Smoke-free homes, smoking susceptibility and familial smoking among never-smoking high school students: a cross-sectional analysis

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Abstract:	Background: Research has shown that living in a smoke-free home has a positive effect on adolescents' perceived acceptance of smoking. However, the relationship between smoke-free homes and adolescent smoking behaviours remains unclear. The aim of this study is to examine the associations between smoke-free homes and smoking susceptibility among high school students, and to determine whether these associations persist when analysis are stratified based on familial smoking status. Methods: This is a random cross-sectional survey (2012/2013 Youth Smoking Survey) of primary, junior, and high school students in Canada (n=47,203). Multivariable logistic regression analyses are used to examine the associations between smoke-free homes and susceptibility to smoking among never-smoking high school students, with and without stratification on familial smoking. Results: Multivariable logistic regression show that adolescents living in a smoke-free home have a reduced odds of being susceptible to smoking (OR = 0.582, 95% CI: 0.428-0.791) compared to those in households where smoking is permitted. When adolescents have other family members who are smokers, having a smoke-free home is not significantly associated with reduced smoking susceptibility (OR = 0.878. 95% CI: 0.721-1.071). Interpretation: In addition to protecting children from exposure to second-hand smoke, the results of this study suggest that smoke-free homes may also influence future smoking initiation. Optimal success in preventing youth smoking uptake necessitates having a coherent anti-smoking message, between the home smoking environment and familial smoking behaviour.

Smoke-free homes, smoking susceptibility and familial smoking among never-smoking high school students: a cross-sectional analysis

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Abstract (Max 250 Words):

Background: Research has shown that living in a smoke-free home has a positive effect on adolescents' perceived acceptance of smoking. However, the relationship between smoke-free homes and adolescent smoking behaviours remains unclear. The aim of this study is to examine the associations between smoke-free homes and smoking susceptibility among high school students, and to determine whether these associations persist when analysis are stratified based on familial smoking status.

Methods: This is a random cross-sectional survey (2012/2013 Youth Smoking Survey) of primary, junior, and high school students in Canada (n=47,203). Multivariable logistic regression analyses are used to examine the associations between smoke-free homes and susceptibility to smoking among never-smoking high school students, with and without stratification on familial smoking.

Results: Multivariable logistic regression show that adolescents living in a smoke-free home have a reduced odds of being susceptible to smoking (OR = 0.52, 95% CI: 0.42-0.791) compared to those in households where smoking is permitted. When adolescents have other family members who are smokers, having a smoke-free home is not significantly associated with reduced smoking susceptibility (OR = 0.7, 95% CI: 0.721-1.071).

Interpretation: In addition to protecting children from exposure to second-hand smoke, the results of this study suggest that smoke-free homes may also influence future smoking initiation.

Optimal success in preventing youth smoking uptake necessitates having a coherent antismoking message, between the home smoking environment and familial smoking behaviour.

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INTRODUCTION:

The last decade has seen considerable progress in reducing exposure to second-hand smoke in the home among Canadian youth (12 to 17 years old), dropping from 23% in 2002 to 7% in 2012 (1). Living in a smoke-free home has been shown to have positive effects on a range of smoking related behaviours and health outcomes (2-6). Smokers in homes that are partial or fully smoke-free tend to smoke fewer cigarettes per day and have a higher motivation to quit smoking (7-8). Meanwhile, non-smoking members of such households report lower exposure to second-hand smoke (9-10), higher overall perceived health and well-being (11), and hold reduced intentions to become future smokers (12). While the literature has shown a consistent relationship between living in a smoke-free home and smoking behaviours among adults, the impact of smoke-free homes on adolescent smoking remains less clear, in part due to an adolescent's inability to control the implementation of smoke-free home rules and the strong influence that adult behaviour plays in modelling the smoking behaviour of youth (13-14).

Smoke-free homes have been linked with a decrease in adolescents' perceived acceptance of smoking (15-16); however, findings are mixed on the effects of smoke-free homes on adolescent smoking initiation, maintenance and cessation (17). Both longitudinal (16) and cross-sectional (18-21) studies find that adolescents living in smoke-free homes are less likely to initiate smoking and, among current smokers, have a reduced risk of progression to heavy smoking. At the same time, the relationship between smoke-free homes and adolescent smoking may depend on familial smoking status (17), with some studies reporting that smoke-free homes only reduce the risk of adolescent smoking in non-smoking families (16, 22). Other research finds that the relationship between living in a smoke-free home and smoking behaviour exists only among adolescents living with parents who smoke (23), while other studies find that the

association is attenuated after adjusted for parental smoking (24, 25). Collectively, the varied findings suggest a need to more carefully examine the independent and interactive effects of familial smoking on the association between living in a smoke-free home and adolescent smoking behaviour. This paper looks to bridge the gap in the scientific literature with answers to three questions: First, are smoke-free homes associated with reduced smoking susceptibility among never-smoking adolescents? Second, does this association persist after adjusting for familial smoking status? Finally, does the association between smoke-free homes and reduced smoking susceptibility remain after stratification based on familial smoking status?

METHODS:

Design

The Youth Smoking Survey is a nationally representative cross-sectional, biannual classroom-based survey that endeavours to provide estimates of tobacco use rates at national and provincial levels and capture issues influencing tobacco use (knowledge, social influences, and attitudes). The 2012/2013 iteration was administered in nine Canadian provinces as the province of Manitoba declined participation. Comparative estimates of 2010/2011 Youth Smoking Survey with and without Manitoba found no significant differences in smoking outcomes (26).

Participants

The Youth Smoking Survey was administered to 47,203 students enrolled in grades 6 to 12, drawn from a random sample of private, public, and Catholic schools. Students attending special schools (special need, visually-impaired, military), or attending a school with no eligible grades, or no classes with at least 20 students, were excluded. The University of Waterloo (the

principal coordinator of the Youth Smoking Survey), Health Canada, and institutions of consortium members provided ethics approval for all protocols and materials of the Youth Smoking Survey, where required. Dalhousie University in Halifax, Nova Scotia provided the ethical approval for this research project.

