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## Smoking Among Off-Reserve First Nations, Métis, and Inuit High School Students

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# Smoking Among Off-Reserve First Nations, Métis, and Inuit High School Students

## Abstract

Using data from the 2012 Aboriginal Peoples Survey (APS), this study investigated associations between smoking and a number of school, peer, and family characteristics among off-reserve First Nations ( $n = 2,308$ ), Métis ( $n = 2,058$ ), and Inuit ( $n = 655$ ) high school students aged 12 to 21 years. Logistic regressions revealed important group differences in Indigenous youths' correlates of smoking. Characteristics that were negatively associated with smoking included attending a school with a positive environment or having peers with high educational aspirations among First Nations students; participating in school-based *club* extra-curricular activities or living in a smoke-free home among Métis; and living in higher-income families among Inuit. A consistent risk factor for smoking among all Indigenous students was having close friends who engaged in risk behaviours.

## Keywords

tobacco, cigarette, Indigenous, youth, family, peer, school climate, school connectedness, extracurricular activities, socio-economic status

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## **Smoking Among Off-Reserve First Nations, Métis, and Inuit High School Students**

The negative health effects of smoking are well known and include cancer, respiratory illnesses, heart disease, and stroke (U.S. Department of Health and Human Services, 2014). Compared to the non-Indigenous population, off-reserve First Nations, Métis, and Inuit in Canada have a higher prevalence of smoking (Gionet & Roshanafshar, 2013). This is particularly true for Indigenous youth, among whom the prevalence of smoking is at least twice as high as it is among non-Indigenous youth (Elton-Marshall, Leatherdale, & Burkhalter, 2011; Statistics Canada, 2016). Smoking prevalence is notably high among First Nations youth who live on-reserve (First Nations Information Governance Centre, 2012).

Most smokers begin smoking in their teens (Chen & Millar, 1998; U.S. Department of Health and Human Services, 2012). Early smoking initiation is concerning insofar as it has been associated with both significant health problems during adolescence and increased risk factors for health problems in adulthood (U.S. Department of Health and Human Services, 1994). For example, an early age of daily smoking initiation has been associated with earlier diagnoses of chronic obstructive pulmonary disease (COPD), heart disease, and/or rheumatoid arthritis (Chen, 2003). It has also been shown that individuals who started smoking when they were under the age of 18 were less likely to quit than those who began smoking at older ages (Shields, 2005a). The high prevalence of smoking among Indigenous youth, together with the recognition that adolescence is a key period for the initiation of health-compromising behaviours (LeMaster, Connell, Mitchell, & Manson, 2002), highlights the ongoing need to identify the risk and protective factors for smoking among First Nations, Métis, and Inuit youth. Understanding these factors may help inform smoking prevention and cessation programs aimed at this population.

Family, peers, and school are considered the key social contexts that influence child and youth behaviours like smoking (Wen, Van Duker, & Olson, 2009; Wium & Wold, 2009), with peer and parental characteristics the most well established factors associated with teen smoking (Seo & Huang, 2012). However, school is an important context because of the large amount of time youth spend there (Wen et al., 2009; Wium & Wold, 2009). Indeed, schools have often been seen as a target context for health behaviours as well as opportunities for education and promotion with youth (Samdal, Wold, Klepp, & Kannas, 2000). The goal of the present study was to investigate how particular aspects of schools, together with family and peer characteristics, are associated with smoking among off-reserve First Nations, Métis, and Inuit high school students.

### **Smoking Among Adolescents: Family, Peer, and School Contexts**

Family environments have been recognized as an important immediate structure for child development (Bronfenbrenner & Morris, 1998). Family characteristics that have historically shown consistent associations with adolescent smoking include socio-economic status (e.g., household income and parental education) and household members' smoking behaviours (Hanson & Chen, 2007; Leatherdale, Smith, & Ahmed, 2008; Shields, 2005b; Soteriades & DiFranza, 2003; Wen et al., 2009; Wium & Wold, 2009). Ryan, Leatherdale, and Cooke (2017) have recently shown that off-reserve First Nations and Métis youth were more likely to smoke if they were from families with lower household incomes. Generally, the mechanisms through which family characteristics relate to teen smoking are role

modelling and parenting style (Wen et al., 2009; Whitlock, Sittner Hartshorn, McQuillan, & Crawford, 2012).

As children grow into adolescents, their peers typically influence their decision making and health behaviours, including smoking, more strongly (Wiiium & Wold, 2009). For example, past studies have found an association between teen smoking and teens who have friends who smoke in both Indigenous populations (Whitlock et al., 2012) and non-Indigenous populations (Alexander, Piazza, Mekos, & Valente, 2001; Chuang, Ennet, Bauman, & Foshee, 2009; Wen et al., 2009). The relationship between teens, their peers, and smoking behaviour is complex and has been explained through two mechanisms: socialization—which views an individual’s smoking behaviour as something that is influenced by the norms and behaviours of their peer group—and selection—which views this behaviour as the tendency of individuals to seek out peers with similar norms and behaviours (Simons-Morton & Farhat, 2010).

The school environment is an important context that can shape adolescent health behaviour because a lot of time is spent in school and many peer groups are established and maintained in school settings (Wen et al., 2009; Wiiium & Wold, 2009). Specifically, scholars have noted that school connectedness—that is, the feeling of belonging to a school—is important for adolescents’ psychosocial adjustment (Allen, Vella-Brodrick, & Waters, 2016). School connectedness has been shown to be related to many behavioural, emotional, and academic outcomes among youth (Monahan, Oesterle, & Hawkins, 2010). It is believed that students are more likely to engage in healthy behaviours when they feel connected to their schools (Centers for Disease Control and Prevention, 2010); conversely, students who feel alienated from their schools are more likely to engage in health-risk behaviours (Nutbeam, Smith, Moore, & Bauman, 1993). Past studies conducted among the general population have found that school connectedness has a protective effect on adolescent smoking (Azagba & Asbridge, 2013; Dornbusch, Erickson, Laird, & Wong, 2001; Gowing & Jackson, 2016; Resnick et al., 1997; Sabiston et al., 2009). Likewise, past studies have also shown that alienation from school is a risk factor for adolescent smoking (Nutbeam et al., 1993; Samdal et al., 2000).

