or more	**3.28 (2.32, 4.65)*** **	**4.18 (2.12, 8.24)*** **
Respondent's smoking status (manufactured cigarettes)	Never tried	1.00	1.00
	Puffs	**17.30 (8.14, 36.79)*** **	**6.64 (2.27, 19.42)*** **
	Experimentally smoked in the past	**39.54 (18.24, 85.71)*** **	3.04 (0.83, 11.08)
	Experimentally smokes (beginning)	**52.14 (24.02, 113.18)*** **	**22.96 (7.77, 67.79)*** **
	Formerly smoked	**295.74 (122.27, 715.32)*** **	5.44 (0.64, 46.30)
	Currently smoked occasionally	**144.33 (65.16, 319.70)*** **	**56.43 (18.82, 169.22)*** **
	Currently smokes daily	**155.12 (66.84, 359.98)*** **	**89.44 (28.67, 279.00)*** **
Used cigarillos or little cigars[b]	No	1.00	1.00
	Yes	**2.55 (1.94, 3.36)*** **	1.33 (0.92, 1.91)
Used cigars[b]	No	1.00	1.00
	Yes	**2.03 (1.59, 2.60)*** **	**2.97 (1.96, 4.51)*** **
Used smokeless tobacco[b]	No	1.00	1.00
	Yes	1.09 (0.75, 1.59)	0.91 (0.45, 1.83)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Roll-your-own cigarette ever use**	Model 2 **Roll-your-own cigarette current use**
Used bidis[b]	No	1.00	1.00
	Yes	**16.74 (8.62, 32.50)*** **	**20.49 (5.30, 79.25)*** **
Used a hookah[b]	No	1.00	1.00
	Yes	1.17 (0.86, 1.60)	0.89 (0.51, 1.56)
Used pipe tobacco[b]	No	1.00	1.00
	Yes	**3.54 (2.60, 4.80)*** **	**13.09 (7.53, 22.76)*** **
Used blunt wraps[b]	No	1.00	1.00
	Yes	**1.47 (1.04, 2.10)***	1.54 (0.88, 2.72)
Ever used flavoured tobacco products	No	1.00	1.00
	Yes	1.24 (0.92, 1.67)	**1.87 (1.16, 3.01)***
Respondent's binge drinking status[c]	Non-binge drinker	1.00	1.00
	Non-current binge drinker	0.90 (0.63, 1.27)	1.15 (0.66, 2.03)
	Current binge drinker	**0.62 (0.43, 0.89)****	1.13 (0.67, 1.92)
Respondent's marijuana use status[d]	Non-marijuana user	1.00	1.00
	Non-current marijuana user	**2.04 (1.42, 2.93)*** **	**3.06 (1.61, 5.84)*** **
	Current marijuana user	**2.41 (1.69, 3.43)*** **	**2.66 (1.44, 4.93)****

Model 1: 1 = Ever used roll-your-own cigarettes (n=1,014), 0 = Never used roll-your-own cigarettes (n=11,908); based on data from 133 secondary schools
Model 2: 1 = Currently uses roll-your-own cigarettes (n=476), 0 = Does not currently use roll-your-own cigarettes (n=12,273); based on data from 133 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
[b] Model 1 examined ever use of each product, while Model 2 examined current use of each product.
[c] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.
[d] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.
* p<0.05 **p<0.01 ***p<0.001

6.3.6 Factors associated with current use of RYO cigarettes among grades 9 and 10 students in Canada

As shown in Table 9, between-school random variation in the odds a student currently uses RYO cigarettes was identified [$\sigma^2_{\mu 0}$=0.960 (0.195)]; school-level differences accounted for 22.6% of the variability in RYO current use.

6.3.6.1 School-level characteristics associated with current use of RYO cigarettes among grades 9 and 10 students in Canada

Table 14 presents adjusted odds ratios (AOR) for school-level characteristics associated with current use of RYO cigarettes (Model 2) among grades 9 and 10 students in Canada. After controlling for province ($F=1.22$, $df=8$, $p>0.05$) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently smoked manufactured cigarettes were significantly more likely to report currently using RYO cigarettes compared to students who attended a school with a low rate of senior students that currently smoked manufactured cigarettes (AOR 1.88, 95%CI 1.15 to 3.07). In contrast, students who attended a secondary school in a neighbourhood with an average or above average household income were significantly less likely to report currently using RYO cigarettes relative to students who attended a secondary school in a neighbourhood with a below average household income (AOR 0.49, 95%CI 0.27 to 0.88; and AOR 0.46, 95%CI 0.23 to 0.92, respectively).

Variables that were not significantly associated with RYO current use after controlling for province and adjusting for all other variables in the model included: the school's senior student RYO cigarette smoking rate, the school's geographic classification, and the tobacco retailer density.

6.3.6.2 School- and student-level characteristics associated with current use of RYO cigarettes among grades 9 and 10 students in Canada

Table 15 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with current use of RYO cigarettes (Model 2) among grades 9 and 10 students in Canada. After controlling for province ($F=2.67$, $df=8$, $p<0.05$) and adjusting

for all other variables in the model, grades 9 and 10 students who attended a secondary school in a neighbourhood with an above average household income were significantly less likely to report having ever used RYO cigarettes relative to those who attended a secondary school in a neighbourhood with a below average household income (AOR 0.20, 95%CI 0.07 to 0.54).

Model 2 illustrates that after controlling for province and adjusting for all other variables in the model, grade 10 students were significantly less likely to report currently using RYO cigarettes compared to grade 9 students (AOR 0.63, 95%CI 0.44 to 0.89). In contrast, grades 9 or 10 students with 1 or 2, or 3 or more close friends that smoked manufactured cigarettes were significantly more likely to report currently using RYO cigarettes (AOR 2.21, 95%CI 1.07 to 4.59; and AOR 4.18, 95%CI 2.12 to 8.24, respectively). Furthermore, compared to those who have never tried smoking manufactured cigarettes, grades 9 or 10 youth who puff (AOR 6.64, 95%CI 2.27 to 19.42), experimentally smoke (AOR 22.96, 95%CI 7.77 to 67.79), currently smoke occasionally (AOR 56.43, 95%CI 18.82 to 169.22), or currently smoke daily (AOR 89.44, 95%CI 28.67 to 279.00) were significantly more likely to report currently using RYO cigarettes. Additionally, grades 9 or 10 students who reported currently using cigars (AOR 2.97, 95%CI 1.96 to 4.51), bidis (AOR 20.49, 95%CI 5.30 to 79.25), or pipe tobacco (AOR 13.09, 95%CI 7.53 to 22.76) were significantly more likely to report currently using RYO cigarettes compared to those who did not report currently using each of these products. Similarly, grades 9 or 10 students who reported having ever used flavoured tobacco products were significantly more likely to report currently using RYO cigarettes compared to those who reported never using flavoured tobacco products (AOR 1.87, 95%CI 1.16 to 3.01). Finally, compared to non-marijuana users, grades 9 or 10 students who were non-current or current marijuana users were

significantly more likely to report currently using RYO cigarettes (AOR 3.06, 95%CI 1.61 to 5.84; and AOR 2.66, 95%CI 1.44 to 4.93, respectively).

Variables that were not significantly associated with RYO current use after controlling for province and all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student RYO cigarette smoking rate, the school's geographic classification, the tobacco retailer density, gender, ethnicity, disposable income, parent's smoking status, sibling's smoking status, current use of cigarillos or little cigars, current use of SLT, current use of a hookah, current use of blunt wraps, and binge drinking status.

6.3.7 Factors associated with ever use of smokeless tobacco among grades 9 and 10 students in Canada

As shown in Table 8, between-school random variation in the odds a student ever used SLT was identified [$\sigma^2_{\mu 0}$=1.060 (0.223)]; school-level differences accounted for 24.4% of the variability in SLT ever use.

6.3.7.1 School-level characteristics associated with ever use of smokeless tobacco among grades 9 and 10 students in Canada

Table 16 presents adjusted odds ratios (AOR) for school-level characteristics associated with ever use of SLT (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=1.77, df=8, p>0.05) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently smoked manufactured cigarettes were significantly more likely to report having ever used SLT compared to students who attended a school with a low rate (AOR 1.83, 95%CI 1.11 to 3.01). Furthermore, students who attended a secondary school

with a high rate of senior students that currently used SLT were significantly more likely to report having ever used SLT compared to students who attended a school with a low rate (AOR 3.15, 95%CI 1.54 to 6.47). Finally, grade 9 and 10 students who attended a secondary school in a neighbourhood with an above average household income were significantly more likely to report having ever used SLT relative to those who attended a secondary school in a neighbourhood with a below average household income (AOR 2.28, 95%CI 1.07 to 4.85).

Variables that were not significantly associated with SLT ever use after controlling for province and adjusting for all other variables in the model included: the school's geographic classification and the tobacco retailer density.

Table 16: Multilevel logistic regression models examining school-level characteristics associated with smokeless tobacco ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Smokeless tobacco ever use**	Model 2 **Smokeless tobacco current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	**1.83 (1.11, 3.01)***	1.41 (0.70, 2.83)
School's senior student smokeless tobacco use rate	Low	1.00	1.00
	High	**3.15 (1.54, 6.47)****	**4.34 (1.62, 11.60)****
Geographic classification	Rural	1.00	1.00
	Suburban	1.12 (0.59, 2.14)	1.02 (0.42, 2.51)
	Urban	0.69 (0.33, 1.44)	0.65 (0.23, 1.81)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	0.90 (0.50, 1.61)	0.90 (0.39, 2.07)
	3 or 4	0.85 (0.45, 1.63)	0.91 (0.37, 2.24)
	5 or more	0.80 (0.41, 1.54)	0.70 (0.27, 1.78)
Neighbourhood household income	Below average	1.00	1.00
	Average	1.29 (0.65, 2.59)	1.32 (0.47, 3.70)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Smokeless tobacco ever use**	Model 2 **Smokeless tobacco current use**
	Above average	**2.28 (1.07, 4.85)***	2.41 (0.79, 7.35)

Model 1: 1 = Ever used smokeless tobacco (n=650), 0 = Never used smokeless tobacco (n=13,890); based on data from 134 secondary schools
Model 2: 1 = Currently uses smokeless tobacco (n=311), 0 = Does not currently use smokeless tobacco (n=13,984); based on data from 134 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
* p<0.05 **p<0.01 ***p<0.001

6.3.7.2 School- and student-level characteristics associated with ever use of smokeless tobacco among grades 9 and 10 students in Canada

Table 17 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with ever use of SLT (Model 1) among grade 9 and 10 students in Canada. After controlling for province (F=2.92, df=8, p<0.01) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently used SLT were significantly more likely to report having ever used SLT compared to students who attended a school with a low rate (AOR 3.07, 95%CI 1.36 to 6.95). Additionally, grades 9 and 10 students who attended a secondary school in a neighbourhood with an above average household income were significantly more likely to report having ever used SLT relative to those who attended a secondary school in a neighbourhood with a below average household income (AOR 2.89, 95%CI 1.23 to 6.82).

Model 1 illustrates that after controlling for province and adjusting for all other variables in the model, male students were significantly more likely to report having ever used SLT compared to female students (AOR 4.00, 95%CI 2.99 to 5.35). Compared to those who described themselves as White, those who described themselves as Asian were significantly less likely to report having ever used SLT (AOR 0.41, 95%CI 0.20 to 0.84). In contrast, students who got between $41 and $100 each week were significantly more likely

to report having ever used SLT compared to students who did not get any money (AOR 1.99, 95%CI 1.23 to 3.20). Students with siblings that smoked manufactured cigarettes were significantly less likely to report having ever used SLT compared to students with no siblings that smoked (AOR 0.56, 95%CI 0.41 to 0.76). Grades 9 and 10 students who reported having ever used cigars (AOR 1.39, 95%CI 1.02 to 1.90), bidis (AOR 2.42, 95%CI 1.42 to 4.14), a hookah (AOR 1.96, 95%CI 1.40 to 2.75), pipe tobacco (AOR 2.42, 95%CI 1.71 to 3.42), and blunt wraps (AOR 1.62, 95%CI 1.10 to 2.39) were significantly more likely to report having ever used SLT compared to those who did not report ever using each of these products. Similarly, grades 9 or 10 students who reported having ever used flavoured tobacco products were significantly more likely to report having ever used SLT compared to those who reported never using flavoured tobacco products (AOR 6.84, 95%CI 4.75 to 9.86). Compared to non-binge drinkers, grades 9 or 10 students who were non-current or current binge drinkers were significantly more likely to report having ever used SLT (AOR 3.36, 95%CI 2.19 to 5.17; and AOR 5.24, 95%CI 3.39 to 8.09, respectively). Finally, compared to non-marijuana users, grades 9 or 10 students who were non-current marijuana users were significantly more likely to report having ever used SLT (AOR 1.66, 95%CI 1.12 to 2.45).

Variables that were not significantly associated with SLT ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's geographic classification, the tobacco retailer density, grade, parent's smoking status, friend's smoking status, a youth's smoking status, ever use of cigarillos or little cigars, and ever use of RYO cigarettes.