Measures

Dependent Variable:

Susceptibility to smoking is measured among those who have never tried cigarettes, drawing on three question about smoking intentions from a previously validated scale (27): "Do you think in the future you might try smoking cigarettes?", "If one of your best friends was to offer you a cigarette would you smoke it?", and "At any time during the next year do you think you will smoke?". Students could respond "Definitely yes", "Probably yes", "Probably not", or "Definitely not". If a student provided any response other than "Definitely not" to any of the questions they were classified as a "Yes" for smoking susceptibility.

Independent Variables:

Smoke-free home is the main variable of interest for predicting susceptibility to smoking and intentions to quit. Students could describe the rules in their home using a four-point nominal scale: "No one is allowed to smoke in the home", "Only special quests are allowed", "Only in certain areas is smoking allowed", or "Smoking is allowed anywhere". Keeping in line with previous research (16), no one allowed to smoke represents a smoke-free home, while we consider all other arrangements as allowing smoking in the home.

A number of covariates previously shown to be associated with smoking behaviours are included in our models. These are student gender, grade (9 through 12), race (white versus non-white), and school marks [based on a 5-point interval scale asking students to best describe their marks in the past year (ranging from high "Mostly A's and B's/70-84%/level 3-4", to medium, "Mostly B's and C's/60-69%/level 3", to low "Mostly C's/50-59%/level 2")]. The Youth Smoking Survey includes a measure for self-esteem drawing on three questions from a validated scale on self-concept (2□): "In general, I like the way I am", "When I do something, I do it well", and "I like the way I look". For each question a student could respond on a 5-point Likert scale of "False", "Mostly false", "Neutral", "Mostly true", and "True" with corresponding values of 0-4, respectively, for a total summed score out of 12. We categorize scores as less than the median (≤□ out of 12), greater than the median but less than 90th percentile (9-11 out of 12), and greater than the 90th percentile (12 out of 12). Familial smoking status is derived from students' responses on how many of their parents, step-parents, guardians and siblings smoked cigarettes, with responses dichotomized based on having at least one family member who smokes versus having no family members who smoke.

Statistical Analysis:

Multivariable logistic regression models are employed to assess the associations between smoke-free homes and smoking susceptibility. For analysis, only students in grades 9 and above and students that have never tried or experimented with cigarette smoking are included (n = 17,396). Additionally, analyses stratified by family smoking status (no versus one or more family member who smokes) are also performed. Survey weights are employed in all analyses to produce representative population estimates and adjust for the unequal probability of selection

and student non-response. Survey weights are derived in two stages. In the first stage a weight is created to account for the school selection within health region and school strata. A second weight is calculated to adjust for student non-response. The weights are then calibrated to the provincial gender and grade distribution in each province (26). We carried out all analyses using Stata 13.0 ME (StataCorp LP, College Station, Texas) and a cut-off for significance of p = 0.05.

Results

Completed questionnaires were received from 47,203 students, drawn from 1073 schools across 127 school boards, for a national participation rate of 72% (of 65,□12 eligible students). Table 1 contains the weighted demographic characteristics of the never-smoking students (n = 17,396) included in the current study. Around 30% of never-smoking students are considered susceptible to smoking. Significant differences in susceptibility among never-smokers are observed across indicators, with female students, younger students, those with lower self-esteem, students with poor grades, and students who come from smoking homes, showing a higher smoking susceptibility.

INSERT TABLE #1 HERE

Table 2 shows the results of the multivariable logistic regression examining the association between smoke-free homes and smoking susceptibility. Model 1 adjusts for gender, grade, province, race, self-esteem, and academic performance. In addition to Model 1 covariates, Model 2 adjusts for familial smoking. The results show a statistically significant association between smoke-free homes and susceptibility to smoking in both models. In particular, living in a smoke-free home is associated with lower odds of being susceptible to smoking (OR = 0.6□7,

95% CI: 0.5□8–0.□04). This association was slightly attenuated after controlling for family member smoking (OR = 0.7□7, 95% CI: 0.664–0.932). In terms of other covariates, a significant increase in the odds of smoking susceptibility is also observed among younger students, students with poor academic performance, and students who report lower self-esteem.

INSERT TABLE #2 HERE

Results from the analyses stratified by familial smoking status are shown in Table 3. Living in a smoke-free home is not consistently associated with adolescent smoking susceptibility across familial smoking status. Among students whose family members do not smoke, living in a smoke-free home significantly reduces susceptible to smoking (OR = 0.5□2, 95% CI: 0.42□–0.791). Conversely, among students with familial members who do smoke, living in a smoke-free home is not associated with smoking susceptibility (OR = 0.□7□ 95% CI: 0.721–1.071).

INSERT TABLE #3 HERE

Interpretation

Public health efforts to reduce the impact of smoking have been enhanced in recent years with the widespread adoption of smoke-free homes, working in conjunction with broader restrictions on smoking in other public spaces, and other tobacco control measures. Smoke-free homes have been shown to reduce the onset of smoking, which is particularly important among young people given that the great majority of long-term smokers initiate tobacco use before age 1□(17). The current study finds that living in a smoke-free home is significantly associated with a reduced susceptibility to smoking among students who had never tried or experimented with

cigarette smoking. However, stratified analysis suggests that this relationship is contextualized based on familial smoking status. Specifically, the benefits of reduced smoking susceptibility accrued by living in a smoke-free home are only realized if the student's family members are also non-smokers. If a student has other family members who smoke, living in a smoke-free home is not associated with smoking susceptibility.

Findings are in line with previous studies that have observed a stronger association between smoke-free homes and lower rates of smoking among youth whose parents do not smoke (16, 17, 22). In a recent review, Emory and colleagues found marginal evidence of an association between smoke-free homes and adolescent smoking behaviours, with stronger associations in homes without a family member who is a smoker (17). Other studies have found that smoke-free homes are not associated with adolescent smoking behaviour after controlling for parental smoking (24, 25), though these studies do not provide stratified analyses. O'Loughlin and colleagues (14), adopting a slightly different approach, found that smoking onset was significantly higher among young people living in a smoke-free home in which both parents were smokers, compared to homes where neither parent smoked. The authors suggested that young people in these homes likely recognize a disconnect between their parents' smoking behaviours, the larger rules surrounding tobacco use in the home, and parents' lack of adherence to their own rules (do as I say, not as I do). As such, uncertainty is created through the absence of a clear anti-smoking message, leaving young people more vulnerable to smoking initiation. A similar disconnect was observed in an earlier a qualitative study examining messages that teens receive about cigarette smoking (13, 29).