The definition of school connectedness has varied across studies, but common characteristics generally include feeling close to the people at a school, feeling part of a school, feeling safe and happy at a school, and being treated fairly at a school (Azagba & Asbridge, 2013; Dornbusch et al., 2001; Gowing & Jackson, 2016; Resnick et al., 1997; Sabiston et al., 2009). School connectedness has been shown to be fostered by many factors (Allen et al., 2016; Monahan et al., 2010), including participation in extracurricular activities or afterschool programs (Anderson-Butcher, 2010; Martinez, Coker, McMahan, Cohen, & Thapa, 2016; Thompson, Iachan, Overpeck, Ross, & Gross, 2006), parental support and involvement in school (Thompson et al., 2006; Wang & Eccles, 2012), and positive peer groups (Centers for Disease Control and Prevention, 2010; Wang & Eccles, 2012).

Notably, school connectedness might be particularly important for Indigenous youth’s health outcomes in light of the legacy of the Indian Residential School system in Canada (see Aboriginal Healing Foundation, 2002 for a description of Canada’s Indian Residential School system). The relationship that First Nations, Métis, and Inuit youth have with formal education systems may be influenced by this legacy through the passing on of *transgenerational effects* (Kirmayer et al., 2007) or *historical trauma* (Soto, Baezconde-Garbanati, Schwartz, & Unger, 2015). Previous studies have shown different school outcomes for Indigenous children and youth who have family histories of residential school attendance

than for children and youth who do not have such a history (Bougie & Senécal, 2010; Feir, 2016). In this study, the school characteristics that were explored—such as positive and negative school environments—have also been shown to be associated with the mental health outcomes of off-reserve First Nations youth (Guèvremont, Arim, & Kohen, 2016). However, no studies to date have examined the relationship between school characteristics and smoking for off-reserve First Nations, Métis, and Inuit youth.

This study examined the association between current smoking and school environments among off-reserve First Nations, Métis, and Inuit high school students, while also considering the influence of families and peers. The aspects of the school environment that were examined were determined by survey content and included:

- Positive and negative school environment;
- Attendance at a school that supports First Nations, Métis, or Inuit culture through teaching and/or activities;
- Participation in extra-curricular activities (sport, art, and club) organized by schools; and
- Family involvement in school activities.

The family and peer factors examined were:

- Household income;
- Maternal highest level of education;
- Presence of a regular smoker in the home;
- Peer educational aspirations; and
- Peer risk behaviours.

This study was guided by the following research question: Are there particular aspects of the school environment that are associated with smoking among off-reserve First Nations, Métis, and Inuit high school students, over and above family and peer characteristics?

## Methods

### Data

This study used data from the 2012 Aboriginal Peoples Survey (APS). The APS is a national, cross-sectional survey of First Nations people living off-reserve, Métis, and Inuit in Canada that has been developed by Statistics Canada. The APS did not include people living in institutions, and it excluded people living on Indian reserves and settlements as well as in certain First Nations communities in the Yukon and in the Northwest Territories. Participation in the APS was voluntary. Data were collected directly from respondents through personal interviews or through computer-assisted interviews between February and July of 2012. Proxy reporting was used for most children aged 6 to 14 years, nearly half of youth aged 15 to 17 years, and for adults in certain specific situations. The APS' overall response rate was 76%.

## Sample

The sample included all Indigenous youth aged 12 to 21 who were attending high school (Grades 7 to 12 or equivalent) at the time of data collection. Students were categorized as First Nations, Métis, or Inuit based on single Aboriginal identity reporting. Only Inuit residing in Inuit Nunangat (the Inuit homeland in Northern Canada<sup>1</sup>) were retained; the Inuit student sample outside of Inuit Nunangat was too small to support multivariate analyses, and combining Inuit living inside and outside Inuit Nunangat would have masked important differences between those two groups. From the initial study sample, about 2% of First Nations, 1% of Métis, and 5% of Inuit students did not have any smoking data and were thus excluded. The final study sample consisted of 2,308 off-reserve First Nations youth (mean age 14.8 years), 2,058 Métis youth (mean age 14.9 years), and 655 Inuit (mean age 15.0 years) high school students. Proportions of males were similar across off-reserve First Nations, Métis, and Inuit students, averaging at about 51%.

## Instruments

**Dependent variable—Current smoking.** Current smoking was measured with the following question: “At the present time, do you smoke cigarettes daily, occasionally, or not at all?” The outcome of interest was current (occasional or daily) smoking versus non-smoking.

**Independent variable—Family.** Family characteristics included household income, maternal highest level of education (“What is the highest level of education that mother or female guardian has ever completed?”), and the presence of a regular smoker in the home (“Including both household members and regular visitors, does anyone smoke inside your home, every day or almost every day?”). Household income data were obtained from the respondents’ answers in the 2011 National Household Survey (NHS) appended to the APS master file. In this context, household income refers to the sum of the total incomes of all members of a household. Household income was used as a continuous variable and operationalized as the after-tax household income (in Canadian dollars) adjusted by a factor that accounted for household size. The highest level of education completed by the mother or female guardian was coded as *less than high school*, *high school*, or *postsecondary education*.

**Independent variable—Peers.** The 2012 APS included several items pertaining to peer characteristics. An exploratory factor analysis indicated that a *peer influence* construct could be described by two factors: peer educational aspirations, which consisted of three items, and peer risk behaviours, which consisted of six items (Findlay, 2013). Respondents were asked how many of their closest friends:

Peer educational aspirations

- a. Thought completing high school was very important;
- b. Planned to further their education or training;
- c. Thought it was okay to work hard at school

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<sup>1</sup> Inuit Nunangat is comprised of four regions: Nunatsiavut (Labrador); Nunavik (northern Québec); Nunavut; and the Inuvialuit region (Northwest Territories).

## Peer risk behaviours

- d. Skipped classes once a week or more;
- e. Dropped out of high school;
- f. Had a reputation for causing trouble;
- g. Smoked cigarettes;
- h. Used drugs;
- i. Drank alcohol.