Table 17: Multilevel logistic regression models examining school- and student-level characteristics associated with smokeless tobacco ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Smokeless tobacco ever use**	Model 2 **Smokeless tobacco current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	1.57 (0.90, 2.73)	0.82 (0.32, 2.07)
School's senior student smokeless tobacco use rate	Low	1.00	1.00
	High	**3.07 (1.36, 6.95)****	3.67 (0.99, 13.51)
Geographic classification	Rural	1.00	1.00
	Suburban	0.91 (0.44, 1.87)	1.19 (0.36, 3.96)
	Urban	0.86 (0.38, 1.95)	0.67 (0.17, 2.70)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	1.12 (0.59, 2.14)	1.03 (0.34, 3.18)
	3 or 4	0.80 (0.40, 1.63)	0.88 (0.27, 2.93)
	5 or more	0.91 (0.44, 1.87)	0.45 (0.13, 1.56)
Neighbourhood household income	Below average	1.00	1.00
	Average	2.18 (0.99, 4.84)	2.22 (0.51, 9.56)
	Above average	**2.89 (1.23, 6.82)***	3.02 (0.62, 14.74)
Student-level characteristics			
Gender	Female	1.00	1.00
	Male	**4.00 (2.99, 5.35)*****	**5.88 (3.54, 9.78)*****
Grade	9	1.00	1.00
	10	1.07 (0.81, 1.40)	1.04 (0.67, 1.61)
Ethnicity	White	1.00	1.00
	Asian	**0.41 (0.20, 0.84)***	1.55 (0.67, 3.57)
	Other	1.10 (0.69, 1.75)	0.55 (0.23, 1.32)
	Aboriginal	0.80 (0.49, 1.30)	0.69 (0.33, 1.45)
	Black	1.59 (0.88, 2.88)	1.49 (0.59, 3.71)
	Latin American/Hispanic	1.40 (0.72, 2.74)	1.86 (0.67, 5.17)
Amount of money respondents usually get each week to spend on themselves or to save	$0	1.00	1.00
	$1-20	1.25 (0.84, 1.88)	1.60 (0.78, 3.27)
	$21-40	1.07 (0.66, 1.71)	1.94 (0.88, 4.32)
	$41-100	**1.99 (1.23, 3.20)****	**2.51 (1.12, 5.64)***
	More than $100	1.48 (0.92, 2.37)	**2.22 (1.00, 4.90)***

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Smokeless tobacco ever use**	Model 2 **Smokeless tobacco current use**
	I don't know how much I get each week	1.18 (0.71, 1.98)	1.51 (0.65, 3.51)
Respondents with parents, step-parents, or guardians who smoke	No	1.00	1.00
	Yes	0.88 (0.68, 1.15)	1.31 (0.87, 1.97)
Respondents with siblings that smoke	No	1.00	1.00
	Yes	**0.56 (0.41, 0.76)*** **	0.75 (0.47, 1.22)
Number of close friends that smoke cigarettes	0	1.00	1.00
	1-2	1.09 (0.77, 1.54)	1.60 (0.92, 2.76)
	3 or more	0.86 (0.60, 1.24)	0.90 (0.48, 1.67)
Respondent's smoking status (manufactured cigarettes)	Never tried	1.00	1.00
	Puffs	0.88 (0.56, 1.38)	**0.38 (0.19, 0.75)** **
	Experimentally smoked in the past	0.95 (0.58, 1.55)	**0.08 (0.03, 0.23)*** **
	Experimentally smokes (beginning)	1.23 (0.74, 2.03)	**0.40 (0.19, 0.83)***
	Formerly smoked	0.98 (0.43, 2.26)	0.40 (0.11, 1.54)
	Currently smoked occasionally	1.26 (0.71, 2.24)	**0.29 (0.12, 0.71)** **
	Currently smokes daily	1.21 (0.65, 2.24)	**0.21 (0.08, 0.52)*** **
Used cigarillos or little cigars[b]	No	1.00	1.00
	Yes	0.99 (0.69, 1.40)	1.11 (0.66, 1.87)
Used cigars[b]	No	1.00	1.00
	Yes	**1.39 (1.02, 1.90)***	**2.92 (1.68, 5.09)*** **
Used roll-your-own cigarettes[b]	No	1.00	1.00
	Yes	0.90 (0.62, 1.32)	0.66 (0.32, 1.35)
Used bidis[b]	No	1.00	1.00
	Yes	**2.42 (1.42, 4.14)** **	**37.73 (11.30, 125.99)*** **
Used a hookah[b]	No	1.00	1.00
	Yes	**1.96 (1.40, 2.75)*** **	0.77 (0.39, 1.51)
Used pipe tobacco[b]	No	1.00	1.00
	Yes	**2.42 (1.71, 3.42)*** **	**3.02 (1.42, 6.46)** **
Used blunt wraps[b]	No	1.00	1.00
	Yes	**1.62 (1.10, 2.39)***	**5.13 (2.73, 9.66)*** **
Ever used flavoured tobacco products	No	1.00	1.00
	Yes	**6.84 (4.75, 9.86)*** **	**18.40 (10.06, 33.65)*** **
Respondent's binge drinking status[c]	Non-binge drinker	1.00	1.00
	Non-current binge drinker	**3.36 (2.19, 5.17)*** **	**4.28 (2.15, 8.53)*** **
	Current binge drinker	**5.24 (3.39, 8.09)*** **	**7.03 (3.54, 13.97)*** **
Respondent's marijuana	Non-marijuana user	1.00	1.00

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Smokeless tobacco ever use**	Model 2 **Smokeless tobacco current use**
use status[d]	Non-current marijuana user	**1.66 (1.12, 2.45)***	1.30 (0.67, 2.54)
	Current marijuana user	1.14 (0.75, 1.71)	1.76 (0.96, 3.23)

Model 1: 1 = Ever used smokeless tobacco (n=546), 0 = Never used smokeless tobacco (n=12,376); based on data from 133 secondary schools
Model 2: 1 = Currently uses smokeless tobacco (n=248), 0 = Does not currently use smokeless tobacco (n=12,501); based on data from 133 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
[b] Model 1 examined ever use of each product, while Model 2 examined current use of each product.
[c] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.
[d] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.
* p<0.05 **p<0.01 ***p<0.001

6.3.8 Factors associated with current use of smokeless tobacco among grades 9 and 10 students in Canada

As shown in Table 9, between-school random variation in the odds a student currently uses SLT was identified [$\sigma^2_{\mu 0}$=1.460 (0.332)]; school-level differences accounted for 30.7% of the variability in SLT current use.

6.3.8.1 School-level characteristics associated with current use of smokeless tobacco among grades 9 and 10 students in Canada

Table 16 presents adjusted odds ratios (AOR) for school-level characteristics associated with current use of SLT (Model 2) among grades 9 and 10 students in Canada. After controlling for province (F=1.70, df=8, p>0.05) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently used SLT were significantly more likely to report currently using SLT compared to students who attended a school with a low rate (AOR 4.34, 95%CI 1.62 to 11.60).

Variables that were not significantly associated with SLT current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's geographic classification, the tobacco retailer density, and the neighbourhood household income.

6.3.8.2 School- and student-level characteristics associated with current use of smokeless tobacco among grades 9 and 10 students in Canada

Table 17 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with current use of SLT (Model 2) among grades 9 and 10 students in Canada. After controlling for province ($F=2.45$, $df=8$, $p<0.05$) and adjusting for all other variables in the model, none of the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported currently using SLT.

Model 2 illustrates that after controlling for province and adjusting for all other variables in the model, male students were significantly more likely to report currently using SLT compared to female students (AOR 5.88, 95%CI 3.54 to 9.78). Additionally, students who got between $41 and $100 or more than $100 each week were significantly more likely to report currently using SLT compared to students who did not get any money (AOR 2.51, 95%CI 1.12 to 5.64; and AOR 2.22, 95%CI 1.00 to 4.90, respectively). In contrast, compared to those who have never tried smoking manufactured cigarettes, grades 9 or 10 students who puff (AOR 0.38, 95%CI 0.19 to 0.75), experimentally smoked in the past (AOR 0.08, 95%CI 0.03 to 0.23), experimentally smoke (AOR 0.40, 95%CI 0.19 to 0.83), currently smoke occasionally (AOR 0.29, 95%CI 0.12 to 0.71), or currently smoke daily (AOR 0.21, 95%CI 0.08 to 0.52) were significantly less likely to report currently using SLT. Grades 9 or 10 students who reported currently using cigars (AOR 2.92, 95%CI 1.68 to 5.09), bidis (AOR

37.73, 95%CI 11.30 to 125.99), pipe tobacco (AOR 3.02, 95%CI 1.42 to 6.46), or blunt wraps (AOR 5.13, 95%CI 2.73 to 9.66) were significantly more likely to report currently using SLT compared to those who did not report currently using each of these products. Similarly, grades 9 or 10 students who reported having ever used flavoured tobacco products were significantly more likely to report currently using SLT compared to those who reported never using flavoured tobacco products (AOR 18.40, 95%CI 10.06 to 33.65). Finally, compared to non-binge drinkers, grades 9 or 10 students who were non-current or current binge drinkers were significantly more likely to report currently using SLT (AOR 4.28, 95%CI 2.15 to 8.53; and AOR 7.03, 95%CI 3.54 to 13.97, respectively).

Variables that were not significantly associated with SLT current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student SLT use rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, grade, ethnicity, parent's smoking status, sibling's smoking status, friend's smoking status, current use of cigarillos or little cigars, current use of RYO cigarettes, current use of a hookah, and marijuana use status.

6.3.9 Factors associated with ever use of bidis among grades 9 and 10 students in Canada

As shown in Table 8, between-school random variation in the odds a student ever used bidis was identified [$\sigma^2_{\mu 0}$=0.895 (0.224)]; school-level differences accounted for 21.4% of the variability in bidi ever use.

6.3.9.1 School-level characteristics associated with ever use of bidis among grades 9 and 10 students in Canada

Table 18 presents adjusted odds ratios for school-level characteristics associated with ever use of bidis (Model 1) among grades 9 and 10 students in Canada. After controlling for province ($F=0.71$, $df=8$, $p>0.05$) and adjusting for all other variables in the model, none of the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported having ever used bidis.

Variables that were not significantly associated with bidi ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student bidi smoking rate, the school's geographic classification, the tobacco retailer density, or the neighbourhood household income.

Table 18: Multilevel logistic regression models examining school-level characteristics associated with bidi ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Adjusted Odds Ratio[a] (95% CI)	
		Model 1 **Bidi ever use**	Model 2 **Bidi current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	1.77 (0.92, 3.41)	2.63 (0.99, 7.02)
School's senior student bidi smoking rate	Low	1.00	1.00
	High	1.64 (0.73, 3.69)	1.43 (0.44, 4.64)
Geographic classification	Rural	1.00	1.00
	Suburban	1.15 (0.47, 2.83)	0.71 (0.20, 2.62)
	Urban	0.86 (0.32, 2.30)	0.84 (0.21, 3.45)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	1.04 (0.47, 2.30)	1.18 (0.33, 4.19)
	3 or 4	1.09 (0.45, 2.66)	1.33 (0.35, 5.07)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Bidi ever use**	Model 2 **Bidi current use**
	5 or more	1.57 (0.66, 3.73)	1.95 (0.52, 7.37)
Neighbourhood household income	Below average	1.00	1.00
	Average	0.76 (0.32, 1.81)	0.62 (0.16, 2.37)
	Above average	1.42 (0.57, 3.56)	1.85 (0.47, 7.34)

Model 1: 1 = Ever used bidis (n=250), 0 = Never used bidis (n=14,290); based on data from 134 secondary schools
Model 2: 1 = Currently uses bidis (n=127), 0 = Does not currently use bidis (n=14,168); based on data from 134 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
* p<0.05 **p<0.01 ***p<0.001

6.3.9.2 School- and student-level characteristics associated with ever use of bidis among grades 9 and 10 students in Canada

Table 19 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with ever use of bidis (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=0.73, df=8, p>0.05) and adjusting for all other variables in the model, none of the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported having ever used bidis.

Model 1 illustrates that after controlling for province and adjusting for all other variables in the model, male students were significantly more likely to report having ever used bidis compared to female students (AOR 2.52, 95%CI 1.39 to 4.57). Compared to those who described themselves as White, those who described themselves as Aboriginal were significantly less likely to report having ever used bidis (AOR 0.23, 95%CI 0.07 to 0.80), whereas those who described themselves as Latin American or Hispanic were significantly more likely to report having ever used bidis (AOR 20.68, 95%CI 7.73 to 55.34). Students who did not know how much they get each week were significantly less likely to report having ever used bidis compared to students who did not get any money (AOR 0.18, 95%CI 0.05 to 0.64). In contrast, compared to those who have never tried smoking manufactured cigarettes, grade 9 or 10 students who puff (AOR 13.38, 95%CI 4.33 to

41.33), experimentally smoked in the past (AOR 7.95, 95%CI 2.21 to 28.55), experimentally smoke (AOR 8.59, 95%CI 2.26 to 32.72), or currently smoke daily (AOR 28.36, 95%CI 7.27 to 110.60) were significantly more likely to report having ever used bidis. Additionally, grades 9 or 10 students who reported having ever used RYO cigarettes (AOR 20.59, 95%CI 9.43 to 44.96), pipe tobacco (AOR 4.87, 95%CI 2.38 to 9.95), or blunt wraps (AOR 3.30, 95%CI 1.66 to 6.57) were significantly more likely to have ever used bidis compared to those who did not report ever using each of these products. Compared to non-binge drinkers, grades 9 or 10 students who were current binge drinkers were significantly less likely to have ever used bidis (AOR 0.29, 95%CI 0.12 to 0.70).

Variables that were not significantly associated with bidi ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student bidi smoking rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, grade, parent's smoking status, sibling's smoking status, friend's smoking status, ever use of cigars, ever use of cigarillos or little cigars, ever use of SLT, ever use of a hookah, ever use of flavoured tobacco, and marijuana use status.