Limitations

A few limitations should be noted. First, study data are cross-sectional and only allow for an examination of association; however, in measuring smoking susceptibility we are examining future intentions, rather than current behaviour, which may help to mitigate some concerns with temporality. Second, the Youth Smoking Survey contains self-report information which is susceptible to a number of forms of bias, including recall bias, in which students may inaccurately remember events occurring in the preceding months or years, and social desirability bias, where students may respond to questions in a manner that they perceive as being viewed more favourably by others. Both forms of bias may produce errors in estimates, which may inflate (over-reporting of positive behaviours) or reduce (under-reporting of negative behaviours) measures of association. Third, our key exposure measure, smoke-free homes, is measured based on students' understanding of the rules in their house, and there may be a discrepancy with the actual house rules as articulated by the parents. We attempted to address this with the inclusion of older students only (grade 9 and above) who may have a greater awareness of home smoking rules. Lastly, the Youth Smoking Survey does not contain measures of socioeconomic status (family income or parental educational level) and family structure, which are potential confounders.

Policy Implications and Future Research

Moving forward, continued research in this area is required employing longitudinal designs that account for familial smoking status. Clearly there is considerable complexity in the relationship between the impact of smoke-free homes and smoking initiation, such that a failure to consider the effect of the smoking environment (e.g. parental or peer influences) may produce incorrect estimates of effectiveness. Such work should employ an updated version of the

smoking susceptibility scale (30), which now includes a measure of curiosity, as this has been shown to improve the prediction of smoking initiation, and may provide more robust estimates of the protective effects of smoke8free homes. Beyond smoking initiation, limited research has examined the relationship between smoke8free homes and cessation8related behaviours among adolescent smokers; a deeper examination of the effect of smoke8free homes on quitting is warranted. This study makes an important contribution to our understanding of the relationship between smoke8free homes and adolescent smoking behaviours. It suggests that the various components of the home smoking environment – home smoking rules, familial smoking behaviours, and familial attitudes towards smoking – must not contradict one another if the prevention of smoking initiation among young people is to be effective. As O'Loughlin and colleagues note, when these features do not align, not only do they fail to reduce negative smoking related behaviours, they may, in turn, increase such behaviours further and do more harm than good (14).

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	Non-smokers (N=17396)		
Characteristics of survey population	Non-susceptible to cigarette smoking (n,%) (12295, 70.2%)	Susceptible to cigarette smoking (n,%) 5101 (29.8%)	P-value[a]
Gender			
Female	64□5 (6□5)	2672 (31.5)	.0032
Male	5□10 (71.9)	2429 (2□1)	
Grade			
9	3503 (66.□)	1729 (33.2)	
10	34□3 (67.5)	1551 (32.5)	<.0001
11	3052 (73.0)	112□(27.0)	
12	2257 (75.3)	693 (24.7)	
Provinces [b]			
Atlantic	4279 (70.9)	1625 (29.1)	
Quebec	1139 (72.2)	3□7 (27.□)	
Ontario	2062 (69.2)	915 (30.□)	.1966
Saskatchewan	1501 (6□9)	706 (31.1)	
Alberta	149□(70.0)	659 (30.0)	
British Columbia	1□16 (71.5)	□09 (2□5)	
Race [b]			
White	9317 (69.6)	3774 (30.4)	.1577
Non8white	2910 (71.4)	12□4 (2□6)	
Overall self8esteem score [b]			
Less than median (score<=□)	3735 (60.□)	231□(39.2)	
Median to <90 percentile (score 98l1)	6400 (73.4)	225□(26.6)	<.0001
90 percentile and above (score 12 up)	2126 (79.2)	509 (20.□)	
School grade [b]			
Level 3 and 4	10034 (71.3)	3792 (2□7)	
Level 3	1611 (66.3)	914 (33.7)	<.0001
Level 2 and lower	363 (59.0)	256 (41.0)	
Any family member smoking [b]			
No	7442 (74.1)	254□(25.9%)	<.0001
Yes	4246 (64.4)	2245 (35.6%)	

[a]: Rao-Scott Chi-Square p-value for test of association

[b]: some missing values for this variable in the study population.

Table 1: Weighted distribution of characteristics among non-smokers, by susceptible level to cigarette smoking - YSS 2012-2013 – Students grade 9-12.

Weighted distribution of characteristics among current-smokers (see definition), by likelihood of smoking in the next year - YSS 2012-2013 – Students grade 9-12

	Susceptibility to Initiate Smoking			
	Model 1		Model 2	
Characteristics of sample (Reference category)	Odds Ratio Estimate	95% CI	Odds Ratio Estimate	95% CI
Smoke8Free Home				
Completely	0.6□7*	(0.5□□, 0.□04)	0.7□7*	(0.664, 0.932)
Gender (female)				
Male	1.072	(0.954, 1.205)	1.039	(0.920, 1.172)
Grade (12)				
9	1.4□1*	(1.239, 1.770)	1.45□*	(1.213, 1.753)
10	1.441*	(1.204, 1.726)	1.461*	(1.214, 1.759)
11	1.10□	(0.914, 1.342)	1.129	(0.926, 1.376)
Provinces (Ontario) [b]				
Atlantic	0.□53*	(0.755, 0.965)	0.□62*	(0.760, 0.979)
Quebec	0.70□*	(0.5□0, 0.□65)	0.729*	(0.592, 0.□9□)
Saskatchewan	1.030	(0.901, 1.17□)	1.042	(0.907, 1.196)
Alberta	0.926	(0.7□9, 1.0□7)	0.936	(0.793, 1.103)
British Columbia	0.□57*	(0.741, 0.990)	0.□□2	(0.759, 1.025)
Race [b]				
White	1.106	(0.96□, 1.263)	1.093	(0.952, 1.255)
Overall self8esteem score [b]				
Less than median (score<=□)	2.240*	(1.□47, 2.715)	2.19□*	(1.□02, 2.6□0)
Median to <90 percentile (score 98l1)	1.317*	(1.092, 1.5□9)	1.304*	(1.075, 1.5□3)
School grade (Level 3 and 4) [b]				
Level 3	1.231*	(1.067, 1.421)	1.191*	(1.027, 1.3□1)
Level 2 and lower	1.543*	(1.103, 2.160)	1.439*	(1.004, 2.061)
Any family member who smokes (None) [b]				
1+	N/A	N/A	1.349*	(1.190, 1.529)