Each item was rated on a four-point scale, with 1 signifying *none of a respondent's close friends* and 4 signifying *all of them*. Response category 5 *not applicable* was re-coded as missing data. Following this, items within each factor were summed to obtain an overall score. To augment the robustness of the construct, scores were only calculated in cases in which a respondent replied to a minimum of 75% of the questions (i.e., 2 out of 3 and 5 out of 6 questions) (Findlay, 2013). Cronbach alphas for peer risk behaviours and peer educational aspirations were acceptable at 0.85 and 0.77, respectively, for off-reserve First Nations, 0.82 and 0.75 for Métis, and 0.78 and 0.69 for Inuit students.

**Independent variable—School.** Several items on the 2012 APS pertained to the school environment. An exploratory factor analysis of school characteristics items indicated that a “school environment” construct could be described by two factors: positive (four items) and negative (five items; Findlay, 2013). Respondents were asked to 1 *strongly disagree*, 2 *disagree*, 3 *agree*, or 4 *strongly agree* to the following statements:

## Positive school environment

- a. Overall, respondent feels safe at school;
- b. Overall, respondent is happy at school;
- c. Most children enjoy being at the school;
- d. The school provides many opportunities to be involved in school activities.

## Negative school environment

- e. Racism is a problem at school;
- f. Bullying is a problem at school;
- g. The presence of alcohol is a problem at school;
- h. The presence of drugs is a problem at school;
- i. Violence is a problem at school.

Items within each factor were summed to obtain an overall score. To augment the robustness of the construct, scores were only calculated in cases where the respondent replied to a minimum of 75% of the questions (i.e., 3 out of 4, and 4 out of 5 questions) (Findlay, 2013). Cronbach alphas for positive and negative school environment were acceptable at 0.76 and 0.80 respectively for off-reserve First Nations, 0.76 and 0.81 for Métis, and 0.66 and 0.74 for Inuit students.

One item that addressed whether a school supported First Nations, Métis, or Inuit culture through teaching and/or activities (ranging from 1 *strongly disagree* to 4 *strongly agree*) did not load on any of the school environment factors and was analyzed separately.

The 2012 APS also contained questions about students' participation in extra-curricular activities and families' involvement with schools. Respondents were asked to indicate whether they had taken part in activities outside of school hours at any time during the school year, including sport or physical activity, or organized sports (including taking lessons); art, drama, or music group or club (including taking lessons); a school group or club (such as student council, yearbook, or science club), or groups or clubs outside of school. Respondents were further asked to indicate whether these activities were organized by their schools. For each activity (sport, art, and club) respondents were categorized into two groups: *participated in activity organized by the school* and *did not participate in activity organized by the school*. The response category *not available* was included in the *did not participate* category.

Respondents were also asked to indicate if any of their family members had done the following activities during the school year: speak to, correspond with, or visit the respondent's teacher (including parent-teacher interviews); attend a school event in which the respondent participated; or participate in other school activities. Respondents were categorized into two groups: *family is involved in at least two activities* and *family is not involved in at least two activities*.

## Data Analysis

Data were examined separately for off-reserve First Nations, Métis, and Inuit students since pan-Indigenous analyses often mask important group differences. As such, this study described current smoking proportions both overall and by gender. Then, this study investigated correlates of smoking through bivariate analyses and logistic regression analyses. First, bivariate analyses (chi-square tests and *F*-tests) examined the association of each family, peer, and school characteristic with a respondent's current smoking; any variable whose bivariate test had a *p* value of less than 0.05 was selected for the multivariate analysis. Second, we fitted one full model for each Indigenous group that only included the variables that were significant in their respective group-specific bivariate tests. All variables were entered simultaneously. The full models controlled for age, sex, and proxy reporting. Preliminary analyses showed no concern for collinearity among the independent variables, with all tolerance values over 0.50 (Tabachnick & Fidell, 2001) and all variance inflation factor (VIF) values under 2 (Stevens, 2002). The following variables had 5% to 10% missing data: peer risk behaviour (Métis), peer educational aspirations (First Nations), negative school environment (First Nations and Inuit), and school supports culture (First Nations and Métis). The following variables had more than 10% missing data: peer risk behaviour (First Nations and Inuit), peer educational aspirations (Inuit), and maternal level of education (Inuit). The final sample size for the regression analyses—that is, the number of respondents with complete data on all covariates—was 1,758 for First Nations, 1,716 for Métis, and 428 for Inuit students.

We report odds ratios as the measure of association between smoking and selected characteristics. Odds ratios with a value of less than 1.00 indicate that a particular characteristic is associated with reduced odds of smoking, whereas odds ratios with a value greater than 1.00 indicate that a particular characteristic is associated with increased odds of smoking. Sampling weights were applied to all analyses to account for the sample design, non-response, and known population totals. A bootstrapping technique with a Fay adjustment factor was used when calculating estimates of variance in order to adjust for the complex survey design (Cloutier & Langlet, 2014). Estimates with high sampling



variability have been identified by the letter E and should be used with caution. Estimates flagged with the letter F are too unreliable to publish (Budinski & Langlet, 2014).

## Results

### Prevalence of Current Smoking

Descriptive statistics for the prevalence of current smoking are presented in Table 1. The majority of off-reserve First Nations and Métis high school students were non-smokers—about 84% and 85% respectively. About 16% of off-reserve First Nations high school students were current smokers—9% smoked daily and 8% smoked occasionally. Among Métis students, 15% were current smokers—8% daily and 7%<sup>E</sup> occasionally. As for Inuit students in Inuit Nunangat, 46% were current smokers—35% daily and 11% occasionally—and 54% were non-smokers. Chi-square tests of independence revealed a significant ( $p < 0.05$ ) gender difference in current smoking prevalence among off-reserve First Nations students, where current smoking proportions were higher among females than males, but not for Métis or Inuit students ( $p > 0.05$ ).