Table 19: Multilevel logistic regression models examining school- and student-level characteristics associated with bidi ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		**Adjusted Odds Ratio[a] (95% CI)** Model 1 **Bidi ever use**	Model 2 **Bidi current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	1.04 (0.33, 3.31)	2.05 (0.31, 13.47)
School's senior student bidi smoking rate	Low	1.00	1.00
	High	1.45 (0.34, 6.17)	1.10 (0.13, 9.36)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Bidi ever use**	Model 2 **Bidi current use**
Geographic classification	Rural	1.00	1.00
	Suburban	1.09 (0.23, 5.17)	1.60 (0.14, 18.63)
	Urban	0.75 (0.14, 4.14)	2.53 (0.14, 47.45)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	1.91 (0.48, 7.65)	2.56 (0.20, 32.89)
	3 or 4	1.41 (0.30, 6.71)	5.11 (0.42, 61.92)
	5 or more	2.30 (0.50, 10.50)	6.38 (0.54, 75.04)
Neighbourhood household income	Below average	1.00	1.00
	Average	1.27 (0.28, 5.72)	1.08 (0.06, 18.27)
	Above average	2.12 (0.42, 10.70)	1.66 (0.10, 28.44)
Student-level characteristics			
Gender	Female	1.00	1.00
	Male	**2.52 (1.39, 4.57)****	2.13 (0.50, 9.17)
Grade	9	1.00	1.00
	10	0.66 (0.38, 1.17)	1.34 (0.34, 5.35)
Ethnicity	White	1.00	1.00
	Asian	2.90 (0.78, 10.82)	1.63 (0.17, 15.78)
	Other	2.24 (0.93, 5.38)	1.84 (0.27, 12.52)
	Aboriginal	**0.23 (0.07, 0.80)***	0.09 (0.00, 2.82)
	Black	1.79 (0.67, 4.77)	6.46 (0.77, 53.92)
	Latin American/Hispanic	**20.68 (7.73, 55.34)*****	11.91 (0.75, 190.12)
Amount of money respondents usually get <u>each week</u> to spend on themselves or to save	$0	1.00	1.00
	$1-20	0.53 (0.25, 1.16)	**0.06 (0.01, 0.45)****
	$21-40	0.54 (0.21, 1.34)	**0.04 (0.00, 0.49)***
	$41-100	0.47 (0.16, 1.41)	**0.03 (0.00, 0.69)***
	More than $100	0.90 (0.38, 2.10)	0.28 (0.04, 1.83)
	I don't know how much I get each week	**0.18 (0.05, 0.64)****	**0.02 (0.00, 0.74)***
Respondents with parents, step-parents, or guardians who smoke	No	1.00	1.00
	Yes	1.15 (0.63, 2.09)	1.59 (0.40, 6.39)
Respondents with siblings that smoke	No	1.00	1.00
	Yes	1.53 (0.86, 2.71)	**4.52 (1.12, 18.34)***
Number of close friends that smoke cigarettes	0	1.00	1.00
	1-2	0.62 (0.27, 1.46)	0.76 (0.07, 8.19)
	3 or more	0.87 (0.40, 1.92)	0.34 (0.05, 2.46)
Respondent's smoking status (manufactured cigarettes)	Never tried	1.00	1.00
	Puffs	**13.38 (4.33, 41.33)*****	0.79 (0.06, 11.18)
	Experimentally smoked in the past	**7.95 (2.21, 28.55)****	0.39 (0.01, 25.76)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Bidi ever use**	Model 2 **Bidi current use**
	Experimentally smokes (beginning)	**8.59 (2.26, 32.72)****	4.31 (0.30, 61.10)
	Formerly smoked	2.44 (0.35, 16.93)	0.10 (0.00, 978.74)
	Currently smoked occasionally	3.95 (0.99, 15.76)	1.36 (0.11, 16.77)
	Currently smokes daily	**28.36 (7.27, 110.60)*****	4.47 (0.35, 57.54)
Used cigarillos or little cigars[b]	No	1.00	1.00
	Yes	0.89 (0.41, 1.94)	1.49 (0.24, 9.28)
Used cigars[b]	No	1.00	1.00
	Yes	0.67 (0.32, 1.41)	1.16 (0.19, 7.12)
Used roll-your-own cigarettes[b]	No	1.00	1.00
	Yes	**20.59 (9.43, 44.96)*****	**13.61 (2.18, 85.02)****
Used smokeless tobacco[b]	No	1.00	1.00
	Yes	1.67 (0.84, 3.35)	**12.27 (2.54, 59.30)****
Used a hookah[b]	No	1.00	1.00
	Yes	1.33 (0.68, 2.62)	0.56 (0.10, 3.16)
Used pipe tobacco[b]	No	1.00	1.00
	Yes	**4.87 (2.38, 9.95)*****	**8.11 (1.76, 37.49)****
Used blunt wraps[b]	No	1.00	1.00
	Yes	**3.30 (1.66, 6.57)*****	**21.31 (3.43, 132.56)****
Ever used flavoured tobacco products[c]	No	1.00	1.00
	Yes	2.04 (0.90, 4.63)	-
Respondent's binge drinking status[d]	Non-binge drinker	1.00	1.00
	Non-current binge drinker	1.04 (0.48, 2.25)	0.66 (0.09, 5.00)
	Current binge drinker	**0.29 (0.12, 0.70)****	0.17 (0.02, 1.53)
Respondent's marijuana use status[e]	Non-marijuana user	1.00	1.00
	Non-current marijuana user	0.76 (0.28, 2.05)	4.70 (0.27, 81.79)
	Current marijuana user	2.57 (0.99, 6.65)	**9.36 (1.01, 86.52)***

Model 1: 1 = Ever used bidis (n=187), 0 = Never used bidis (n=12,735); based on data from 133 secondary schools
Model 2: 1 = Currently uses bidis (n=92), 0 = Does not currently use bidis (n=12,742); based on data from 133 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
[b] Model 1 examined ever use of each product, while Model 2 examined current use of each product.
[c] Model 2 did not include ever use of flavoured tobacco products
[d] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.
[e] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.
* p<0.05 **p<0.01 ***p<0.001

6.3.10 Factors associated with current use of bidis among grades 9 and 10 students in Canada

As shown in Table 9, between-school random variation in the odds a student currently uses bidis was identified [$\sigma^2_{\mu 0}$=1.494 (0.401)]; school-level differences accounted for 31.2% of the variability in bidi current use.

6.3.10.1 School-level characteristics associated with current use of bidis among grades 9 and 10 students in Canada

Table 18 presents adjusted odds ratios for school-level characteristics associated with current use of bidis (Model 2) among grades 9 and 10 students in Canada. After controlling for province (F=1.33, df=8, p>0.05) and adjusting for all other variables in the model, none of the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported currently using bidis.

Variables that were not significantly associated with bidi current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student bidi smoking rate, the school's geographic classification, the tobacco retailer density, or the neighbourhood household income.

6.3.10.2 School- and student-level characteristics associated with current use of bidis among grades 9 and 10 students in Canada

Table 19 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with current use of bidis (Model 2) among grades 9 and 10 students in Canada. After controlling for province (F=0.79, df=8, p>0.05) and adjusting for all other variables in the model, none of the school-level characteristics examined were

significantly associated with the odds that a grade 9 or 10 student reported currently using bidis.

Model 2 illustrates that after controlling for province and adjusting for all other variables in the model, compared to students who did not get any money each week, those who got between $1 and $20 (AOR 0.06, 95%CI 0.01 to 0.45), $21 and $40 (AOR 0.04, 95%CI 0.00 to 0.49), $41 and $100 (AOR 0.03, 95%CI 0.00 to 0.69), or who did not know how much they get each week (AOR 0.02, 95%CI 0.00 to 0.74) were significantly less likely to report currently using bidis. In contrast, students with siblings that smoked manufactured cigarettes were significantly more likely to report currently using bidis compared to those with no siblings that smoked (AOR 4.52, 95%CI 1.12 to 18.34). Similarly, grades 9 or 10 students who reported currently using RYO cigarettes (AOR 13.61, 95%CI 2.18 to 85.02), SLT (AOR 12.27, 95%CI 2.54 to 59.30), pipe tobacco (AOR 8.11, 95%CI 1.76 to 37.49), or blunt wraps (AOR 21.31, 95%CI 3.43 to 132.56) were significantly more likely to report currently using bidis compared to those who did not report currently using each of these products. Finally, compared to non-marijuana users, grades 9 and 10 students who were current marijuana users were significantly more likely to report currently using bidis (AOR 9.36, 95%CI 1.01 to 86.52).

Variables that were not significantly associated with bidi current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student bidi smoking rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, gender, grade, ethnicity, parent's smoking status, friend's smoking status, a youth's smoking status, current use of cigars, current use of cigarillos or little

cigars, current use of a hookah, and binge drinking status. This model did not include ever use of flavoured tobacco products.

6.3.11 Factors associated with ever use of a hookah among grades 9 and 10 students in Canada

As shown in Table 8, between-school random variation in the odds a student ever used a hookah was identified [$\sigma^2_{\mu 0}$=0.528 (0.103)]; school-level differences accounted for 13.8% of the variability in hookah ever use.

6.3.11.1 School-level characteristics associated with ever use of a hookah among grades 9 and 10 students in Canada

Table 20 presents adjusted odds ratios (AOR) for school-level characteristics associated with ever use of a hookah (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=1.79, df=8, p>0.05) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with 3 or 4 tobacco retailers within 1km of the school were significantly more likely to report having ever used a hookah compared to students who attended a secondary school with no tobacco retailers within 1km of the school (AOR 1.73, 95%CI 1.04 to 2.88).

Variables that were not significantly associated with hookah ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student hookah use rate, the school's geographic classification, and the neighbourhood household income.

Table 20: Multilevel logistic regression models examining school-level characteristics associated with hookah ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Hookah ever use**	Model 2 **Hookah current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	1.44 (0.94, 2.19)	1.40 (0.75, 2.60)
School's senior student hookah use rate	Low	1.00	1.00
	High	1.41 (0.98, 2.03)	**1.75 (1.03, 2.97)***
Geographic classification	Rural	1.00	1.00
	Suburban	1.23 (0.70, 2.13)	0.72 (0.32, 1.61)
	Urban	1.11 (0.61, 2.01)	0.88 (0.37, 2.09)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	0.75 (0.46, 1.21)	0.64 (0.31, 1.29)
	3 or 4	**1.73 (1.04, 2.88)***	1.24 (0.59, 2.62)
	5 or more	1.30 (0.77, 2.18)	1.06 (0.49, 2.27)
Neighbourhood household income	Below average	1.00	1.00
	Average	0.71 (0.43, 1.17)	0.97 (0.44, 2.13)
	Above average	1.45 (0.84, 2.52)	1.73 (0.75, 3.96)

Model 1: 1 = Ever used a hookah (n=778), 0 = Never used a hookah (n=13,762); based on data from 134 secondary schools
Model 2: 1 = Currently uses a hookah (n=339), 0 = Does not currently use a hookah (n=13,956); based on data from 134 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
* p<0.05 **p<0.01 ***p<0.001

6.3.11.2 School- and student-level characteristics associated with ever use of a hookah among grades 9 and 10 students in Canada

Table 21 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with ever use of a hookah (Model 1) among grades 9 and 10 students in Canada. After controlling for province (F=1.86, df=8, p>0.05) and adjusting for all other variables in the model, students who attended a secondary school with 3 or 4 tobacco retailers within 1km of the school were significantly more likely to report having ever used a

hookah compared to students who attended a secondary school with no tobacco retailers within 1km of the school (AOR 1.94, 95%CI 1.03 to 3.64).

Model 1 illustrates that after controlling for province and adjusting for all other variables in the model, male students were significantly less likely to report having ever used a hookah compared to female students (AOR 0.78, 95%CI 0.64 to 0.95). Compared to those who described themselves as White, those who described themselves as Aboriginal were significantly less likely to report having ever used a hookah (AOR 0.23, 95%CI 0.13 to 0.40), whereas those who described themselves as Black or other were significantly more likely to report having ever used a hookah (AOR 3.34, 95%CI 2.17 to 5.15; and AOR 2.30, 95%CI 1.65 to 3.19, respectively). Compared to those with no parents (including step-parents or guardians) who smoked manufactured cigarettes, grades 9 and 10 students with parents who smoked manufactured cigarettes were significantly less likely to report having ever used a hookah (AOR 0.71, 95%CI 0.57 to 0.88). In contrast, compared to students with no siblings who smoked manufactured cigarettes, grades 9 and 10 students with siblings who smoked were significantly more likely to report having ever used a hookah (AOR 1.55, 95%CI 1.23 to 1.95). Furthermore, compared to those who have never tried smoking manufactured cigarettes, grades 9 and 10 students who puff (AOR 1.67, 95%CI 1.19 to 2.34), experimentally smoked in the past (AOR 1.70, 95%CI 1.15 to 2.51), experimentally smoke (AOR 2.15, 95%CI 1.44 to 3.21), currently smoke occasionally (AOR 1.73, 95%CI 1.09 to 2.76), or currently smoke daily (AOR 2.06, 95%CI 1.22 to 3.50) were more likely to report having ever used a hookah. Additionally, grades 9 and 10 students who reported having ever used SLT (AOR 2.27, 95%CI 1.64 to 3.14), bidis (AOR 1.70, 95%CI 1.03 to 2.80), pipe tobacco (AOR 2.73, 95%CI 2.05 to 3.64), or blunt wraps (AOR 4.27, 95%CI 3.12 to 5.85) were significantly more likely to report having ever used a hookah compared to

those who report never using each of these products. Similarly, grades 9 and 10 students who did not report ever using flavoured tobacco products were significantly more likely to report having ever used a hookah compared to those who reported never using flavoured tobacco products (AOR 4.06, 95%CI 3.08 to 5.35). Finally, compared to non-marijuana users, grades 9 and 10 students who were non-current or current marijuana users were significantly more likely to report having ever used a hookah (AOR 2.53, 95%CI 1.84 to 3.48; and AOR 5.35, 95%CI 3.91 to 7.32, respectively).

Variables that were not significantly associated with hookah ever use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student hookah use rate, the school's geographic classification, the neighbourhood household income, grade, disposable income, friend's smoking status, ever use of cigars, ever use of cigarillos or little cigars, ever use of RYO cigarettes, and binge drinking status.