Table 2: Multivariable logistic regression of susceptibility to smoking among non8smokers

*: Significant at the p = 0.05 level

	Susceptibility to Initiate Smoking			
	0 Family Smokers		1+ Family Smokers	
Characteristics of sample (Reference category)	Odds Ratio Estimate	95% CI	Odds Ratio Estimate	95% CI
Smoke-Free Home				
Completely	0.5□2*	(0.42□, 0.791)	0.□7□	(0.721, 1.071)
Gender (female)				
Male	1.023	(0.□71, 1.200)	1.05□	(0.□79, 1.275)
Grade (12)				
9	1.22□	(0.964, 1.564)	1.□73*	(1.406, 2.494)
10	1.407*	(1.107, 1.7□9)	1.554*	(1.163, 2.07□)
11	0.973	(0.753, 1.25□)	1.414*	(1.035, 1.931)
Provinces (Ontario) [b]				
Atlantic	0.□□9	(0.749, 1.056)	0.□2□*	(0.6□6, 0.999)
Quebec	0.790	(0.597, 1.046)	0.657*	(0.4□2, 0.□95)
Saskatchewan	1.119	(0.934, 1.340)	0.933	(0.751, 1.15□)
Alberta	0.92□	(0.743, 1.15□)	0.922	(0.717, 1.1□6)
British Columbia	0.966	(0.795, 1.175)	0.7□9	(0.622, 1.001)
Race [b]				
White	1.259*	(1.050, 1.510)	0.□67	(0.69□, 1.077)
Overall self-esteem score [b]				
Less than median (score<=□)	2.021*	(1.57□, 2.5□□)	2.729*	(1.970, 3.7□1)
Median to <90 percentile (score 98-11)	1.140	(0.□9□, 1.44□)	1.742*	(1.265, 2.400)
School grade (Level 3 and 4) [b]				
Level 3	1.0□0	(0.□73, 1.335)	1.309*	(1.061, 1.615)
Level 2 and lower	1.526*	(1.024, 2.272)	1.400	(0.□13, 2.410)

Table 3: Multivariable logistic regression of susceptibility to smoking stratified by family smoking status

*: Significant at the p = 0.05 level

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~~Home smoking bans~~Smoke-free homes, smoking susceptibility and ~~quit intentions~~familial smoking among never-smoking high school students: a cross-sectional analysis

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Abstract (Max 250 Words):

Background: Research has shown that ~~the presence of home smoking bans (HSB~~living in a smoke-free home~~)~~ has a positive effect~~s~~ on adolescents' perceived acceptance of smoking. However, the relationship between smoke-free homes~~HSB~~ and adolescent smoking behaviours remains unclear. The ~~objective~~ aim of this study ~~was~~is to examine the associations between ~~HSB~~smoke-free homes and smoking ~~behaviours (smoking~~ susceptibility ~~and quit intentions)~~ among high school students, and to determine~~. We also examined~~ whether these associations persist when analysis are stratified based on familial smoking status.

Methods: This is ~~study used data from the 2012/2013 Youth Smoking Survey (n = 21,269),~~ a random cross-sectional survey (2012/2013 Youth Smoking Survey) of primary, junior, and high school students in Canada (n=47,203).~~ ~~Multivariable logistic regression analyses ~~were~~ are used to examine the associations between ~~HSB~~smoke-free homes and~~with~~ susceptibility to smoking ~~and intentions to quit~~ among never-smoking high school students, with and without stratification on familial smoking.

Results: Multivariable logistic regression show ~~ed~~that adolescents living in a ~~non-~~smoke-free home~~ing households with an HSB~~ ha~~ved~~ a reduced odds of being susceptible to smoking (OR =

0.582, 95% CI: 0.428-0.791) compared to those in ~~non-smoking households without an HSB~~households where smoking is permitted. When adolescents have other family members who are smok~~In a smoking household~~ers~~d~~, having a smoke-free home~~HSB~~ ~~was~~is not significantly associated with reduced smoking susceptibility (OR = 0.878. 95% CI: 0.721-1.071). ~~Similarly, no significant association was found between HSB and future quit intentions among current smokers.~~

Interpretation: In addition to~~Apart from , primarily~~ protecting children from exposure to ~~environmental tobacco~~second-hand smoke~~ smoke~~, the results of this study suggest that ~~home smoking bans~~smoke-free homes may also influence future smoking initiation. Optimal success in preventing youth smoking uptake necessitates having a coherent antismoking message, ~~which includes living in smoke-free homes~~between the home smoking environment and familial smoking behaviour.

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INTRODUCTION:

The last decade has seen considerable progress in reducing exposure to second-hand smoke in the home among Canadian youth (12 to 17 years old), dropping from 23% in 2002 to 7% in 2012 (~~REF~~1). ~~The presence of home smoking bans (HSB)~~Living in a smoke-free home has been shown to have positive effects on a range of smoking related behaviours and health outcomes (2~~1~~-6~~5~~). Smokers in homes ~~with~~ that are partial or fully smoke-free ~~bans~~ tend to smoke fewer cigarettes per day and have a higher motivation to quit smoking~~.~~ (7~~6~~-8~~7~~). Meanwhile, non-smoking members of such households ~~with smoking bans~~ report~~have a~~ lower exposure to ~~environmental tobacco~~second-hand smoke (9~~8~~-10~~9~~), ~~have~~ higher overall perceived health and well-being (11~~0~~), and hold~~ave~~ reduced intentions to become future smokers (12~~1~~). While the literature has shown a consistent relationship between living in a smoke-free home~~HSB~~ and smoking behaviours among adults, the impact of smoke-free homes~~HSB~~ on adolescent smoking remains less clear, in part due to an adolescent's inability to control the implementation of ~~HSB~~smoke-free home rules and the strong influence that adult behaviour plays in modelling the smoking behaviour of youth (13~~2~~-14~~3~~).