### Family, Peer, and School Characteristics

Descriptive statistics for the selected family, peer, and school characteristics are presented in Table 2, both overall and by smoking status. In terms of family characteristics, 61.5% of off-reserve First Nations, 66.7% of Métis, and 21% of Inuit students had a mother with postsecondary education, and 20.5%, 21.4%, and 27.8% respectively reported the presence of a regular smoker in their homes. The mean after-tax household income, adjusted for household size, was \$31,309 for off-reserve First Nations, \$35,806 for Métis, and \$38,634 for Inuit students. Bivariate tests showed that compared to their non-smoking counterparts, off-reserve First Nations, Métis, and Inuit students who smoked were significantly ( $p < 0.05$ ) more likely to have a mother with lower levels of education, to report the presence of a regular smoker in their homes, and to live in lower-income households.

In terms of peer characteristics, bivariate tests showed that smokers were significantly more likely than non-smokers to have high scores on the peer risk behaviour scale and lower scores on the peer educational aspirations scale.

Turning to school characteristics, about 40.4% of off-reserve First Nations, 41.7% of Métis, and 65.1% of Inuit students participated in school-based *sport* activities. In addition, 33%, 32.1%, and 37.9%, respectively, participated in school-based *art* activities, and 19.3%, 17.6%, and 24.4%, respectively, participated in school-based *club* activities. More than half of off-reserve First Nations (54.3%) and Métis (53.9%) students, along with 67.4% of Inuit students, had a family member who was involved in at least two school activities. Bivariate tests showed that smokers were significantly more likely than non-smokers to have higher scores on the negative school environment scale and lower scores on the positive school environment scale. Smokers were also significantly less likely than non-smokers to have family members who were involved in at least two school activities. Off-reserve First Nations students who smoked were significantly less likely to participate in school-organized sport activities, while Métis students who smoked were significantly less likely to participate in school-organized club activities. Participating in school-based art activities and attending a school that supports Indigenous culture were not associated with current smoking among any of the respondents.

**Table 1. Current Smoking Prevalence, Overall and by Sex, Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Canada, 2012**

	Off-Reserve First Nations										$\chi^2$ p value
	Overall			Males			Females				
	%	95% CI		%	95% CI		%	95% CI			
		LL	UL		LL	UL		LL	UL		
Current smoking	16.3	13.7	19.2	13.2	10.4	16.5	19.6	15.5	24.4	0.02	
Daily	8.5	6.7	10.8	7.4	5.4	10.1	9.8	E	6.8	13.8	
Occasionally	7.7	5.8	10.2	5.8	E	4.1	8.0	9.8	E	6.6	14.3
Current non-smoking	83.7	80.8	86.3	86.8	83.5	89.6	80.4	75.6	84.5		

  

	Métis										$\chi^2$ p value	
	Overall			Males			Females					
	%	95% CI		%	95% CI		%	95% CI				
		LL	UL		LL	UL		LL	UL			
Current smoking	14.9	11.9	18.5	14.1	E	9.5	20.3	15.7	12.2	20.0	0.64	
Daily	8.3	6.2	11.1	7.5	E	4.4	12.4	9.2	E	6.5	12.7	
Occasionally	6.5	E	4.5	9.4	6.6	E	3.5	12.1	6.5	E	4.4	9.5
Current non-smoking	85.1	81.5	88.1	85.9	79.7	90.5	84.3	80.0	87.8			

**Table 1. Current Smoking Prevalence, Overall and by Sex, Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Canada, 2012 (continued)**

	Inuit in Inuit Nunangat										
	Overall			Males			Females			$\chi^2$ p value	
	%	95% CI		%	95% CI		%	95% CI			
		LL	UL		LL	UL		LL	UL		
Current smoking	46.3	42.0	50.7	43.3	37.3	49.5	49.4	43.2	55.7		0.18
Daily	35.1	31.1	39.3	30.9	25.4	36.9	39.6	33.5	45.9		
Occasionally	11.2	8.8	14.1	12.4	E	8.8	17.2	9.9	E	7.1	13.6
Current non-smoking	53.7	49.3	58.0	56.7	50.5	62.7	50.6	44.3	56.8		

*Note.* Source: Aboriginal Peoples Survey, 2012.  $\chi^2$  tests of independence were conducted for current smoking versus non-smoking proportions. CI = confidence interval; LL = lower limit; UL = upper limit. E = use with caution.

**Table 2. Descriptive Family, Peer, and School Characteristics for Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Overall and by Current Smoking Status, Canada, 2012**

	Off-Reserve First Nations									$\chi^2$ p value	
	Overall			Current Smoking Status							
	%	95% CI		%	Smoker		%	Non-smoker			
		LL	UL		95% CI	LL		UL	95% CI		LL
Maternal/female guardian highest level of education											
Less than high school	17.8	14.8	21.4	28.4	E	19.4	39.6	15.9	13.0	19.2	0.005
High school	20.6	18.0	23.5	26.3	E	18.6	35.9	19.6	17.0	22.5	
Postsecondary education	61.5	57.4	65.5	45.3		34.1	57.0	64.5	60.5	68.3	
Presence of a regular smoker in the home											
Yes	20.5	17.5	23.9	36.3		27.7	46.0	17.5	14.3	21.2	0.001
No	79.5	76.1	82.5	63.7		54.0	72.3	82.5	78.8	85.7	
Participated in school-organized sport activity											
Yes	40.4	37.3	43.7	29.9		22.6	38.4	42.5	38.9	46.1	0.01
No	59.6	56.3	62.7	70.1		61.6	77.4	57.5	53.9	61.1	
Participated in school-organized art activity											
Yes	33.0	29.5	36.7	25.2		18.1	33.9	34.5	30.4	38.8	0.06
No	67.0	63.3	70.5	74.8		66.1	81.9	65.5	61.2	69.6	

**Table 2. Descriptive Family, Peer, and School Characteristics for Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Overall and by Current Smoking Status, Canada, 2012 (continued)**