Table 21: Multilevel logistic regression models examining school- and student-level characteristics associated with hookah ever and current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters		**Adjusted Odds Ratio[a] (95% CI)** Model 1 **Hookah ever use**	Model 2 **Hookah current use**
School-level characteristics			
School's senior student manufactured cigarette smoking rate	Low	1.00	1.00
	High	1.06 (0.63, 1.79)	1.29 (0.51, 3.30)
School's senior student hookah use rate	Low	1.00	1.00
	High	1.43 (0.91, 2.23)	1.58 (0.70, 3.56)
Geographic classification	Rural	1.00	1.00
	Suburban	1.22 (0.60, 2.51)	0.54 (0.15, 1.87)
	Urban	1.37 (0.63, 2.96)	1.18 (0.31, 4.51)
Tobacco retailer density within 1km of the school	None	1.00	1.00
	1 or 2	0.77 (0.43, 1.40)	0.85 (0.29, 2.49)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Hookah ever use**	Model 2 **Hookah current use**
	3 or 4	**1.94 (1.03, 3.64)***	1.31 (0.41, 4.19)
	5 or more	1.24 (0.65, 2.39)	1.11 (0.35, 3.57)
Neighbourhood household income	Below average	1.00	1.00
	Average	0.77 (0.41, 1.46)	1.35 (0.40, 4.56)
	Above average	1.90 (0.95, 3.78)	2.06 (0.58, 7.33)
Student-level characteristics			
Gender	Female	1.00	1.00
	Male	**0.78 (0.64, 0.95)***	1.38 (0.99, 1.92)
Grade	9	1.00	1.00
	10	1.09 (0.89, 1.34)	**1.64 (1.15, 2.35)****
Ethnicity	White	1.00	1.00
	Asian	1.49 (0.97, 2.27)	0.95 (0.45, 1.99)
	Other	**2.30 (1.65, 3.19)*****	**2.15 (1.26, 3.65)****
	Aboriginal	**0.23 (0.13, 0.40)*****	**0.27 (0.11, 0.66)****
	Black	**3.34 (2.17, 5.15)*****	**4.01 (2.12, 7.61)*****
	Latin American/Hispanic	1.62 (0.96, 2.73)	1.92 (0.87, 4.26)
Amount of money respondents usually get each week to spend on themselves or to save	$0	1.00	1.00
	$1-20	1.06 (0.80, 1.41)	**2.68 (1.48, 4.86)****
	$21-40	1.10 (0.78, 1.53)	**5.65 (3.08, 10.37)*****
	$41-100	1.26 (0.87, 1.82)	**4.33 (2.14, 8.76)*****
	More than $100	0.79 (0.54, 1.14)	**2.38 (1.18, 4.80)***
	I don't know how much I get each week	0.76 (0.52, 1.13)	1.83 (0.86, 3.91)
Respondents with parents, step-parents, or guardians who smoke	No	1.00	1.00
	Yes	**0.71 (0.57, 0.88)****	**0.58 (0.41, 0.83)****
Respondents with siblings that smoke	No	1.00	1.00
	Yes	**1.55 (1.23, 1.95)*****	1.36 (0.94, 1.96)
Number of close friends that smoke cigarettes	0	1.00	1.00
	1-2	0.85 (0.65, 1.11)	0.68 (0.42, 1.11)
	3 or more	1.07 (0.82, 1.42)	0.81 (0.50, 1.32)
Respondent's smoking status (manufactured cigarettes)	Never tried	1.00	1.00
	Puffs	**1.67 (1.19, 2.34)****	0.66 (0.36, 1.22)
	Experimentally smoked in the past	**1.70 (1.15, 2.51)****	0.83 (0.42, 1.62)
	Experimentally smokes (beginning)	**2.15 (1.44, 3.21)*****	1.54 (0.82, 2.89)
	Formerly smoked	1.05 (0.53, 2.10)	0.02 (0.00, 1.23)
	Currently smoked occasionally	**1.73 (1.09, 2.76)***	0.87 (0.42, 1.81)
	Currently smokes daily	**2.06 (1.22, 3.50)****	0.64 (0.28, 1.46)

Parameters		Adjusted Odds Ratio[a] (95% CI) Model 1 **Hookah ever use**	Model 2 **Hookah current use**
Used cigarillos or little cigars[b]	No	1.00	1.00
	Yes	1.05 (0.80, 1.36)	**1.57 (1.04, 2.36)***
Used cigars[b]	No	1.00	1.00
	Yes	1.26 (0.99, 1.61)	**2.13 (1.34, 3.38)****
Used roll-your-own cigarettes[b]	No	1.00	1.00
	Yes	1.21 (0.90, 1.64)	0.80 (0.46, 1.41)
Used smokeless tobacco[b]	No	1.00	1.00
	Yes	**2.27 (1.64, 3.14)*****	0.92 (0.49, 1.74)
Used bidis[b]	No	1.00	1.00
	Yes	**1.70 (1.03, 2.80)***	1.69 (0.59, 4.79)
Used pipe tobacco[b]	No	1.00	1.00
	Yes	**2.73 (2.05, 3.64)*****	**13.04 (7.48, 22.72)*****
Used blunt wraps[b]	No	1.00	1.00
	Yes	**4.27 (3.12, 5.85)*****	**7.66 (4.55, 12.89)*****
Ever used flavoured tobacco products	No	1.00	1.00
	Yes	**4.06 (3.08, 5.35)*****	**7.11 (4.45, 11.36)*****
Respondent's binge drinking status[c]	Non-binge drinker	1.00	1.00
	Non-current binge drinker	1.33 (0.99, 1.79)	**2.60 (1.52, 4.46)*****
	Current binge drinker	1.12 (0.82, 1.55)	**2.09 (1.22, 3.58)****
Respondent's marijuana use status[d]	Non-marijuana user	1.00	1.00
	Non-current marijuana user	**2.53 (1.84, 3.48)*****	**2.39 (1.27, 4.49)****
	Current marijuana user	**5.35 (3.91, 7.32)*****	**6.13 (3.47, 10.83)*****

Model 1: 1 = Ever used a hookah (n=654), 0 = Never used a hookah (n=12,268); based on data from 133 secondary schools
Model 2: 1 = Currently uses a hookah (n=278), 0 = Does not currently use a hookah (n=12,471); based on data from 133 secondary schools
[a] Odds ratios controlling for province and adjusting for all other variables in the table
[b] Model 1 examined ever use of each product, while Model 2 examined current use of each product.
[c] Non-binge drinkers included those who have never had a drink of alcohol, and those who have never had 5 drinks or alcohol or more on one occasion; Non-current binge drinkers included those who did not have 5 or more drinks on one occasion in the last 12 months, and those who had 5 drinks of alcohol or more less than once a month; Current binge drinkers included those who had 5 drinks of alcohol or more once a month, 2 to 3 times a month, once a week, 2 to 5 times a week, and daily or almost daily.
[d] Non-marijuana users included those who have never used marijuana; Non-current marijuana users included those who have used it but not in the last 12 months, and those who used it less than once a month; Current marijuana users included those who used it once a month, 2 or 3 times a month, once a week, 2 or 3 times a week, 4 to 6 times a week, and every day.
* p<0.05 **p<0.01 ***p<0.001

6.3.12 Factors associated with current use of a hookah among grades 9 and 10 students in Canada

As shown in Table 9, between-school random variation in the odds a student currently uses a hookah was identified [$\sigma^2_{\mu 0}$=0.678 (0.162)]; school-level differences accounted for 17.1% of the variability in hookah current use.

6.3.12.1 School-level characteristics associated with current use of a hookah among grades 9 and 10 students in Canada

Table 20 presents adjusted odds ratios (AOR) for school-level characteristics associated with current use of a hookah (Model 2) among grades 9 and 10 students in Canada. After controlling for province (F=0.59, df=8, p>0.05) and adjusting for all other variables in the model, grades 9 and 10 students who attended a secondary school with a high rate of senior students that currently used a hookah were significantly more likely to report currently using a hookah compared to students who attended a school with a low rate (AOR 1.75, 95%CI 1.03 to 2.97).

Variables that were not significantly associated with hookah current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's geographic classification, the tobacco retailer density, and the neighbourhood household income.

6.3.12.2 School- and student-level characteristics associated with current use of a hookah among grades 9 and 10 students in Canada

Table 21 presents adjusted odds ratios (AOR) for school- and student-level characteristics associated with current use of a hookah (Model 2) among grades 9 and 10 students in Canada. After controlling for province (F=0.95, df=8, p>0.05) and adjusting for all

other variables in the model, none of the school-level characteristics examined were significantly associated with the odds that a grade 9 or 10 student reported currently using a hookah.

Model 2 illustrates that after controlling for province and adjusting for all other variables in the model, grade 10 students were significantly more likely to report currently using a hookah compared to grade 9 students (AOR 1.64, 95%CI 1.15 to 2.35). Compared to those who described themselves as White, those who described themselves as Aboriginal were significantly less likely to report currently using a hookah (AOR 0.27, 95%CI 0.11 to 0.66), whereas those who described themselves as Black or other were significantly more likely to report currently using a hookah (AOR 4.01, 95%CI 2.12 to 7.61; and AOR 2.15, 95%CI 1.26 to 3.65, respectively). Students who got between $1 and $20 (AOR 2.68, 95%CI 1.48 to 4.86), $21 and $40 (AOR 5.65, 95%CI 3.08 to 10.37), $41 and $100 (AOR 4.33, 95%CI 2.14 to 8.76), or more than $100 each week (AOR 2.38, 95%CI 1.18 to 4.80) were significantly more likely to report currently using a hookah compared to students who did not get any money each week. In contrast, compared to students with no siblings who smoked manufactured cigarettes, grades 9 and 10 students with siblings who smoked were significantly less likely to report currently using a hookah (AOR 0.58, 95%CI 0.41 to 0.83). Grades 9 and 10 students who reported currently using cigarillos or little cigars (AOR 1.57, 95%CI 1.04 to 2.36), cigars (AOR 2.13, 95%CI 1.34 to 3.38), pipe tobacco (AOR 13.04, 95%CI 7.48 to 22.72), or blunt wraps (AOR 7.66, 95%CI 4.55 to 12.89) were significantly more likely to report currently using a hookah compared to those who did not report currently using each of these products. Similarly, grades 9 and 10 students who reported having ever used flavoured tobacco products were significantly more likely to report currently using a hookah compared to those who reported never using flavoured tobacco

products (AOR 7.11, 95%CI 4.45 to 11.36). Compared to non-binge drinkers, non-current or current binge drinkers were significantly more likely to report currently using a hookah (AOR 2.60, 95%CI 1.52 to 4.46; and AOR 2.09, 95%CI 1.22 to 3.58, respectively). Finally, compared to non-marijuana users, grades 9 and 10 students who were non-current or current marijuana users were significantly more likely to report currently using a hookah (AOR 2.39, 95%CI 1.27 to 4.49; and AOR 6.13, 95%CI 3.47 to 10.83, respectively).

Variables that were not significantly associated with hookah current use after controlling for province and adjusting for all other variables in the model included: the school's senior student manufactured cigarette smoking rate, the school's senior student hookah use rate, the school's geographic classification, the tobacco retailer density, the neighbourhood household income, gender, sibling's smoking status, friend's smoking status, a youth's smoking status, current use of RYO cigarettes, current use of SLT, and current use of bidis.

6.4 Summary of school- and student-level characteristics associated with alternative tobacco product use among grades 9 and 10 students in Canada

Table 22 presents a summary of the school- and student-level characteristics associated with ATP ever use among grades 9 and 10 students in Canada, while Table 23 presents a summary of the school- and student-level characteristics associated with ATP current use among grades 9 and 10 students in Canada.

Table 22: Summary table of school- and student-level characteristics associated with alternative tobacco product ever use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters	Ever use of alternative tobacco products					
	Cigarillos or little cigars	**Cigars**	**Roll-your-own cigarettes**	**Smokeless tobacco**	**Bidis**	**Hookah**
School-level characteristics						
School's senior student tobacco use rate	-high rates of cigarillo or little cigar use predictive			-high rates of SLT use predictive		
Geographic classification						
Tobacco retailer density within 1km of the school						
Neighbourhood household income			-higher household income protective			
Student-level characteristics						
Gender	-male predictive	-male predictive	-male protective	-male predictive	-male predictive	-male protective
Grade	-grade 10 predictive		-grade 10 protective			
Disposable income	-more income predictive			-more income predictive		
Social influences	-siblings that smoke protective -friends that smoke predictive		-friends that smoke predictive	-siblings that smoke protective		-parents that smoke protective -siblings that smoke predictive
Other tobacco product use	-manufactured cigarette, cigar, RYO cigarette, pipe tobacco, and blunt wrap use predictive	-manufactured cigarette, cigarillo or little cigar, RYO cigarette, SLT, hookah, pipe tobacco, and blunt wrap use predictive	-manufactured cigarette, cigarillo or little cigar, cigar, bidi, pipe tobacco, and blunt wrap use predictive	-cigar, bidi, hookah, pipe tobacco, and blunt wrap use predictive	-manufactured cigarette, RYO cigarette, pipe tobacco, and blunt wrap use predictive	-manufactured cigarette, SLT, bidi, pipe tobacco, and blunt wrap use predictive
Flavoured tobacco product use	-ever use predictive	-ever use predictive		-ever use predictive		-ever use predictive
Binge drinking behaviour	-binge drinking predictive	-binge drinking predictive		-binge drinking predictive		
Marijuana use	-marijuana use predictive	-marijuana use predictive	-marijuana use predictive	-marijuana use predictive		-marijuana use predictive

Table 23: Summary table of school- and student-level characteristics associated with alternative tobacco product current use among Canadian students (grades 9 and 10), 2010-11 Youth Smoking Survey, Canada.