~~A number of studies have linked HSB~~Smoke-free homes have been linked with a decrease in adolescents' perceived acceptance of smoking (15~~4~~-16~~5~~); ~~. H~~however, ~~there are~~findings are mixed ~~findings~~ on the effects of smoke-free homes~~HSB~~ on adolescent smoking initiation, maintenance and cessation (17~~6~~). Both longitudinal (16~~5~~) and cross-sectional ~~Some (18~~7~~-21~~19~~, 24)~~ studies ~~have shown~~find that adolescents living in smoke-free homes~~HSB~~ are less likely to initiate~~negatively associated with~~ smoking ~~initiation at an early age or~~and, among current smokers, ~~associated with lower~~have a reduced ~~-~~ risk of progression to~~becoming~~ heavy smoke~~r~~rings ~~(17-19)~~. At the same time, ~~studies have shown that~~ the relationship between smoke-

free homesHSB and adolescent smoking behaviours may depend on familial smoking status (176), with some studies reporting that smoke-free homesHSB only reduce the risk of adolescents smoking in non-smoking families (165, 220). Contrariwise, oOther researchstudies findsound no relationship or that the relationship between living in a smoke-free home and smoking behaviour exists only among adolescents living with parents who smokes (231), while other studies find that the association is attenuated one that disappears after adjustedcontrolling for parental smoking (242 (2,1- 253). Beyond smoking initiation, limited research has examined the relationship between HSB and cessation-related behaviours among adolescent smokers. For example, Clark et al. (12) found no significant association between a complete HSB and quit behaviour while Farkas et al. (24) found that a completely smoke-free home was associated with the odds of quitting among smokers aged 15-17 year olds. It is important to note that Farkas and colleagues' study was done 15 years ago and in the interim, there has been substantial progress in the adoption of HSB.

Collectively, the varied findings suggest a need to more carefully examine the independent and interactive effects of parental familial smoking on the association between living in a smoke-free homeHSB and adolescent smoking behaviour. This paper looks to bridge the gap in the scientific literature with answers to three questions: First, are smoke-free homes associated with reduced smoking susceptibility among never-smoking adolescents? Second, does this association persist after adjusting for familial smoking status? Finally, does the association between smoke-free homes and reduced smoking susceptibility remain after stratification based on familial smoking status?

~~Two areas of research are particularly important -- the impact of HSB on smoking susceptibility among never-tried-smoking adolescent and on intentions to quit among current smokers -- and whether observed findings are consistent for adolescents living in homes where parents smoke and those who come from non-smoking families. Employing a nationally representative sample of Canadian high school students, this paper aims to answer a series of questions. First, are HSB associated with smoking susceptibility among non-smoking students? Second, are HSB associated with intentions to quit among current smoking adolescents? Third, do these associations persist after controlling for parental smoking status? Finally, do these associations persist when analysis are stratified based on parental smoking status.~~

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METHODS:

D<u>esign</u>~~ata~~

<u>The Youth Smoking Survey is a nationally representative cross-sectional, biannual classroom-based survey that endeavours to provide estimates of tobacco use rates at national and provincial levels and capture issues influencing tobacco use (knowledge, social influences, and attitudes).</u> ~~This study used data from the 2~~<u>The 2</u>012/2013 <u>iteration</u>~~Youth Smoking Survey (YSS), which is a nationally representative study~~ <u>was</u> administered in nine Canadian provinces <u>as</u> ~~(Manitoba did not participate).~~<u>the province of Manitoba declined participation. Comparative estimates of 2010/2011 Youth Smoking Survey with and without Manitoba found no significant differences in smoking outcomes (26)</u>~~REF).~~ ~~The YSS is a cross-sectional, biennial classroom-based survey that endeavours to provide estimates of tobacco use rates at national and provincial levels and capture issues influencing tobacco use (knowledge, social influences, and attitudes).~~

Participants

The Youth Smoking SurveySS ~~includes~~ was administered to 47,203 students enrolled in grades 6 to 12, drawn from a random sample of ~~from~~ private, public, and Catholic schools. ~~enrolled in grades 6 to 12, inclusive. Only students in grades 9 and above were considered for this study.~~ Students ~~living in the Territories or Manitoba,~~ attending special schools (special need, visually-impaired, military), or attending a school with no eligible grades, or no classes with at least 20 students, were excluded. ~~The total national participation rate at the school board level was 57%, 64% at the school level, and 72% at the student level.~~ The University of Waterloo (the principal coordinator of the Youth Smoking Survey), Health Canada, and institutions of consortium members provided ethics approval for all protocols and materials of the Youth Smoking Survey, where required. Dalhousie University in Halifax, Nova Scotia provided the ethical approval for this research project.

Measures

Dependent Variable~~s~~:

~~Two outcome measures were examined, smoking susceptibility among never smokers, and intentions to stop smoking among current smokers.~~ Susceptibility to smoking ~~was~~ is measured among those ~~that~~ who ha~~d~~ve never tried cigarettes, drawing on three question about smoking intentions from a previously validated scale (2~~7~~5): "Do you think in the future you might try smoking cigarettes?", "If one of your best friends was to offer you a cigarette would you smoke it?", and "At any time during the next year do you think you will smoke?". Students

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could respond “Definitely yes”, “Probably yes”, “Probably not”, or “Definitely not”. If a student provided any response other than “Definitely not” to any of the questions ~~we~~ they were classified ~~that respondent~~ as a “Yes” for smoking susceptibility.