	Off-Reserve First Nations									$\chi^2$ <i>p</i> value
	Overall			Current Smoking Status						
	%	95% CI		Smoker			Non-smoker			
		LL	UL	%	95% CI		%	95% CI		
				LL	UL		LL	UL		
Participated in school-organized club activity										
Yes	19.3	16.7	22.2	F			19.9	17.2	22.8	0.56
No	80.7	77.8	83.3	83.6	69.3	92.1	80.1	77.2	82.8	
Family is involved in at least two school activities										
Yes	54.3	50.7	57.9	39.6	28.8	51.5	57.2	53.6	60.7	0.003
No	45.7	42.1	49.3	60.4	48.5	71.2	42.8	39.3	46.4	
	Overall		Smoker		Non-smoker					
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>F</i> test <i>p</i> value	
Household income (\$)	31,309	753	24,450	1780	32,643	846			< .0001	
Peer risk behaviours score	1.5	0.02	2.2	0.06	1.4	0.02			< .0001	
Peer educational aspirations score	3.1	0.03	2.5	0.08	3.2	0.03			< .0001	
Positive school environment score	3.1	0.03	2.9	0.06	3.1	0.02			< .0001	
Negative school environment score	2.2	0.02	2.4	0.06	2.2	0.02			0.001	
School supports First Nations, Métis, or Inuit culture	2.8	0.03	2.9	0.07	2.8	0.03			0.47	

**Table 2. Descriptive Family, Peer, and School Characteristics for Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Overall and by Current Smoking Status, Canada, 2012 (continued)**

	Métis										$\chi^2$ p value
	Overall			Current Smoking Status							
	%	95% CI		Smoker			Non-smoker				
		LL	UL	%	95% CI		%	95% CI			
Maternal/female guardian highest level of education											
Less than high school	11.7	9.4	14.5	20.3	E	12.0	32.1	10.3	8.2	12.9	0.03
High school	21.6	18.5	25.1	26.7	E	18.3	37.1	20.7	17.5	24.4	
Postsecondary education	66.7	62.7	70.5	53.1		40.6	65.2	69.0	64.9	72.7	
Presence of a regular smoker in the home											
Yes	21.4	18.2	24.9	46.1		33.7	59.0	17.1	14.2	20.4	0.0002
No	78.6	75.1	81.8	53.9		41.0	66.3	82.9	79.6	85.8	
Participated in school-organized <i>sport</i> activity											
Yes	41.7	37.7	45.8	33.7	E	23.1	46.4	43.1	38.9	47.4	0.14
No	58.3	54.2	62.3	66.3		53.6	76.9	56.9	52.6	61.1	
Participated in school-organized <i>art</i> activity											
Yes	32.1	28.8	35.6	28.0	E	17.0	42.3	32.8	29.4	36.4	0.47
No	67.9	64.4	71.2	72.0		57.7	83.0	67.2	63.6	70.6	

**Table 2. Descriptive Family, Peer, and School Characteristics for Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Overall and by Current Smoking Status, Canada, 2012 (continued)**

	Métis										$\chi^2$ <i>p</i> value
	Overall			Current Smoking Status							
	95% CI			Smoker			Non-smoker				
	%	LL	UL	%	LL	UL	%	LL	UL		
Participated in school-organized <i>club</i> activity											
Yes	17.6	15.0	20.5	7.6	E	3.9	14.2	19.3	16.5	22.5	0.0004
No	82.4	79.5	85.0	92.4		85.8	96.1	80.7	77.5	83.5	
Family is involved in at least two school activities											
Yes	53.9	50.1	57.7	30.5		21.9	40.7	58.0	54.0	61.9	< .0001
No	46.1	42.3	49.9	69.5		59.3	78.1	42.0	38.1	46.0	
	Overall		Smoker		Non-smoker						
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>				<i>F</i> test	
										<i>p</i> value	
Household income (\$)	35,806	779	28,686	1894	37,049	814	< .0001				
Peer risk behaviours score	1.5	0.02	2.1	0.07	1.4	0.02	< .0001				
Peer educational aspirations score	3.2	0.03	2.9	0.10	3.3	0.03	0.002				
Positive school environment score	3.1	0.02	2.9	0.10	3.1	0.02	0.03				
Negative school environment score	2.2	0.03	2.4	0.07	2.2	0.03	0.001				
School supports First Nations, Métis or Inuit culture	2.9	0.03	2.9	0.13	2.9	0.03	0.93				

**Table 2. Descriptive Family, Peer, and School Characteristics for Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Overall and by Current Smoking Status, Canada, 2012 (continued)**

	Inuit in Inuit Nunangat									$\chi^2$ p value
	Overall			Current Smoking Status						
	95% CI			Smoker			Non-smoker			
	%	LL	UL	%	LL	UL	%	LL	UL	
Maternal/female guardian highest level of education										
Less than high school	64.1	59.6	68.4	72.4	65.4	78.4	57.8	51.7	63.6	0.01
High school	14.8	11.9	18.4	10.9	6.9	16.7	17.9	13.9	22.6	
Postsecondary education	21.0	17.7	24.8	16.8	12.2	22.6	24.3	19.9	29.4	
Presence of a regular smoker in the home										
Yes	27.8	23.9	32.1	34.5	28.4	41.3	22.1	17.4	27.6	0.004
No	72.2	67.9	76.1	65.5	58.7	71.6	77.9	72.4	82.6	
Participated in school-organized <i>sport</i> activity										
Yes	65.1	60.6	69.4	64.6	57.6	71.0	65.6	59.5	71.3	0.82
No	34.9	30.6	39.4	35.4	29.0	42.4	34.4	28.7	40.5	
Participated in school-organized <i>art</i> activity										
Yes	37.9	33.6	42.4	40.2	33.8	46.9	35.9	30.4	41.8	0.33
No	62.1	57.6	66.4	59.8	53.1	66.2	64.1	58.2	69.6	



**Table 2. Descriptive Family, Peer, and School Characteristics for Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Overall and by Current Smoking Status, Canada, 2012 (continued)**