Parameters	Current use of alternative tobacco products					
	Cigarillos or little cigars	**Cigars**	**Roll-your-own cigarettes**	**Smokeless tobacco**	**Bidis**	**Hookah**
School-level characteristics						
School's senior student tobacco use rate						
Geographic classification						
Tobacco retailer density within 1km of the school						
Neighbourhood household income			-higher household income protective			
Student-level characteristics						
Gender	-male predictive	-male predictive		-male predictive		
Grade		-grade 10 protective	-grade 10 protective			-grade 10 predictive
Disposable income	-more income predictive	-more income predictive			-more income protective	-more income predictive
Social influences	-parents and friends that smoke predictive	-parents that smoke protective -friends that smoke predictive	-friends that smoke predictive		-siblings that smoke predictive	-parents that smoke protective
Other tobacco product use	-manufactured cigarette, cigar, SLT, and pipe tobacco use predictive	-manufactured cigarette, cigarillo or little cigar, RYO cigarette, SLT, hookah, and blunt wrap use predictive	-manufactured cigarette, cigar, bidi, and pipe tobacco use predictive	-manufactured cigarette use protective -cigar, bidi, pipe tobacco, and blunt wrap use predictive	-RYO cigarette, SLT, pipe tobacco, and blunt wrap use predictive	-cigarillo or little cigar, cigar, pipe tobacco, and blunt wrap use predictive
Flavoured tobacco product use	-ever use predictive	-ever use predictive	-ever use predictive	-ever use predictive	N/A	-ever use predictive
Binge drinking behaviour	-binge drinking predictive			-binge drinking predictive		-binge drinking predictive
Marijuana use	-marijuana use predictive	-marijuana use predictive	-marijuana use predictive			-marijuana use predictive

Chapter 7

Discussion

Alternative tobacco product (ATP) use is an important tobacco control issue among Canadian students since over 181,000 students in grades 9 and 10 (24.5%) reported having ever used one or more ATPs (including cigars, cigarillos or little cigars, RYO cigarettes, SLT, bidis, a hookah, pipe tobacco, or blunt wraps) and over 83,000 students in grades 9 and 10 (11.5%) reported currently using one or more ATPs. It is evident from these data that the prevalence of ATP ever and current use is very similar to that of manufactured cigarettes (30.7% of students in grades 9 and 10 reported ever using manufactured cigarettes and 11.2% of students in grades 9 and 10 reported currently using manufactured ciagrettes); therefore tobacco control programs and policies should include strategies to curb the use of all tobacco products, especially given the potentially different determinants and contexts in which use occurs.

7.1 Tobacco use among Canadian students (grades 9-10)

ATP ever and current use varies considerably across products. According to the current study, 45,800 grades 9 and 10 students reported currently using cigarillos or little cigars, 30,200 students reported currently using cigars, 24,900 students reported currently using RYO cigarettes, 12,300 students reported currently using SLT, 4,100 students reported currently using bidis, and 18,100 students reported currently using a hookah. Because the use of ATPs varies considerably across products, surveillance tools that collect data on a range of tobacco products allow decision makers to accurately measure tobacco use in Canada and distribute funds and plan interventions accordingly. For example, although recent attention has been placed on hookah use among youth (Noonan, 2010;

NSRA, 2011), the current data reveal that the prevalence of use of cigarillos or little cigars, or RYO cigarettes is higher than that of a hookah but their use receives less attention within tobacco control programming activities and research.

The public health focus on manufactured cigarettes has left a gap in our understanding where relatively little is known with respect to factors that influence the use of ATPs, especially among youth. As a result, current tobacco control policies focus on the use of manufactured cigarettes and do not address the use of ATPs even though these results confirm that their prevalence of use is equal to that of manufactured cigarettes and many ATPs pose risks that are equal to or greater than manufactured cigarettes (Akl et al., 2010; Engeland et al., 1996; Iribarren et al., 1999; Rahman, Sakamoto & Fukui, 2003; Rodu & Jansson, 2004). For example, the Smoke-Free Ontario Act, which prohibits smoking or holding lit tobacco at schools, does not prohibit the use of SLT (an unlit tobacco product) at school (Government of Ontario, 1994). Additionally, the ban on flavoured tobacco products implemented by the Government of Canada is limited to prohibiting specified additives to cigarettes, little cigars, and blunt wraps (Health Canada, 2010); flavouring agents are still permitted in loose tobacco and SLT products. Therefore, additional efforts are required to ensure that future tobacco control policies are not focused on a single product, but rather are designed to impact the range of tobacco products available.

These data reveal that there is a population of youth who use ATPs but who do not use manufactured cigarettes. As a result, according to the operational definitions used in the YSS (Elton-Marshall et al., 2011), these youth would not be typically classified as current smokers. For example, about 3% of grade 9 students and 5% of grade 10 students who currently use one or more ATPs are not represented in current smoking prevalence estimates reported by Health Canada since they are not smoking manufactured cigarettes

(Health Canada, 2012b). By not including ATPs in the national smoking estimates, current tobacco surveillance tools used in Canada underestimate the prevalence of tobacco use, especially among vulnerable populations such as Canadian youth. Since there are some ATP users who do not consider these products to be tobacco products (for example, cigars; Page & Evans, 2003) or who perceive these products to be less harmful (for example, smokeless tobacco, bidis, or hookah; Callery et al., 2011; Martinasek, McDermott & Martini, 2011; McMillen, Maduka & Winickoff, 2012; Yen, Hechavarria & Bostwick, 2000), it is unlikely that this population of tobacco users is reached through current tobacco control programs and policies which primarily focus on manufactured cigarettes. Therefore, operational definitions of tobacco use that include the full range of possible products and surveillance measures that collect data on a range of tobacco products are required to fully capture the prevalence of tobacco use among Canadian youth. Similarly, national tobacco use estimates, such as those produced by the Youth Smoking Survey and the Canadian Tobacco Use Monitoring Survey, should include prevalence estimates for the use of manufactured cigarettes as well as for the use of any tobacco products.

Consistent with previous research in youth (Saunders & Geletko, 2012) and young adult populations (Rigotti, Lee & Wechsler, 2000), results from the current study illustrate that many students report currently using more than one tobacco product. Of note, a high prevalence of students (88%) who use bidis also currently use a range of other tobacco products (results not shown), suggesting that screening for youth who use bidis might identify those at the highest risk of polytobacco use when it is not possible to measure multiple forms of tobacco. As a result, cessation programs could identify and target these high risk youth. Additional studies are needed to explore polytobacco use and determine the

tobacco control programs and policies that are most effective at deterring the use of multiple tobacco products.

7.2 School-level characteristics associated with the current use of alternative tobacco products among Canadian students (grades 9 and 10)

The school environment continues to play an important role in tobacco control. Consistent with previous research on manufactured cigarettes (Ennett et al., 1997; Leatherdale et al., 2005a; Lovato et al., 2010b; Murnaghan et al., 2007), results from the current study reveal that the school a grade 9 or 10 student attended was significantly associated with the likelihood of currently using an ATP. In fact, compared to manufactured cigarettes (Lovato et al., 2010b), ATPs accounted for more school-level variability in the current use of these tobacco products (between 14.1% and 31.2%). Furthermore, compared to international data (Loukas et al., 2012), these data show that school-level characteristics account for more variation in SLT use among Canadian students. As a result, it is likely that that school environment is more important for predicting ATP use compared to manufactured cigarette use.

The rate of manufactured cigarette smoking among senior students affects the smoking behaviour of younger students (Cameron et al., 1999; Leatherdale et al., 2005a; Murnaghan et al., 2008). Consistent with these findings, results from the current study demonstrate that high rates of manufactured cigarette use increase the odds that a youth uses cigarillos or little cigars and RYO cigarettes, supporting the interconnectedness of the use of various tobacco products. Additionally, these results suggest that reducing the prevalence of manufactured cigarette use among senior students would not only reduce the prevalence of manufactured cigarette use among junior students, but may also reduce the

prevalence of cigarillo or little cigar or RYO cigarette use among these students. Since peers influence tobacco use (Avenevoli & Merikangas, 2003; Doubeni et al., 2008; Kobus, 2003; Tyas & Pederson, 1998) and students obtain tobacco products from each other (DiFranza & Coleman, 2001; Forster et al., 2003), students may be exposed to nontraditional tobacco products through their school peer groups. In this way, the prevalence of manufactured cigarette use among senior students impacts the prevalence of ATP use among junior students. It is clear that tobacco control programs and policies targeted to the use of manufactured cigarettes continue to be important and relevant, especially among older student populations.

In addition, results from the current study increase knowledge of the influence of senior students and show that high rates of SLT use and hookah use among senior students are independently associated with an increased likelihood that a junior student currently uses each of these products. This was especially true for SLT where a grade 9 or 10 student was over 4 times more likely to currently use SLT when a high proportion of senior students currently used SLT. Numerous reasons have been identified to explain how a higher prevalence of senior student manufactured cigarette use influences junior student manufactured cigarette use, namely by increasing the acceptability of smoking behaviours (Alexander et al., 2001; Ennett et al., 1997), by increasing the availability of manufactured cigarettes at school (Doubeni et al., 2008; Forster et al., 2003), and by increasing the likelihood that a student has a friend that smokes manufactured cigarettes (Go et al., 2010; Hoffman et al., 2007). It is likely that senior students that use SLT or a hookah influence junior students through a similar mechanism; however, future studies should explore the relationship between senior and junior tobacco users in order to inform future school-based tobacco control policies. Since there is evidence that school policies that prohibit the use of

snus by students during school hours reduce the likelihood that a student uses snus, (Øverland, Aarø & Lindbak, 2010), the Smoke-Free Ontario Act should be amended to prohibit the use of all tobacco products on and around school property. In this way, the use of all tobacco products, including SLT, would be included in current tobacco control policies within the school context. This approach would require evaluation. Since the current study used the mean SLT rate for sampled secondary schools to identify low and high risk schools, future studies should determine the threshold rate that increases the odds that a student currently uses each tobacco product. This information could then be used to identify high risk schools and allocate tobacco resources accordingly.

Consistent with a review of the association between SES and smoking manufactured cigarettes (Hiscock et al., 2012) as well as research examining the association between SES and price minimizing behaviours (Licht et al., 2011), results from the current study indicate that neighbourhood SES was significantly associated with the odds of using RYO cigarettes. Specifically, grades 9 and 10 students who attended schools in neighbourhoods with an above average SES were significantly less likely to currently use RYO cigarettes, even when student-level characteristics were included in the model. RYO tobacco continues to be a more affordable alternative to manufactured cigarettes, especially since this product is taxed at half the rate of manufactured cigarettes in 8 of 10 Canadian provinces (OTRU, 2010). Furthermore, evidence indicates that those who use RYO cigarettes are heavier smokers (Leatherdale, Kaiserman & Ahmed, 2009; Licht et al., 2011). Therefore, increasing the tobacco taxes applied to RYO tobacco would be an effective strategy to reduce the prevalence of current use, especially among those at the greatest risk of harm, while eliminating a popular price minimizing behaviour.

Contrary to previous studies of manufactured cigarettes (Chan & Leatherdale, 2011; Henriksen et al., 2008; McCarthy et al., 2009; Novak et al., 2006), results from the current study indicate that tobacco retailer density was not associated with current use of any of the ATPs studied. A few possible explanations for these results exist. Since ATPs make up less of the tobacco market (Connolly & Alpert, 2008), it is possible that not all of the products under investigation in this study were sold at all tobacco retailers. Verifying the tobacco products sold at each tobacco retailer was outside of the scope of the current investigation; however, future studies should confirm the tobacco products sold at each tobacco retailer of interest. On the other hand, these results suggest that similar to those that use manufactured cigarettes (Croghan et al., 2003; Forster et al., 2003), students that use ATPs may be more likely to obtain ATPs from social sources, such as family and friends, rather than commercial sources. Determining the source of ATPs was outside of the scope of the current investigation, but future studies should determine whether students obtain ATPs from social or commercial sources. Then again, it is possible that school proximity to tobacco retailers has a greater influence on ATP use than retailer density. Although, the limited evidence for the influence of school proximity to tobacco retailers to the use of manufactured cigarettes reveals that tobacco retailer proximity has no influence on the use of manufactured cigarettes by youth (Henriksen et al., 2008). Alternatively, even though tobacco retailer density does not appear to directly influence ATP use, it could indirectly affect ATP use through the use of manufactured cigarettes. Since this study confirms that a high prevalence of manufactured cigarette use among senior students affects the prevalence of use of ATPs among junior students and previous studies show that tobacco retailer density affects manufactured cigarette use (Chan & Leatherdale, 2011; Henriksen et al., 2008; McCarthy et al., 2009; Novak et al., 2006), zoning policies that limit the tobacco

retailer density around schools could indirectly lead to reductions in ATP use among students. Despite suggestions that changes to tobacco retailer zoning could reduce tobacco use across the population (Ashe et al., 2003; Schneider et al., 2005), there is no evidence to indicate whether this tobacco policy would be effective. However, evidence from studies of alcohol use illustrate that when the sale of alcohol is reduced to specific locations, alcohol consumption and alcohol-related injuries decrease, especially in younger populations (Ramstedt, 2002). Therefore, evidence is required to evaluate whether similar, positive effects would occur if the sale of tobacco was restricted.

The only positive association between tobacco retailer density and the use of an ATP was evident with the use of a hookah, where grades 9 or 10 students who attended a school with 3 or 4 tobacco retailers within 1km of the school were more likely to report having ever used a hookah. Previous evidence suggests that there may be an association between proximity to a hookah lounge and hookah use (Smith et al., 2011; Sterling & Mermelstein, 2011); unfortunately, results from the current study are insufficient to clearly examine this relationship. It is unclear whether these retailers sell a variety of tobacco products, or whether they are hookah specific retailers. These results do however indicate that further evidence is necessary to fully understand the relationship between tobacco retailer density and hookah use.