~~We assessed quitting intentions among current smokers using one of the susceptibility questions that asked about smoking in the next year (“At any time during the next year do you think you will smoke?”). We classified current smokers that thought they will either “probably not” or “definitely not” smoke during the next year as having intentions to quit, otherwise we considered the student to not have intentions to quit.~~

Independent Variables:

~~Home smoking bans~~Smoke-free home ~~wa~~is the main variable of interest for predicting susceptibility to smoking and intentions to quit. Students could describe the rules in their home using a four~~4~~-point nominal scale: “N~~n~~o one is allowed to smoke in the home”, “O~~o~~nly special quests are allowed”, “O~~o~~nly in certain areas is smoking allowed”, or “S~~s~~moking is allowed anywhere”. Keeping in line with previous research (16~~5~~), no one allowed to smoke represents~~was~~ a ~~total HSB~~smoke-free home, while we consider~~ed~~ all other arrangements as allowing smoking in the home ~~no HSB.~~

~~We included a~~A number of covariates previously shown to be associated with smoking behaviours are included in our models ~~that are consistent with previous studies~~. These are~~include~~ student gender, grade (9 through 12), race (white versus non-white), and school marks [based on a 5-point interval scale asking students to best describe their marks in the past year (ranging from high “Mostly A’s and B’s/70-84%/level3-4”, – to medium, “Mostly B’s and C’s/60-69%/level 3”, to low “Mostly C’s/50-59%/level 2”)]. The Youth Smoking Survey ~~also~~ include~~d~~s a measure~~s~~ for

self-esteem drawing on three questions from a ~~validit~~validated ~~y~~ scale on self-concept (2~~8~~6): "In general, I like the way I am", "When I do something, I do it well", and "I like the way I look"~~.~~." For each question a student could respond on a 5-point Likert scale of "False", "Mostly f~~F~~alse", "Neutral", "Mostly t~~T~~rue", and "True" with corresponding values of 0-4, respectively, for a total summed score~~.~~ out of 12. We categorize~~d~~ scores as less than the median (≤8 out of 12), greater than the median but less than 90th percentile (9-11 out of 12), and greater than the 90th percentile (12 out of 12). Familial smoking status ~~was~~ is derived from students' responses on how many of their parents, step-parents, guardians and siblings smoked cigarettes, with responses~~. Students were~~ dichotomized based on ~~as~~ having at least one family member who smokes versus having no family members who smoke~~none~~.

Statistical Analysis:

Multivariable logistic regression models ~~were~~are employed to assess the associations between smoke-free homes~~HSB~~ and smoking susceptibility. For analysis, ~~O~~only ~~s~~students in grades 9 and above and students that have never tried or experimented with cigarette smoking are included ~~were considered~~(n = 17,396) ~~for this study~~. ~~For smoking susceptibility, only students that never tried or experimented with cigarette smoking were included, while the analysis of quitting intentions only included current smokers.~~. Additionally, ~~Also, a~~analyses ~~were~~ stratified by family smoking status (no versus one or more family member who smokes) are also performed.~~.~~ Survey weights ~~we~~are employed in all analyses to produce representative population estimates and adjust for the unequal probability of selection and student non-response. Survey weights are derived in two stages. In the first stage a weight is created to account for the school selection within health region and school strata. A second weight is calculated to adjust for

student non-response. The weights are then calibrated to the provincial gender and grade distribution in each province (26)~~REF)~~. We carried out all analyses using Stata 13.0 ME (StataCorp LP, College Station, Texas) and a cut-off for significance~~t~~ of p = 0.05.

Results

Completed questionnaires were received from 47,203 students, drawn from 1073 schools across 127 school boards, for~~The~~ a ~~total~~ national participation rate of 72% (of 65,812 eligible students). ~~at the school board level was 57%, 64% at the school level, and 72% at the student level.~~Table 1 contains the weighted demographic characteristics of the ~~(n = 21,269~~17,396~~)~~ never-smoking s~~S~~tudents (n = 17,396) included in the current study. Around~~About 18% (n = 3,873) were current smokers and 82% (n = 17,396) identified as non-smokers. Among non-smokers, about~~ 30% of never-smoking students ~~we~~are considered susceptible to smoking. Significant differences in susceptibility among never~~on~~-smokers ~~we~~are observed across indicators, with female students, younger students, those with lower self-esteem, students with poor grades, and students who come from smoking homes, showing a higher smoking susceptibility. ~~Among current smokers, 13% indicated they would likely not be smoking in the next year. There were no significant differences observed across indicators.~~

INSERT TABLE #1 HERE

Table 2 shows the results of the multivariable logistic regression examining the association between smoke-free homes ~~HSB~~ and smoking susceptibility. ~~Model 1 adjust~~Model 1 adjust~~ed~~ for gender, grade, province, race, self-esteem, and academic performance. In addition to Model 1 covariates, Model 2 adjust~~ed~~ for ~~famil~~familial~~y member~~ smoking. The results

showed a statistically significant association between smoke-free homes HSB and susceptibility to smoking forin both models. In particular, living in ahaving an HSB smoke-free home wais associated with lower oddswith lower odds of being susceptible to smoking (OR = 0.687, 95% CI: 0.588-0.804). This association was slightly attenuated after controlling for family member smoking (OR = 0.787, 95% CI: 0.664-0.932). In terms of other covariates, a significant increase in the odds of smoking susceptibility is also observed among younger students, students with poor academic performance, and students who report lower self-esteem.

INSERT TABLE #2 HERE

Results from the analysees stratified by familial smoking status are shown in Table 3. The association between Living in a smoke-free home HSB andis not consistently associated with adolescent smoking susceptibility was statistically significant only for those with no smoking family members across familial smoking status. Among students whose family members do not smoke, In non-smoking homes, high school students living in homes with ana smoke-free home HSB significantly reduceswere less likely to be susceptible to smoking (OR = 0.582, 95% CI: 0.428-0.791) than those without HSB. Conversely, among students with familial members who do smoke, living in a In comparison, HSB smoke-free home had no significanis nott associatedion with smoking susceptibility for those who had a family member who smokes (OR = 0.878. 95% CI: 0.721-1.071).