	Inuit in Inuit Nunangat									$\chi^2$ <i>p</i> value
	Current Smoking Status									
	Overall			Smoker			Non-smoker			
	%	95% CI		%	95% CI		%	95% CI		
LL		UL	LL		UL	LL		UL		
Participated in school-organized <i>club</i> activity										
Yes	24.4	20.7	28.6	22.1	16.7	28.5	26.5	21.6	32.0	0.27
No	75.6	71.4	79.3	77.9	71.5	83.3	73.5	68.0	78.4	
Family is involved in at least two school activities										
Yes	67.4	62.9	71.5	60.0	53.1	66.5	73.7	68.1	78.7	0.002
No	32.6	28.5	37.1	40.0	33.5	46.9	26.3	21.3	31.9	
	Overall		Smoker		Non-smoker					
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>			<i>F</i> test	
									<i>p</i> value	
Household income (\$)	38,634	1,036	35,156	1,324	41,633	1,554			0.002	
Peer risk behaviours score	1.7	0.03	2.0	0.03	1.5	0.03			< .0001	
Peer educational aspirations score	2.7	0.03	2.6	0.04	2.8	0.04			0.004	

**Table 2. Descriptive Family, Peer, and School Characteristics for Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Overall and by Current Smoking Status, Canada, 2012 (continued)**

	Inuit in Inuit Nunangat						<i>F</i> test <i>p</i> value
	Overall		Smoker		Non-smoker		
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	
Positive school environment score	3.1	0.02	3.0	0.02	3.1	0.03	0.02
Negative school environment score	2.3	0.02	2.3	0.04	2.2	0.04	0.02
School supports First Nations, Métis or Inuit culture	3.2	0.03	3.2	0.04	3.2	0.03	0.08

*Notes.* Data source: Aboriginal Peoples Survey 2012. CI = confidence interval; LL = lower limit; UL = upper limit. E = Use with caution. F = Too unreliable to publish. Peer risk behaviours scores range from 1 to 4; a higher score indicates a greater number of peers engaging in risk behaviours. Peer educational aspirations scores range from 1 to 4; a higher score indicates a greater number of peers with high aspirations. Positive school environment scores range from 1 to 4; a higher score indicates a more positive environment. Negative school environment scores range from 1 to 4; a higher score indicates a more negative environment. School supports culture scores range from 1 to 4; a higher score indicates a more culturally supportive school.

## Logistic Regression Analyses

In the presence of all examined family, peer, and school factors, the characteristics that remained significantly ( $p < 0.05$ ) associated with current smoking were as follows and are illustrated in Table 3. Among off-reserve First Nations students, decreased odds of smoking were observed in those who had high scores on the peer educational aspirations scale, OR = 0.44, 95% CI [0.29, 0.66], and those who perceived a positive school environment, OR = 0.44, 95% CI [0.22, 0.89], while increased odds of smoking were observed among off-reserve First Nations students who had high scores on the peer risk behaviour scale, OR = 6.8, 95% CI [3.4, 13.7].

Among Métis students, decreased odds of smoking were observed among those who participated in school-organized club extracurricular activities, OR = 0.28, 95% CI [0.12, 0.63], while increased odds of smoking were observed among those who lived in a home where someone smoked regularly, OR = 2.9, 95% CI [1.3, 6.5], and those who had high scores on the peer risk behaviour scale, OR = 6.7, 95% CI [2.9, 15.8].

Among Inuit students, decreased odds of smoking were observed among those who lived in higher-income households, OR = 0.86, 95% CI [0.77, 0.97], while increased odds of smoking were observed among those who had high scores on the peer risk behaviour scale, OR = 6.8, 95% CI [3.2, 14.6].

The only characteristic that was consistently associated with smoking among all three groups of Indigenous students was having many peers who engaged in risk behaviours.

## Discussion

This study used population-based data to investigate the characteristics associated with current smoking among three groups of Indigenous high school students in Canada: off-reserve First Nations, Métis, and Inuit. In order to do this, this study examined three social contexts that have been shown to influence adolescent smoking behaviour: family, peers, and school. We expected family and peer factors to be strongly associated with smoking behaviours because families and peers reflect adolescents' immediate social environments (Wen et al., 2009; Wiium & Wold, 2009). However, since schools are often a key context for health education and promotion with youth (Samdal et al., 2000), we also focused on school environment factors. A growing body of research has started to examine the factors associated with smoking among Indigenous youth in Canada and the United States. This research has addressed many contributing factors, including cultural factors (Ryan et al., 2017; Soto et al., 2015; Yu, Stiffman, & Freedenthal, 2005); physical activity, co-occurring health-risk behaviours, and socioeconomic factors (Ryan et al., 2017); historical trauma (Soto et al., 2015); mental health and peer influences (Whitlock et al., 2012; Yu et al., 2005); perceived harm from tobacco use (Beauvais, Thurman, Burnside, & Plested, 2007); and academic orientation and stressful life events (LeMaster et al., 2002). This study contributes to this growing body of research by investigating the associations between smoking and various school characteristics, together with family and peer factors, among off-reserve First Nations, Métis, and Inuit high school students.

**Table 3. Logistic Regression Models Predicting Current Smoking, Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Canada, 2012**

	Off-Reserve First Nations <sup>a</sup>			
	OR	95% CI		<i>p</i> value
		LL	UL	
<b>Family characteristics</b>				
Household income (divided by 10,000)	0.98	0.82	1.16	0.77
Mother's education				
No high school ( <i>ref.</i> )	1.00			
High school	1.08	0.45	2.59	0.86
Postsecondary	0.67	0.28	1.63	0.38
Regular smoker in the home	1.73	0.94	3.17	0.08
<b>Peer characteristics</b>				
Peer risk behaviours	6.76	3.35	13.65	< .0001
Peer educational aspirations	0.44	0.29	0.66	0.0001
<b>School characteristics</b>				
Positive school environment	0.44	0.22	0.89	0.02
Negative school environment	0.70	0.41	1.21	0.20
Participated in school-organized <i>sport</i> activity	1.11	0.64	1.92	0.72
Family is involved in at least two activities in school	1.19	0.61	2.33	0.61

**Table 3. Logistic Regression Models Predicting Current Smoking, Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Canada, 2012 (continued)**