7.3 Student-level characteristics associated with the current use of alternative tobacco products among Canadian students (grades 9 and 10)

Consistent with most other research of various tobacco products, including cigarillos or little cigars, (Leatherdale et al., 2011a), cigars (Delnevo et al., 2002; Saunders & Geletko, 2012; Soldz, Huyser & Dorsey, 2003), and SLT (Grotvedt et al., 2008; Kennedy et al., 2011;

Loukas et al., 2012; Tercyak & Audrain, 2002), male students were significantly more likely to currently use cigarillos or little cigars, cigars, and SLT compared to female students. However, similar to trends in the use of manufactured cigarettes where a gender difference is no longer apparent (Tyas & Pederson, 1998), it is expected that if action is not taken, the gender difference in the use of ATPs will no longer be significant. An increased use of tobacco products among females is especially concerning as evidence suggests that females are more susceptible to the negative health effects of smoking manufactured cigarettes, including chronic obstructive pulmonary disease (Prescott et al., 1997; Sørheim et al., 2010), oral cancer (Muscat et al., 1996), and lung cancer (McDuffie, Klaassen & Dosman, 1987; Zang & Wynder, 1996). Therefore, preventive strategies are required to reduce the prevalence of tobacco use and reduce the burden of tobacco-related diseases, particularly among females.

In line with results from previous studies (Leatherdale et al., 2011a; Kennedy et al., 2011), results from the current study indicate that students with a higher disposable income are more likely to currently use cigarillos or little cigars, cigars, SLT, and a hookah. Evidence indicates that one of the reasons ATPs are attractive is because they are more affordable than manufactured cigarettes (Richter et al., 2008; Soldz & Dorsey, 2005). In fact, current and former manufactured cigarette smokers may transition to ATPs when tobacco taxes increase the price of manufactured cigarettes but not the price of other tobacco products (Delnevo et al., 2004). For example, data from the Ontario Tobacco Research Unit (2010) reveals that in 2010, RYO tobacco was taxed at half the rate of manufactured cigarettes in 8 of 10 Canadian provinces, increasing the affordability of RYO cigarettes to Canadian youth. Since youth are the most price sensitive population of smokers (Chaloupka et al., 2011), it is recommended that tobacco taxes be applied and increase consistently across all tobacco

products in order to encourage a reduction in tobacco product use, rather than the transition to other, more affordable tobacco products.

Results from the current study indicate that students who have ever used flavoured tobacco products were more likely to currently use cigarillos or little cigars, cigars, RYO cigarettes, SLT, and a hookah. To date, only one other study has examined the relationship between flavoured tobacco use and ATP use. Leatherdale and colleagues (2011a) found that those who have ever used flavoured tobacco were more likely to currently use cigarillos or little cigars and cigars. More research has focused on the use of flavoured manufactured cigarettes among youth and adult populations. Evidence indicates that flavoured manufactured cigarettes are more popular and are rated more positively among younger and newer smokers relative to older, more experienced smokers, suggesting that flavouring tobacco may ease youth into using various tobacco products (Ashare et al., 2007; Hersey et al., 2006; Klein et al., 2008), increasing the risk of earlier addiction. In fact, qualitative evidence from tobacco industry focus groups suggests that there is a population of smokers who would not use manufactured cigarettes if they were not flavoured (Kreslake, Wayne & Connolly, 2008). Additionally, these documents suggest that some manufactured menthol cigarette users may not be affected by tobacco cessation or prevention programs since this population of smokers uses menthol cigarettes because they enjoy the flavour, not to mask the taste of tobacco (Kreslake, Wayne & Connolly, 2008). Finally, evidence indicates that youth who use menthol cigarettes are no more likely to make a quit attempt, even though they are more likely to report using cessation programs or nicotine replacement therapy (Hersey et al., 2006). Taken together, these results demonstrate the negative influence of flavoured manufactured cigarettes. Since flavoured ATPs are appealing due to their smell or taste (Richter et al., 2008; Soldz & Dorsey, 2005), it is likely that flavoured ATPs would also

entice younger and newer smokers who would not normally use these products to begin using tobacco products. Although the Canadian Federal Tobacco Act was amended to prohibit the use of flavour additives in cigars and cigarillos (Bill C-32, 2009), results from the current study support the expansion of Bill C-32 to include all other tobacco products.

It is apparent that youth are not tobacco product sensitive, but rather currently use multiple tobacco products (Bover Manderski, Hrywna & Delnevo, 2012; Brooks et al., 2008; Creath, Wright & Wisniewski, 1992; Delnevo & Hrywna, 2006; Leatherdale et al., 2011a; Saunders & Geletko, 2012), increasing the likelihood of tobacco addiction and the risk of negative long-term health effects. Furthermore, these youth also use other illicit substances including alcohol and marijuana (Cole, Leatherdale & Rynard, [Submitted]; Czoli, Leatherdale & Rynard, 2013; Frazier et al., 2000; Loukas et al., 2012). Therefore, developing tools that allow schools to recognize youth susceptible to using multiple tobacco products and to screen for youth who use multiple tobacco products may allow these institutions to identify the highest risk youth who would most benefit from school-based interventions. As a result, it is apparent that inclusive school-based tobacco control programs and policies are both relevant and necessary to effectively prevent the onset and continual use of numerous tobacco products (Leatherdale & Ahmed, 2010).

7.4 Study Strengths

The present study has several strengths. First, the YSS is a nationally representative survey, providing insight to provincial differences in ATP use in Canada. Additionally, the YSS collects data on a range of tobacco products, producing the most comprehensive picture of tobacco use among youth in Canada. These data allowed for the investigation of multiple tobacco products and the exploration of polytobacco use.

Secondly, the current study improves awareness of the relationship between tobacco products. Typically, existing research examined the relationship between ATP use and manufactured cigarette use (Afifi et al., 2010; Boyle, Claxton & Forster, 1997; Chan et al., 2011; Czoli, Leatherdale & Rynard, 2013; Kennedy et al., 2011; Leatherdale et al., 2011a; Nasim et al., 2012; Smith et al., 2011; Taylor & Biener, 2001; Tercyak & Audrain, 2002). Although this evidence indicates that manufactured cigarette use is highly predictive of ATP use, results from the current study provide additional evidence for the concurrent use of multiple ATPs.

Thirdly, this study explored the influence of school-level characteristics to the use of numerous ATPs, a novel area of research. Previous evidence indicates that characteristics of the school environment are associated with youth uptake of manufactured cigarettes and the progression from occasional to daily smoking patterns (Aveyard, Markham & Cheng, 2004; Bernat et al., 2009; Leatherdale et al., 2005a; Leatherdale et al., 2005b; Murnaghan et al., 2007; Murnaghan et al., 2008); however, evidence with respect ATPs is lacking. Through the inclusion of a variety of proximal (e.g., senior student smoking rates) and distal (e.g., neighbourhood SES, geographic location) school-level characteristics, the current investigation provides additional evidence for TTI, evaluates the influence of each type of characteristic, and highlights the importance of proximal school-level characteristics which are frequently the strongest predictors of a behaviour. Finally, the current study furthers knowledge of the influence of student-level characteristics to the use of numerous ATPs, especially with respect to the use of flavoured tobacco products.

7.5 Study Limitations

The use of secondary data in this study presents a few limitations. First, the use of cross-sectional data does not allow for causal inferences with respect to variables of interest and ATP use. Longitudinal data are required to determine the temporal relationships between manufactured cigarette, alcohol, or marijuana use and ATP use.

Secondly, the current study relies on self-reported smoking behaviours; therefore the validity of responses cannot be guaranteed. However, self-report tobacco use measures have previously been demonstrated to be reliable and valid (Fendrich et al., 2005; Messeri et al., 2007) and students were ensured that their responses were confidential.

Thirdly, measures of ever and current use of tobacco products may not represent the usual use of these products by respondents. It is possible that a respondent first used a product once within the last 30 days; therefore this respondent would be classified as a current user, even though they are not a regular tobacco user. The measures used in the survey did not provide any indication of the frequency of use or whether respondents use multiple tobacco products concurrently. Furthermore, measures of social influence were specific to manufactured cigarette use by family and friends, thereby providing an imperfect measure of ATP use by family and friends.

Fourthly, misclassification errors in the DMTI-EPOI data file may have occurred when tobacco stores, tobacco and tobacco product wholesalers, gasoline stations, convenience stores, and pharmacies and drug stores were assumed to sell tobacco products and subsequently identified as tobacco retailers. It was not feasible to confirm the presence of tobacco products at each retailer; however, these five retailers typically sell tobacco products. The use of postal code information in identifying tobacco retailers and schools may have limited the study's ability to detect associations when there is a difference

between the postal code and the actual building location (DeLuca & Kanaroglou, 2008). It was not feasible to confirm the geographic location of each tobacco retailer and school; however, these data are based on the most accurate data available.

Finally, it was outside of the scope of the current study to include school-level policy information. As a result, the relationship between school-level policies and the use of ATPs cannot be evaluated.

7.6 Implications for future research

Results from the current investigation present some implications and directions for future research. First, current and future tobacco surveillance tools need to include variables to measure the range of tobacco products available, and tobacco use estimates need to consider the use of all types of tobacco products in order to fully describe the scope of tobacco use in Canada. Since there is a population of youth who do not smoke manufactured cigarettes but use ATPs, this population of youth would not be considered smokers according to traditional definitions (Leatherdale et al., 2011a). Furthermore, the use of each ATP should be measured individually, as evidence indicates that current surveillance tools that measure cigar, cigarillo, or little cigar use in a single, broad measure underestimate the actual prevalence of use of these products compared to more specific measures (Delnevo, Bover-Manderski & Hrywna, 2011; Terchek et al., 2009). Additionally, there is a need to develop more robust measures of ever and current use of ATPs (similar to current measures for manufactured cigarette use) that would allow researchers to more accurately identify and classify ATP users based on the frequency of use.

Longitudinal studies are required to examine the relationship between school-level characteristics and ATP use. Specifically, these studies should explore how changes in the

senior student smoking rates influence ATP use and how changes in tobacco retailer density affect ATP use. Although researchers suggest that changes to zoning policies that limit the number and location of tobacco retailers surrounding vulnerable populations would lead to reductions in manufactured cigarette use across the population (Ashe et al., 2003; Schneider et al., 2005), there is a lack of evidence for the effectiveness of this tobacco control policy. Additionally, longitudinal studies are required to investigate the relationship between student-level characteristics and ATP use. Specifically, these studies should explore the temporal relationship between manufactured cigarette, alcohol, or marijuana use and ATP use. Knowledge of the temporal relationship between these health behaviours would provide insight to the population of youth that would most benefit from prevention programming.

Future examinations of the relationship between tobacco retailer density and ATP use should confirm the tobacco products sold at tobacco retailers to evaluate whether tobacco retailers that sell ATPs influence the use of each ATP. There is some evidence of a relationship between proximity to a hookah lounge and hookah use (Smith et al., 2011; Sterling & Mermelstein, 2011), and future studies should limit the investigation to this type of retailer. Alternatively, evidence is required to determine whether students obtain ATPs from commercial sources (such as tobacco retailers) or social sources (such as family members and friends).

Additional evidence is required to evaluate whether there are school policies in effect for the use of ATPs, whether these policies are consistently implemented and enforced, and what effect these policies have on the use of ATPs among students. Knowledge of these school policies will inform whether new school-based prevention and cessation programs are necessary or whether current school-based programs can be expanded to include the

use of ATPs. Consequently, school-based policy evaluation tools (such as the Healthy School Planner by the Joint Consortium for School Health) should include questions that evaluate the existence and implementation of school-based programs and policies that aim to prevent the use of ATPs. Furthermore, it would be worthwhile to determine the threshold tobacco use rate that increases the odds that a student currently uses each tobacco product. This information could then be used to identify high risk schools or communities and allocate tobacco resources accordingly. Developing tools that allow schools to recognize youth susceptible to using multiple tobacco products and to screen for youth who use multiple tobacco products would allow these institutions to identify the highest risk youth who would most benefit from school-based interventions. As a result, it would be prudent to develop indicators for student susceptibility to ATP use similar to the validated smoking susceptibility measure used to identify potential manufactured cigarette smokers (Pierce et al., 1996).

7.7 Implications for practice and policy

Results from the current investigation present some implications and directions for future practice and policy. Recommended actions are outlined below.

1. *Continue to develop inclusive tobacco surveillance tools*. Results from the current study highlight the need to collect data on a range of tobacco products. Since youth use a variety of tobacco products, inclusive tobacco surveillance measures are required to allow decision makers to accurately measure tobacco use in Canada. Additionally, it is important to develop operational definitions of tobacco use that include the full range of tobacco products available for use. Current operational definitions of smoking exclude a population of youth who use ATPs but not

manufactured cigarettes (Leatherdale et al., 2011a), underestimating the prevalence of tobacco use among Canadian youth. Therefore, tobacco surveillance tools should:

a. measure the prevalence of use of all available tobacco products with individual measures for each tobacco product;
b. measure the prevalence of polytobacco use;
c. measure the frequency of ATP use; and,
d. identify sources (i.e., retail, social) of ATPs.

2. *Use the school environment to implement tobacco control programs*. These data indicate that the school environment continues to play an important role in tobacco control since youth spend a considerable amount of time at school where they can be influenced by tobacco control programs and policies (Baillie et al., 2008; Cameron et al., 1999; Leatherdale et al., 2006; Lovato et al., 2010a; Lovato et al., 2010b; Murnaghan et al., 2008). Since evidence indicates that there is a population of youth who do not consider themselves to be tobacco users (e.g., those who smoke the cigar brand “Black & Milds; Page & Evans, 2003) or who consider ATPs to be less harmful than manufactured cigarettes (e.g., those who smoke bidis; Yen, Hechavarria & Bostwick, 2000), these youth may underestimate the risks of using ATPs and may ignore current tobacco control and cessation programs. Therefore, school-based tobacco control programs and policies should:

a. provide accurate health information on a range of tobacco products and negative health behaviours, including alcohol and marijuana use (Leatherdale & Ahmed, 2010);
b. include cessation programs that target all tobacco product users; and,
c. ban the use of all tobacco products at school and in public places at all times.