INSERT TABLE #3 HERE

Table 4 reports the results examining the association between HSB and future intentions to quit among current smokers. No statistically significant association was found between HSB

and future quit intentions. Similarly, analyses stratified by family smoking status showed no statistically significant association between HSB and future intentions to quit smoking (Table 5).

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Interpretation

Public health efforts to reduce the impact of smoking have been enhanced in recent years with the widespread adoption of HSB smoke-free homes, working in conjunction with broader restrictions on smoking in various other public spaces, and other tobacco control measures. Smoke-free homesHome smoking bans have been shown to reduce the onset of smoking, which is particularly important in reducing smoking onset among young people given that the greata majority of long-term smokers initiated smoking tobacco use before age 18 (176). The current study found finds that living in a smoke-free home HSB wais significantly associated with a reduced susceptibility to smoking among students who had never tried or experimented with cigarette smoking. However, stratified analyseis stratified by smoking status showed suggests that this relationship is contextualized e relationship between HSB and smoking susceptibility may dependbased on household familial smoking status. Specifically, the benefits of a reduced smoking susceptibility accrued by living in a smoke-free home are only realized if the student's family members are also non-smokers. If a student has other family members who smoke, living in a smoke-free home is not associated among non-smoking household, high school students living in homes with a HSB were significantly less likely to be susceptible to smoking than those without HSB. For smoking households, HSB was not significantly associated

with smoking susceptibility. ~~These finding~~ ~~are in line with a review study examining the association between home smoking restrictions and youth smoking behaviour (16).~~

Findings are in line with previous studies that have observed a stronger association between smoke-free homes and lower rates of smoking among youth whose parents do not smoke (16~~5~~, 17~~6~~, 22~~0~~). In a recent review, Emory and colleagues found marginal evidence of an association between smoke-free home~~s smoking restrictions~~ and adolescent smoking behaviours, with stronger associations in homes without a family member who is a smoker (17~~6~~). Other studies have found that smoke-free homes are not associated with adolescent smoking behaviour after controlling for parental smoking (24~~2~~, 25~~3~~), though these studies do not provide stratified analyses.~~—~~ O'Loughlin and colleagues (14~~3~~), adopting a slightly different approach, found that smoking onset was significantly higher among young people living in a smoke-free home~~s with a smoking ban~~ in which both parents were smokers, compared to homes where neither parent smoked~~ithout a smoking ban~~. The authors suggested that young people in these homes likely recognize a disconnect between their parents' smoking behaviours, the larger rules surrounding tobacco use in the home, and ~~the~~ parents' lack of adherence to their own rules (do as I say, not as I do). As such, uncertainty is created through the absence~~lack~~ of a clear anti-smoking message, leaving ~~and leaves~~ young people more vulnerable to smoking initiation. A similar disconnect was observed in an earlier a qualitative study examining messages that teens receive about cigarette smoking (13~~2~~, 29~~7~~).

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~~At the same time, we found no significant association between HSB and quitting intentions among current smokers. Unlike susceptibility to smoking, analyses stratified by family smoking status also showed no evidence of an association between HSB and intentions to quit. Previous studies on this topic found somewhat mixed results (12, 24). For example, Clark et al. (12) found HSB to be associated with higher odds of having quit smoking for youth and young adults (aged 15-24). Conversely, an analysis restricted to those aged 15-18 (a comparable age group in the current study) showed a weaker association. In an earlier study, Farkas et al. (24) found that adolescents living in smoke-free households were more likely to have quit smoking than those living in households with no restrictions on smoking. However, neither of these studies examined the interrelationship between HSBs, family smoking status, and intentions to quit.. It is also important to note that our null finding may be related, in part, to our measure of quitting, which draws on one element of the smoking susceptibility scale. It asks about intentions to smoke cigarettes in the next year, which we interpreted as an indication of future quit attempts/intentions.~~ Limitations

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A few limitations should be noted. First, study ~~This study is not without limitations. First, d~~data a~~were~~ cross-sectional and ~~which~~ only allow~~s~~ for an examination of association; however, in measuring smoking susceptibility we are examining future intentions, rather than current behaviour, which may help to mitigate some concerns with temporality.. Second, t~~Second, t~~he Youth Smoking Survey contains self-report information which is susceptible to a number of forms of bias, including recall-bias, in which students may inaccurately remember events occurring in the preceding months or years, and social desirability bias, where students may respond to questions in a manner that they perceive as being viewed more favourably by others. Both forms of bias may produce errors in estimates, which may inflate (over-reporting of

positive behaviours) or reduce (under-reporting of negative behaviours) measures of association. ~~What is being measured is students' understanding of the rules in their house, and there may be a discrepancy with the actual house rules as articulated by the parents.~~ Third, our key exposure measure, smoke-free homes, ~~What~~ is ~~being~~ measured based on~~is~~ students' understanding of the rules in their house, and there may be a discrepancy with the actual house rules as articulated by the parents. We attempted to address this with the inclusion of older students only (grade 9 and above) who may have a greater awareness of home smoking rules. Lastly, the Youth Smoking Survey does not contain measures of socioeconomic status (family income or parental educational level) and family structure, which are potential confounders.

Policy Implications and Future Research

~~Despite these limitations, this study makes an important contribution to our understanding of the relationship between home smoking rules and adolescent smoking behaviours. It suggests that the various components of the home smoking environment – familial smoking behaviours, familial attitudes towards smoking, and home restrictions – must be aligned in order to be more effective. As O'Loughlin and colleagues note, when these features do not align, not only do they fail to reduce negative smoking related behaviours, they may, in turn, increase such behaviours further (13).~~ Moving forward, continued research in this area is required employing longitudinal designs that account for familial smoking status. Clearly there is considerable complexity in the relationship between the impact of smoke-free homes and smoking initiation, such that a failure to consider the effect of the smoking environment (e.g. parental or peer influences) may produce incorrect estimates of effectiveness. Such work should employ an updated version of the smoking susceptibility scale (~~REF~~30), which now includes a

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measure of curiosity, as this has been shown to improve the prediction of smoking initiation, and may provide more robust estimates of the protective effects of smoke-free homes. Beyond smoking initiation, limited research has examined the relationship between smoke-free homes and cessation-related behaviours among adolescent smokers; a deeper examination of the effect of smoke-free homes on quitting is warranted. This study makes an important contribution to our understanding of the relationship between smoke-free homes and adolescent smoking behaviours. It suggests that the various components of the home smoking environment – home smoking rules, familial smoking behaviours, and familial attitudes towards smoking – must not contradict one another if the prevention of smoking initiation among young people is to be effective. As O'Loughlin and colleagues note, when these features do not align, not only do they fail to reduce negative smoking related behaviours, they may, in turn, increase such behaviours further and do more harm than good (143).