	Métis <sup>b</sup>			
	OR	95% CI		<i>p</i> value
		LL	UL	
<b>Family characteristics</b>				
Household income (divided by 10,000)	0.86	0.70	1.07	0.17
Mother's education				
No high school ( <i>ref.</i> )	1.00			
High school	1.18	0.31	4.50	0.81
Postsecondary	0.97	0.23	4.05	0.96
Regular smoker in the home	2.90	1.30	6.51	0.01
<b>Peer characteristics</b>				
Peer risk behaviours	6.73	2.87	15.79	< .0001
Peer educational aspirations	0.99	0.56	1.74	0.97
<b>School characteristics</b>				
Positive school environment	0.77	0.30	1.98	0.59
Negative school environment	1.67	0.82	3.43	0.16
Participated in school-organized "club" activity	0.28	0.12	0.63	0.002
Family is involved in at least two activities in school	0.76	0.40	1.44	0.40

**Table 3. Logistic Regression Models Predicting Current Smoking, Off-Reserve First Nations, Métis, and Inuit High School Students Aged 12 to 21, Canada, 2012 (continued)**

	Inuit in Inuit Nunangat <sup>c</sup>			
	OR	95% CI		<i>p</i> value
		LL	UL	
<b>Family characteristics</b>				
Household income (divided by 10,000)	0.86	0.77	0.97	0.01
Mother's education				
No high school ( <i>ref.</i> )	1.00			
High school	0.62	0.32	1.21	0.16
Postsecondary	0.56	0.31	1.01	0.05
Regular smoker in the home	1.18	0.67	2.06	0.57
<b>Peer characteristics</b>				
Peer risk behaviours	6.77	3.15	14.57	< .0001
Peer educational aspirations	1.02	0.65	1.61	0.92
<b>School characteristics</b>				
Positive school environment	0.61	0.30	1.22	0.16
Negative school environment	1.01	0.55	1.84	0.98
Family is involved in at least two activities in school	0.85	0.46	1.54	0.58

*Note.* Source: Aboriginal Peoples Survey, 2012. The full model only includes the covariates that were significantly associated with current smoking at the bivariate level. The full model controls for age, sex, and proxy reporting (not shown). OR = odds ratio. CI = confidence interval; LL = lower limit; UL = upper limit.

<sup>a</sup> *n* = 1,758; *c* statistic = 0.90; Somers' *D* = 0.80

<sup>b</sup> *n* = 1,716; *c* statistic = 0.90; Somers' *D* = 0.79

<sup>c</sup> *n* = 428; *c* statistic = 0.82; Somers' *D* = 0.65

Our findings revealed important group differences in Indigenous youth's correlates of smoking. The only consistent risk factor for smoking among off-reserve First Nations, Métis, and Inuit students was having many close friends who engaged in risk behaviours (including but not restricted to smoking). This finding is in line with past research regarding both Indigenous and non-Indigenous youth, which has shown an association between teen smoking and having friends who smoke (Alexander et al., 2001; Chuang et al., 2009; Wen et al., 2009; Whitlock et al., 2012). Among off-reserve First Nations students, those who had many close friends with high educational aspirations (i.e., who thought it was important to work hard at school and to complete high school, and who planned to further their education or training) showed decreased odds of smoking. Past research focussing on Indigenous youth has also found that their peers have an influence on their mental health outcomes (Guèvremont et al., 2016;

Kaspar, 2013); this study has highlighted the importance of peer behaviour and influence for smoking among this population. The relationship between peers and smoking behaviour is complex, and it is best seen as bi-directional insofar as youth can be influenced by the norms and behaviours of their peer group and/or seek out peers with norms and behaviours that are similar to their own (Simons-Morton & Farhat, 2010). Future research disentangling these different causal pathways is warranted, as are studies that actively examine the role of peers vis-à-vis other risk behaviours.

As expected, family characteristics were associated with current smoking. In the presence of all examined factors, Métis students living in homes where someone smoked regularly had increased odds of smoking themselves. The association between smoking and living with a regular smoker was in the right direction for the other two groups of students and was marginally significant among First Nations students. This is consistent with past research on youth smoking, which has shown an association between youth smoking and being exposed to smoking in the home or living in a house where smoking is not completely restricted (Leatherdale et al., 2008; Shields, 2005b). Among Inuit students, living in lower-income households was associated with increased odds of smoking. The association between smoking and household income was in the right direction for the other two groups of students. These findings are in line with the well-known associations between teen smoking and family socio-economic characteristics (Hanson & Chen, 2007; Ryan et al., 2017; Shields, 2005b; Soteriades & DiFranza, 2003; Wen et al., 2009; Wiium & Wold, 2009). Future studies are necessary to better understand why youth from low-income families may be more likely to smoke. Scholars have argued that low socio-economic conditions are proxy measures for other constructs that are related to smoking; one example is locus of control, or the belief that one is able or unable to influence their health by engaging in health-promoting activities (Soteriades & DiFranza, 2003; Stronks, van de Mheen, Looman, & Mackenbach, 1997). It has also been argued that smoking may be a coping behaviour for the stress of living in disadvantaged circumstances (Stronks et al., 1997). From this, it is possible that low household income may further be associated with unique barriers to smoking cessation; this could be investigated in future research.

School-related characteristics were also found to be protective for Indigenous student smoking, over and above the associations of smoking with family and peer characteristics. Indeed, lower odds of smoking were observed among off-reserve First Nations students who attended schools with a positive climate, and among Métis students who participated in club activities organized by their schools. Positive school environments were associated with a lower prevalence of smoking among off-reserve First Nations students and, in this study, a positive school environment was defined as a place where students felt safe and happy, where most students enjoyed being at school, and where there were many opportunities to become involved in school activities. These items, although not identical, were consistent with how the construct of school connectedness has been typically operationalized in past studies that have found an association between increased school connectedness and decreased cigarette use (Azagba & Asbridge, 2013; Dornbusch et al., 2001; Gowing & Jackson, 2016; Resnick et al., 1997; Sabiston et al., 2009). To our knowledge, this is the first study to show an association between off-reserve First Nations students' perception of school environment and smoking behaviours.