3. *Expand tobacco price policies so that they are inclusive of all tobacco products*. Current tobacco tax policies are usually applied to manufactured cigarettes, ignoring the plethora of tobacco products available. For example, data from the Ontario Tobacco Research Unit (2010) reveals that in 2010, RYO tobacco was taxed at half the rate of manufactured cigarettes in 8 of 10 Canadian provinces, increasing the affordability of RYO cigarettes to Canadian youth. Additionally, data from Ontario reveals that manufactured cigarette taxes were last increased in 2006, while the tobacco tax applied to cigars has not changed in 10 years (Ontario Ministry of Revenue, 2012). As these data illustrate that students with more disposable income are more likely to use ATPs, and since youth are the most price sensitive population of tobacco users (Chaloupka et al., 2004), it is recommended that:
    a. surveillance tools continue to monitor price minimizing behaviours (such as the use of RYO cigarettes);
    b. tobacco taxes be applied consistently across all tobacco products;
    c. tobacco taxes increase consistently across all tobacco products in order to encourage a reduction in the use of tobacco products rather than a transition to other, more affordable tobacco products; and,
    d. minimum tobacco prices be developed to reduce the price discrepancy across Canadian provinces.
4. *Expand tobacco flavour policies so that they encompass the range of flavoured tobacco products available*. Evidence indicates that ATPs are enticing to individuals because they have an appealing smell or taste (Richter et al., 2008; Soldz & Dorsey, 2005). Although the Canadian Federal Tobacco Act was amended to prohibit the use of flavour additives in cigars, cigarillos, and blunt wraps (Bill C-32, 2009), results

from the current study support the expansion of Bill C-32 to include all other tobacco products.

7.8 Conclusions

The current study illustrates that ATP use is an important tobacco control issue in Canada and current policies and programs inadequately address the use of these products. The school environment continues to play an important role in tobacco control as the rate of tobacco use among senior students affects the use of ATPs by younger students. Since it is apparent that many youth use more than one tobacco product, inclusive tobacco control programs and policies are necessary to address this polytobacco use and reduce the prevalence of tobacco use in this vulnerable population. More robust surveillance tools are needed to continue to monitor the use of ATPs among Canadian youth, and additional studies are necessary to identify the school-based, community-based, and national tobacco control programs and policies that prevent tobacco use.

Appendix A

2010-11 Youth Smoking Survey – Module B

Module B

YOUTH SMOKING SURVEY 2010/2011

PLEASE READ INSTRUCTIONS BEFORE YOU BEGIN THE SURVEY

- **This is NOT a test**. All of your answers will be kept **confidential**. No one, not even your parents or teachers, will ever know what you answered. So, please be honest when you answer the questions.
- Mark only **one option per question** unless the instructions tell you to do something else.
- Choose the option that is the **closest** to what you think/feel is true for you.
- **If you do not smoke**, you will need to answer "I do not smoke" to many of the questions. We ask you to do this so that both smokers and non-smokers will take about the same amount of time to complete the questionnaire and **teachers will not know which students smoke**.

Please, use an HB pencil

●○○○ Proper Mark

⊗⊘◒◔ Improper Marks

Thousands of students across Canada, just like you, have been asked to take part in this survey. Most of the questions are about smoking, but there are also questions about exercise, eating habits, and alcohol and drugs. This important survey will help **Health Canada** to better understand smoking, alcohol, and other drug use among young people in Canada. **Your help today is very important.**

For office use only

○○○○○○○○○○○○○○○○○○○○○○○○ [SERIAL]

About You

1. What grade are you in?

- ○ Grade 6
- ○ Grade 7
- ○ Grade 8
- ○ Grade 9
- ○ Grade 10
- ○ Grade 11
- ○ Grade 12

Quebec students only

- ○ Grade 6
- ○ Secondary I
- ○ Secondary II
- ○ Secondary III
- ○ Secondary IV
- ○ Secondary V

2. How old are you today?

- ○ 11 years or younger
- ○ 12 years
- ○ 13 years
- ○ 14 years
- ○ 15 years
- ○ 16 years
- ○ 17 years
- ○ 18 years
- ○ 19 years or older

3. Are you...

- ○ Female?
- ○ Male?

4. How would you describe yourself? *(Mark all that apply)*

- ○ White
- ○ Black
- ○ Asian
- ○ Aboriginal (First Nations, Métis, Inuit)
- ○ Latin American/Hispanic
- ○ Other_____

5. What language do you speak <u>most often</u> at home?

- ○ English
- ○ French
- ○ Other

6. On average, about how many hours a day do you do the following in your free time?

	None	Less than 1 hour a day	1 to 2 hours a day	More than 2 but less than 5 hours a day	5 or more hours a day
a) Text or talk on a phone	○	○	○	○	○
b) E-mail or instant message	○	○	○	○	○
c) Play video games	○	○	○	○	○
d) Play/surf on a computer	○	○	○	○	○
e) Watch TV or movies	○	○	○	○	○
f) Read for fun	○	○	○	○	○

7. For the next 3 questions, choose the answer that describes how you feel about the statement.

	True	Mostly True	Neutral	Mostly False	False
a) In general, I like the way I am.	○	○	○	○	○
b) When I do something, I do it well.	○	○	○	○	○
c) I like the way I look.	○	○	○	○	○

Your Experience with Smoking

8. Are you a smoker?
   - ○ Yes
   - ○ No

9. Have you ever tried cigarette smoking, even just a few puffs?
   - ○ Yes
   - ○ No

10. How old were you when you first tried smoking cigarettes, even just a few puffs?
   - ○ I have never done this
   - ○ I do not know

   - ○ 8 years or younger
   - ○ 9 years
   - ○ 10 years
   - ○ 11 years
   - ○ 12 years
   - ○ 13 years
   - ○ 14 years
   - ○ 15 years
   - ○ 16 years
   - ○ 17 years
   - ○ 18 years or older

11. Do you think in the future you might try smoking cigarettes?
   - ○ Definitely yes
   - ○ Probably yes
   - ○ Probably not
   - ○ Definitely not

12. If one of your best friends was to offer you a cigarette, would you smoke it?
   - ○ Definitely yes
   - ○ Probably yes
   - ○ Probably not
   - ○ Definitely not

13. At any time during the next year do you think you will smoke a cigarette?
   - ○ Definitely yes
   - ○ Probably yes
   - ○ Probably not
   - ○ Definitely not

14. Do you think it would be difficult or easy for you to get cigarettes if you wanted to smoke?
   - ○ Difficult
   - ○ Easy
   - ○ I do not know

15. Have you ever smoked a whole cigarette?
   - ○ Yes
   - ○ No

○○○○○○○○○○○○○○○○○○○○○○○○ [SERIAL]

16. How old were you when you smoked your first whole cigarette?

- ○ I have never smoked a whole cigarette
- ○ I do not know

- ○ 8 years or younger
- ○ 9 years
- ○ 10 years
- ○ 11 years
- ○ 12 years
- ○ 13 years
- ○ 14 years
- ○ 15 years
- ○ 16 years
- ○ 17 years
- ○ 18 years or older

17. Have you ever smoked 100 or more whole cigarettes in your life?

- ○ Yes
- ○ No

18. Have you ever smoked every day for at least 7 days in a row?

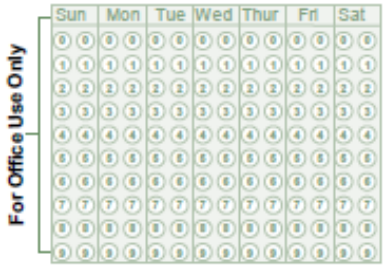
- ○ Yes
- ○ No

19. On how many of the last 30 days did you smoke one or more cigarettes?

- ○ None
- ○ 1 day
- ○ 2 to 3 days
- ○ 4 to 5 days
- ○ 6 to 10 days
- ○ 11 to 20 days
- ○ 21 to 29 days
- ○ 30 days *(every day)*

20. Thinking back over the last 30 days, on the days that you smoked, how many cigarettes did you usually smoke each day?

- ○ None
- ○ A few puffs to one whole cigarette
- ○ 2 to 3 cigarettes
- ○ 4 to 5 cigarettes
- ○ 6 to 10 cigarettes
- ○ 11 to 20 cigarettes
- ○ 21 to 29 cigarettes
- ○ 30 or more cigarettes



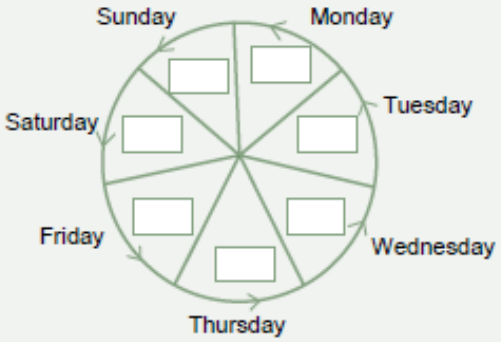
21. Think back over the last 7 days.

Find yesterday on the wheel and fill in the number of whole cigarettes you smoked.

Then, follow the wheel backwards and fill in the number of whole cigarettes you smoked on each of the last 7 days.

If you have not smoked, mark one of the circles below.

- ○ I have never smoked
- ○ I did not smoke over the last 7 days



22a. When you smoke, how often do you share a cigarette with others?

- ○ I do not smoke
- ○ Never
- ○ Sometimes
- ○ Usually
- ○ Always

22b. When you first tried smoking cigarettes, were you drinking alcohol at the same time?

- ○ I have never tried smoking
- ○ Yes
- ○ No

23. What brand of cigarettes do you <u>usually</u> smoke? *(Mark only one)*

- ○ I do not smoke
- ○ I do not have a regular brand

- ○ Accord
- ○ Avanti
- ○ Belmont
- ○ Belvedere
- ○ Benson & Hedges
- ○ Canadian Classics
- ○ Craven
- ○ D.K.
- ○ Du Maurier
- ○ Export "A"
- ○ John Player's
- ○ Legend
- ○ MacDonald
- ○ Mark Ten
- ○ Matinee
- ○ Number 7
- ○ Peter Jackson
- ○ Player's
- ○ Putter's
- ○ Quebec Classics
- ○ Rothmans
- ○ Viceroy
- ○ Viscount
- ○ Vogue
- ○ American brands (e.g. Camel, Marlboro)
- ○ Other cigarettes from First Nations/Native brands
- ○ I roll my own cigarettes
- ○ Other

24. For the cigarette brand that you indicated, what size cigarette do you <u>usually</u> smoke? *(Mark all that apply)*

- ○ I do not smoke
- ○ I do not have a regular size
- ○ King Size
- ○ Regular Size
- ○ Slim (super slim)
- ○ 100s
- ○ Other

25. Why do you smoke the brand of cigarettes that you do? *(Mark all that apply)*

- ○ I do not smoke
- ○ I do not have a usual brand
- ○ My friends smoke the same brand
- ○ My parents smoke the same brand
- ○ I like the packaging
- ○ This brand costs less than other brands
- ○ I like the image of this brand
- ○ I like the taste
- ○ They are the only ones that I can get
- ○ They have less tar
- ○ For the nicotine buzz
- ○ Other

26. Where do you <u>usually</u> get your cigarettes? *(Mark only one)*

- ○ I do not smoke
- ○ I buy them myself at a store
- ○ I buy them from a friend
- ○ I buy them from someone else
- ○ I ask someone to buy them for me
- ○ My brother or sister gives them to me
- ○ My mother or father gives them to me
- ○ A friend gives them to me
- ○ Someone else gives them to me
- ○ I take them from my mother, father, or siblings
- ○ Other

○○○○○○○○○○○○○○○○○○○○○○○○ [SERIAL]

27. In the last 12 months, how often did you smoke the following kinds of cigarettes?

	Never	Less than once a month	1 to 3 times a month	Once a week	2 to 5 times a week	Daily or almost daily
a) Unbranded cigarettes from a plastic bag	○	○	○	○	○	○
b) American brands such as Camel or Marlboro	○	○	○	○	○	○
c) Chinese brands such as Jin Ling	○	○	○	○	○	○
d) First Nations/Native brands D.K.'s, Putters, or Sago	○	○	○	○	○	○
e) Other First Nations/Native brands such as Chiefs, Natives, Discount, or others	○	○	○	○	○	○

28. Within the last 6 months, has a store clerk ever suggested a particular brand when you were buying cigarettes?

- ○ I did not buy cigarettes from a store in the last 6 months
- ○ Yes, a store clerk suggested a brand
- ○ No, a store clerk did not suggest a brand

29. In the last 30 days, have you ever been asked for ID when buying cigarettes in a store?

- ○ I did not buy or try to buy cigarettes in a store in the last 30 days
- ○ Yes, I was asked for ID
- ○ No, I was not asked for ID

30. Thinking about the last time you bought cigarettes in the last 12 months, what did you buy?

- ○ I did not buy cigarettes in the last 12 months
- ○ A pack of 20 cigarettes
- ○ A pack of 25 cigarettes
- ○ A bag of 200 cigarettes
- ○ A single cigarette
- ○ A can or pouch of tobacco (loose tobacco)
- ○ A carton (200 cigarettes)
- ○ Another amount

31. Thinking about the last time you bought cigarettes in the last 12 months, about how much did you pay for each single cigarette, pack, bag, or carton?

- ○ I did not buy cigarettes in the last 12 months
- ○ I do not remember the price
- ○ Less than 10 cents
- ○ 10 cents to 50 cents
- ○ 51 cents to $6.00
- ○ $6.01 to $10.00
- ○ $10.01 to $20.00
- ○ $20.01 to $40.00
- ○ $40.01 to $60.00
- ○ $60.01 to $80.00
- ○ $80.01 or more

32. Have you ever tried to quit smoking cigarettes?

- ○ I have never smoked
- ○ I have only smoked a few times
- ○ I have never tried to quit
- ○ I have tried to quit once
- ○ I have tried to quit 2 or 3 times
- ○ I have tried to quit 4 or 5 times
- ○ I have tried to quit 6 or more times

33. Have you ever tried any of the following? *(Mark all that apply)*

- ○ Smoking pipe tobacco
- ○ Smoking cigarillos or little cigars (*plain or flavoured*)
- ○ Smoking cigars (not including cigarillos or little cigars, *plain or flavoured*)
- ○ Smoking roll-your-own cigarettes (tobacco only)
- ○ Smoking bidis (little cigarettes that are hand-rolled in leaves, tied with a string at the ends, and come in different flavours)
- ○ Using smokeless tobacco (chewing tobacco, pinch, snuff, or snus)
- ○ Using nicotine patches, nicotine gum, nicotine lozenges, or nicotine inhalers
- ○ Using a water-pipe to smoke tobacco (also known as a hookah, sheesha, narg-eelay, hubble-bubble, or gouza)
- ○ Using blunt wraps (a sheet or tube made of tobacco used to roll cigarette tobacco)
- ○ I have not tried any of these things

34. In the last 30 days, did you use any of the following? *(Mark all that apply)*

- ○ Pipe tobacco
- ○ Cigarillos or little cigars (*plain or flavoured*)
- ○ Cigars (not including cigarillos or little cigars, *plain or flavoured*)
- ○ Roll-your-own cigarettes (tobacco only)
- ○ Bidis (little cigarettes that are hand-rolled in leaves, tied with a string at the ends, and come in different flavours)
- ○ Smokeless tobacco (chewing tobacco, pinch, snuff, or snus)
- ○ Nicotine patches, nicotine gum, nicotine lozenges, or nicotine inhalers
- ○ Water-pipe to smoke tobacco (also known as a hookah, sheesha, narg-eelay, hubble-bubble, or gouza)
- ○ Blunt wraps (a sheet or tube made of tobacco used to roll cigarette tobacco)
- ○ I have not used any of these things in the last 30 days

35. In the last 30 days, where did you buy cigarillos or little cigars (*plain or flavoured*)? *(Mark all that apply)*

- ○ I did not buy cigarillos or little cigars
- ○ I bought cigarillos or little cigars at a store
- ○ I bought them from my brother or sister
- ○ I bought them from a friend
- ○ I bought them from someone else
- ○ I asked someone else to buy them for me

36. In the last 30 days, how often did you smoke cigarillos or little cigars (*plain or flavoured*)?

- ○ I have never done this
- ○ I did not smoke any cigarillos or little cigars in the last 30 days
- ○ Once in the last 30 days
- ○ Less than once a week
- ○ Once a week
- ○ 2 to 6 times a week
- ○ Once a day
- ○ More than once a day

37. The last time you bought/got cigarillos or little cigars (*plain or flavoured*), how many did you buy/get?

- ○ I have never bought/got cigarillos nor little cigars
- ○ A single cigarillo or little cigar
- ○ A pack of 5
- ○ A pack of 10
- ○ A pack of 20
- ○ Another amount

38. Have you ever used flavoured tobacco products (menthol, cherry, strawberry, vanilla, etc.)?

- ○ Yes
- ○ No

39. In the last 30 days, did you use any of the following flavoured tobacco products?
(Mark all that apply)

- ○ Menthol cigarette
- ○ Flavoured cigarillo or little cigar
- ○ Flavoured cigar
- ○ Flavoured bidi
- ○ Flavoured smokeless tobacco
- ○ Flavoured tobacco in a water-pipe
- ○ I did not use any of these things in the last 30 days

You, Your Family, and Your Friends

40. Do any of your parents, step-parents, or guardians smoke cigarettes?

- ○ Yes
- ○ No
- ○ I do not know

41. Do any of your brothers or sisters smoke cigarettes?

- ○ Yes
- ○ No
- ○ I do not know
- ○ I have no brothers or sisters

42. What are the rules about smoking in your home?

- ○ No one is allowed to smoke in my home
- ○ Only special guests are allowed to smoke in my home
- ○ People are allowed to smoke only in certain areas in my home
- ○ People are allowed to smoke anywhere in my home

43. During the last 7 days, on how many days did you ride in a car with someone who was smoking cigarettes?

- ○ 0 days
- ○ 1 or 2 days
- ○ 3 or 4 days
- ○ 5 or 6 days
- ○ All 7 days
- ○ I did not ride in a car in the last 7 days
- ○ I do not know

44. Your closest friends are the friends you like to spend the most time with. How many of your closest friends smoke cigarettes?

- ○ None
- ○ 1 friend
- ○ 2 friends
- ○ 3 friends
- ○ 4 friends
- ○ 5 or more friends

○○○○○○○○○○○○○○○○○○○○○○○○ [SERIAL]

45. In your family, you are... *(Mark only one)*

- ○ The only daughter
- ○ The oldest daughter
- ○ A middle daughter
- ○ The youngest daughter

- ○ The only son
- ○ The oldest son
- ○ A middle son
- ○ The youngest son

Don't forget this question

46. About how much money do you usually get <u>each week</u> to spend on yourself or to save?

(Remember to include all money from allowances and jobs like babysitting, delivering papers...)

- ○ Zero
- ○ $1 to $5
- ○ $6 to $10
- ○ $11 to $20
- ○ $21 to $40
- ○ $41 to $100
- ○ More than $100
- ○ I do not know how much money I get each week

Your School and You

47. How strongly do you agree or disagree with each of the following?

	Strongly Agree	Agree	Disagree	Strongly Disagree
a) I feel close to people at my school.	○	○	○	○
b) I feel I am part of my school.	○	○	○	○
c) I am happy to be at my school.	○	○	○	○
d) I feel the teachers at my school treat me fairly.	○	○	○	○
e) I feel safe in my school.	○	○	○	○
f) Getting good grades is important to me.	○	○	○	○

48. In the last 4 weeks, how many days of school did you miss because of your health?

- ○ 0 days
- ○ 1 or 2 days
- ○ 3 to 5 days
- ○ 6 to 10 days
- ○ 11 or more days

49. In the last 4 weeks, how many classes did you skip when you were not supposed to?

- ○ 0 classes
- ○ 1 or 2 classes
- ○ 3 to 5 classes
- ○ 6 to 10 classes
- ○ 11 to 20 classes
- ○ More than 20 classes

50. How many students at this school smoke on school property?

- ○ A lot
- ○ Some
- ○ A few
- ○ None

51. Which of the following best describes your marks during the past year?

- ○ Mostly A's / above 85% / level 4
- ○ Mostly A's and B's / 70 - 84% / level 3 - 4
- ○ Mostly B's and C's / 60 - 69% / level 3
- ○ Mostly C's / 50 - 59% / level 2
- ○ Mostly letter grades below C's / below 50% / level 1

Exercise and Eating

52. How tall are you without your shoes on?
(Please write your height on the line and then fill in the appropriate numbers for your height in feet and inches OR centimetres)

"My height is _____"

Example: 5 ft 7in

Height: Feet | Inches

○ I do not know how tall I am

OR

Height: Centimetres

53. How much do you weigh without your shoes on? (Please write your weight on the line and then fill in the appropriate numbers for your weight in pounds OR kilograms)

"My weight is _____"

Example: 127 lbs

Weight: Pounds

○ I do not know how much I weigh

OR

Weight: Kilograms

54. On how many of the last 7 days did you eat breakfast?

- ○ 0 days
- ○ 1 day
- ○ 2 days
- ○ 3 days
- ○ 4 days
- ○ 5 days
- ○ 6 days
- ○ 7 days (every day)

Don't forget this column

55. On a usual day, how many servings of fruits and/or vegetables do you eat? (*Include* fresh, frozen, canned, and cooked items like apple, banana, carrot, salads, and 100% juice. *Do not include* chips, french fries, or other fried potatoes)

- ○ 0 servings
- ○ 1-2 servings
- ○ 3-4 servings
- ○ 5 servings
- ○ 6 servings
- ○ 7 servings
- ○ 8 or more servings

56. At your school, do you participate in intramural or school team sports?

- ○ Yes
- ○ No

57. How do you usually get to and from school?

- ○ Actively (e.g. walk, bike, skateboard)
- ○ Inactively (e.g. car, bus, public transit)
- ○ Mixed (actively and inactively)

58. Mark how many minutes of HARD physical activity you did on each of the last 7 days. This includes physical activity during physical education class, lunch, recess, after school, evenings, and spare time.

HARD physical activities are jogging, team sports, fast dancing, jump-rope and any other physical activities that increase your heart rate and make you breathe hard and sweat.

For example: If you did 1 hour and 45 minutes of hard activity on Monday, you will need to fill in the 1 hour circle and the 45 minute circle, as shown below:

	Hours	Minutes
Monday	1	45

	Hours	Minutes
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

[SERIAL]

Alcohol and Marijuana Use

Please remember that we will keep your answers ***completely confidential***. Your teachers and parents will not know how you answer these questions. Please take your time and be honest as you answer.

"A drink" means: 1 regular sized bottle, can, or draft of beer; 1 glass of wine; 1 bottle of cooler; 1 shot of liquor (rum, whiskey, etc); or 1 mixed drink (1 shot of liquor with pop, juice, energy drink).

59. In the last 12 months, how often did you have a drink of alcohol that was more than just a sip?

- ○ I have never drank alcohol
- ○ I did not drink alcohol in the last 12 months
- ○ I have only had a sip of alcohol
- ○ Less than once a month
- ○ Once a month
- ○ 2 or 3 times a month
- ○ Once a week
- ○ 2 or 3 times a week
- ○ 4 to 6 times a week
- ○ Every day
- ○ I do not know

60. How old were you when you first had a drink of alcohol that was more than a sip?

- ○ I have never drank alcohol
- ○ I have only had a sip of alcohol
- ○ I do not know
- ○ 8 years or younger
- ○ 9 years
- ○ 10 years
- ○ 11 years
- ○ 12 years
- ○ 13 years
- ○ 14 years
- ○ 15 years
- ○ 16 years
- ○ 17 years
- ○ 18 years or older

61. In the last 12 months, how often did you have 5 drinks of alcohol or more on one occasion?

- ○ I have never done this
- ○ I did not have 5 or more drinks on one occasion in the last 12 months
- ○ Less than once a month
- ○ Once a month
- ○ 2 to 3 times a month
- ○ Once a week
- ○ 2 to 5 times a week
- ○ Daily or almost daily
- ○ I do not know

62. How old were you when you first had 5 drinks or more of alcohol on one occasion?

- ○ I have never done this
- ○ I do not know
- ○ 8 years or younger
- ○ 9 years
- ○ 10 years
- ○ 11 years
- ○ 12 years
- ○ 13 years
- ○ 14 years
- ○ 15 years
- ○ 16 years
- ○ 17 years
- ○ 18 years or older

63. In the last 12 months, have you had alcohol mixed or pre-mixed with an energy drink such as Red Bull, Rock Star, Monster, or another brand?

- ○ I have never done this
- ○ I did not do this in the last 12 months
- ○ Yes
- ○ I do not know

64. In the last 12 months, how often did you use marijuana or cannabis? (a joint, pot, weed, hash...)

- ○ I have never used marijuana
- ○ I have used marijuana but not in the last 12 months
- ○ Less than once a month
- ○ Once a month
- ○ 2 or 3 times a month
- ○ Once a week
- ○ 2 or 3 times a week
- ○ 4 to 6 times a week
- ○ Every day
- ○ I do not know

65. How old were you when you first used marijuana or cannabis?

- ○ I have never used marijuana
- ○ I do not know
- ○ 8 years or younger
- ○ 9 years
- ○ 10 years
- ○ 11 years
- ○ 12 years
- ○ 13 years
- ○ 14 years
- ○ 15 years
- ○ 16 years
- ○ 17 years
- ○ 18 years or older

Other Drug Use

Please remember that we will keep your answers ***completely confidential***. Your teachers and parents will not know how you answer these questions. Please take your time and be honest as you answer.

66. This chart asks about your drug use. If you have <u>ever</u> used or tried any of the following drugs, mark the age at which you <u>first</u> used or tried. Then mark if you have used or tried the drug in the <u>last 12 months</u>.	If you have ever used or tried, how old were you when you first used or tried this?								Have you used or tried this in the **last 12 months**?	
	I have never done this	11 years or younger	12	13	14	15	16	17 years or older	Yes	No
a) Amphetamines (speed, crystal meth or ice, meth...)	○	○	○	○	○	○	○	○	○	○
b) MDMA (ecstasy, E, X...)	○	○	○	○	○	○	○	○	○	○
c) Hallucinogens (LSD, PCP, acid, magic mushrooms, mesc...)	○	○	○	○	○	○	○	○	○	○
d) DACS (links...)	○	○	○	○	○	○	○	○	○	○
e) Heroin (smack, junk, crank...)	○	○	○	○	○	○	○	○	○	○
f) Cocaine (crack, blow, snow...)	○	○	○	○	○	○	○	○	○	○
g) Ketamine (special k, kit-kat...)	○	○	○	○	○	○	○	○	○	○
h) GHB (G, liquid X, goop...)	○	○	○	○	○	○	○	○	○	○
Medication used to get high and NOT for medical purposes										
i) Sedatives or tranquillizers such as Ativan, Xanax, Valium (tranqs, downers, etc.)	○	○	○	○	○	○	○	○	○	○
j) Sleeping medicine from a drugstore such as Nytol, Unisom	○	○	○	○	○	○	○	○	○	○
k) Stimulants such as diet pills and stay awake pills (uppers, bennies) or medicine that is usually used to treat ADHD such as Ritalin, Concerta, Adderall, Dexedrine	○	○	○	○	○	○	○	○	○	○
l) Pain relievers such as Demerol, Percocet, Percodan, Oxycontin, or any pain reliever with codeine	○	○	○	○	○	○	○	○	○	○
m) Dextromethorphan such as cold or cough medicine like Robitussin DM, Benylin DM (robos, dex, DXM)	○	○	○	○	○	○	○	○	○	○
Other substances used to get high										
n) Glue, gasoline, or other solvents	○	○	○	○	○	○	○	○	○	○
o) Salvia (Divine Sage, Magic Mint, Sally D)	○	○	○	○	○	○	○	○	○	○
p) Jimson weed (locoweed, stinkweed, mad apple) **[this is not marijuana or cannabis]**	○	○	○	○	○	○	○	○	○	○

○○○○○○○○○○○○○○○○○○○○○○○○ [SERIAL]

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