Participation in school-based extracurricular activities or afterschool programs has been shown to foster a sense of school connectedness (Anderson-Butcher, 2010; Martinez et al., 2016; Thompson et al., 2006). Past research has shown an association between smoking and frequent participation in extracurricular sport activities among off-reserve Indigenous youth (Ryan et al., 2017). In this study, we

paid attention to extracurricular activities that were organized specifically by schools and, in this context, participation in school-based club activities was associated with a lower prevalence of smoking among Métis students. Supervised, organized extracurricular activities have been associated with positive outcomes among youth, especially if these activities are structured in a manner that supports adolescents' developmental needs (e.g., forming caring relationships with adults and peers, engaging in identity exploration) (Fredricks & Eccles, 2008). It has also been suggested that different types of extracurricular activities (i.e., sport, art, or clubs) may provide students with qualitatively different developmental opportunities (Martinez et al., 2016). To this end, more research is needed to identify the features through which school-based club activities are associated with lower smoking prevalence among Métis high school students.

Among Inuit students, the school characteristics that were significantly associated with smoking at the bivariate level—that is, family involvement in school activities as well as positive and negative school environments—lost their statistical significance in the multivariate analysis. This suggests that school factors, as measured in the 2012 APS, do not seem to play an independent role in current smoking among these youths, but that instead family and peer factors appear to have a stronger association with smoking. School factors as measured in the 2012 APS may also be weak proxies for school environments in Inuit Nunangat.

### **Limitations**

This study has a number of limitations that should be acknowledged. First, it is based on cross-sectional survey data and thus causal relationships between smoking and the factors investigated cannot be inferred. As well, this study focused on youth currently attending school; school leavers, who may be a high-risk group for smoking (Hublet et al., 2006), are not represented in this study's analysis.

Furthermore, this study relies on self-reported current smoking status; although it has been demonstrated that self-reported data on smoking status provide a valid estimate of the prevalence of smoking in Canada (Wong, Shields, Leatherdale, Malaison, & Hammond, 2012), self-reported smoking data have not been validated among either the Indigenous population generally or the Indigenous high school youth population specifically. In addition, the prevalence of current smoking among Indigenous high school students could be underestimated because of the large proportion of proxy respondents in the 2012 APS among youth. Indeed, preliminary data analyses (that are not shown) suggested that current smoking proportions were higher among non-proxy respondents.

Only respondents with complete data on all selected covariates were included in the regression analyses. The resultant reduced sample sizes for the three groups of students—especially for Inuit—could have decreased the statistical power to detect significant differences. Another limitation related to missing data is that the peer influence and the school environment scales were calculated only if respondents replied to a minimum of 75% of the questions comprising the scales. While this was done to augment the robustness of the scores, it also excluded respondents with missing data for these questions and is thus another limitation of the study.

The associations of peer characteristics with smoking are complex. Future studies using social network analysis or longitudinal network data to disentangle the friend selection versus socialization processes (e.g., Schaefer, Adams, & Haas, 2013; Seo & Huang, 2012) are necessary in order to better understand



these dynamics. Also, further analyses of participation in school-based extracurricular activities should adjust for potential self-selection biases—that is, further analyses should address whether participation in organized activity is due to pre-existing differences between participants and non-participants (Fredricks & Eccles, 2008; Wang & Eccles, 2012), such as access or availability.

Another limitation is that although family, peer, and school contexts were discussed in separate themes, the boundaries between these contexts are fluid and this study did not explore their complex interactions. In addition, the relatively small overall sample size of Indigenous high school students precluded the analysis of gender-based correlates of smoking, or of neighbourhood factors associated with smoking. Some have argued that neighbourhoods of different population densities (i.e., urban, suburban, or rural) have structural and cultural differences, which may affect the influence of family, peers, and potentially schools on adolescent smoking behaviours (Chuang et al., 2009).

This study is also limited to the content of the 2012 APS, which did not have any school policy information (such as whether or not respondents' schools had tobacco-free policies). School tobacco policies can influence schools' social environments (Paek, Hove, & Oh, 2013), but this could not be taken into consideration in this study. As well, although several school characteristics were measured in the survey, there was no comprehensive school connectedness measure. There is evidence that school connectedness is a multidimensional construct that taps into many areas of youth's school experiences, including school involvement, academic motivation, school attachment, teacher support, and peer relations (Chung-Do, Goebert, Chang, & Hamagani, 2015). Lastly, the 2012 APS is limited to the off-reserve population. As such, future research using other sources of data to investigate the correlates of smoking among First Nations youth residing in First Nations communities is warranted.

## Conclusions

This study adds to a growing body of research that has sought to identify the risk and protective factors for cigarette use among Indigenous youth in Canada. Our results highlight a number of family, peer, and school characteristics that have been associated with smoking. Our results also reveal important group differences in Indigenous youth's correlates of smoking, and this should be taken into consideration when developing interventions that target smoking among off-reserve First Nations, Métis, and Inuit students in Canada. Even though more research is needed to disentangle the complex processes of peer influences on smoking, our findings do indicate consistent associations between smoking and having close friends who engage in risk behaviours including (but not restricted to) smoking. Moreover, our findings suggest that tobacco control strategies either targeting or considering peer networks are warranted (Kaai, Brown, Leatherdale, Manske, & Murnaghan, 2014). Broadly speaking, our findings also suggest that interventions aimed at helping families make their homes smoke-free could help promote a smoke-free lifestyle among off-reserve Indigenous youths, and that youth living in lower-income families are at a particular risk for smoking and could thus be a focus for interventions.

Lastly, our findings suggest that Indigenous youth attending schools that foster a sense of connectedness—either through school climate or school-based organized activities—may be less at-risk for smoking, regardless of their family and peer influences. Some have suggested that schools can adopt strategies that promote school connectedness among students which can, in turn, lead to lowered risk-taking behaviour, including cigarette smoking initiation (Chapman, Buckley, Sheehan, & Shochet,

2013). However, as has been pointed out by Chapman et al. (2013), interventions targeting school environments are complex endeavours that require time, financial resources, and long-term commitments from schools and their administrations and staff. This, certainly, is something beyond the scope of this study and article. Nevertheless, our study can help inform research on school-based interventions and programs to prevent the onset of smoking among Indigenous students in Canada. Future research seeking to replicate and expand our findings should consider both using more multidimensional and standardized school connectedness tools and conducting qualitative studies that investigate the meaning of *connecting to school* among off-reserve First Nations, Métis, and Inuit high school students in Canada.

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