Acknowledgements: The Youth Smoking Survey is a product of the pan-Canadian capacity building project funded through a contribution agreement between Health Canada and the Propel Centre for Population Health Impact at the University of Waterloo. The Youth Smoking Survey is implemented with the assistance of a consortium of Canadian researchers from all provinces. The views expressed herein do not necessarily represent the views of Health Canada.

Characteristics of survey population	Non-smokers (N=17396) Non-susceptible to cigarette smoking (n,%) (12295, 70.2%)	Susceptible to cigarette smoking (n,%) 5101 (29.8%)	P-value[a]
Gender			
Female	6485 (68.5)	2672 (31.5)	.0032
Male	5810 (71.9)	2429 (28.1)	
Grade			
9	3503 (66.8)	1729 (33.2)	
10	3483 (67.5)	1551 (32.5)	<.0001
11	3052 (73.0)	1128 (27.0)	
12	2257 (75.3)	693 (24.7)	
Provinces [b]			
Atlantic	4279 (70.9)	1625 (29.1)	
Quebec	1139 (72.2)	387 (27.8)	
Ontario	2062 (69.2)	915 (30.8)	.1966
Saskatchewan	1501 (68.9)	706 (31.1)	
Alberta	1498 (70.0)	659 (30.0)	
British Columbia	1816 (71.5)	809 (28.5)	
Race [b]			
White	9317 (69.6)	3774 (30.4)	.1577
Non-white	2910 (71.4)	1284 (28.6)	
Overall self-esteem score [b]			
Less than median (score<=8)	3735 (60.8)	2318 (39.2)	
Median to <90 percentile (score 9-11)	6400 (73.4)	2258 (26.6)	<.0001
90 percentile and above (score 12 up)	2126 (79.2)	509 (20.8)	
School grade [b]			
Level 3 and 4	10034 (71.3)	3792 (28.7)	
Level 3	1611 (66.3)	914 (33.7)	<.0001
Level 2 and lower	363 (59.0)	256 (41.0)	
Any family member smoking [b]			
No	7442 (74.1)	2548 (25.9%)	<.0001
Yes	4246 (64.4)	2245 (35.6%)	

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[a]: Rao-Scott Chi-Square p-value for test of association

[b]: some missing values for this variable in the study population.

Table 1: Weighted distribution of characteristics among non-smokers, by susceptible level to cigarette smoking - YSS 2012-2013 – Students grade 9-12.

Weighted distribution of characteristics among current-smokers (see definition), by likelihood of smoking in the next year - YSS 2012-2013 – Students grade 9-12

	Susceptibility to Initiate Smoking			
	Model 1		Model 2	
Characteristics of sample (Reference category)	Odds Ratio Estimate	95% CI	Odds Ratio Estimate	95% CI
~~Home Smoking Ban~~Smoke-Free Home ~~Total~~Completely	0.687*	(0.588, 0.804)	0.787*	(0.664, 0.932)
Gender (female) Male	1.072	(0.954, 1.205)	1.039	(0.920, 1.172)
Grade (12) 9 10 11	1.481* 1.441* 1.108	(1.239, 1.770) (1.204, 1.726) (0.914, 1.342)	1.458* 1.461* 1.129	(1.213, 1.753) (1.214, 1.759) (0.926, 1.376)
Provinces (Ontario) [b] Atlantic Quebec Saskatchewan Alberta British Columbia	0.853* 0.708* 1.030 0.926 0.857*	(0.755, 0.965) (0.580, 0.865) (0.901, 1.178) (0.789, 1.087) (0.741, 0.990)	0.862* 0.729* 1.042 0.936 0.882	(0.760, 0.979) (0.592, 0.898) (0.907, 1.196) (0.793, 1.103) (0.759, 1.025)
Race [b] White	1.106	(0.968, 1.263)	1.093	(0.952, 1.255)
Overall self-esteem score [b] Less than median (score<=8) Median to <90 percentile (score 9-11)	2.240* 1.317*	(1.847, 2.715) (1.092, 1.589)	2.198* 1.304*	(1.802, 2.680) (1.075, 1.583)
School grade (Level 3 and 4) [b] Level 3 Level 2 and lower	1.231* 1.543*	(1.067, 1.421) (1.103, 2.160)	1.191* 1.439*	(1.027, 1.381) (1.004, 2.061)
Any family member who smok~~inges~~ (None) [b] 1+	N/A	N/A	1.349*	(1.190, 1.529)

Table 2: Multivariable logistic regression of susceptibility to smoking among non-smokers

*: Significant at the p = 0.05 level

	Susceptibility to Initiate Smoking			
	0 Family Smokers		1+ Family Smokers	
Characteristics of sample (Reference category)	Odds Ratio Estimate	95% CI	Odds Ratio Estimate	95% CI
Smoke-Free Home Completely~~Home Smoking Ban~~ ~~Total~~	0.582*	(0.428, 0.791)	0.878	(0.721, 1.071)
Gender (female) Male	1.023	(0.871, 1.200)	1.058	(0.879, 1.275)
Grade (12) 9 10 11	1.228 1.407* 0.973	(0.964, 1.564) (1.107, 1.789) (0.753, 1.258)	1.873* 1.554* 1.414*	(1.406, 2.494) (1.163, 2.078) (1.035, 1.931)
Provinces (Ontario) [b] Atlantic Quebec Saskatchewan Alberta British Columbia	0.889 0.790 1.119 0.928 0.966	(0.749, 1.056) (0.597, 1.046) (0.934, 1.340) (0.743, 1.158) (0.795, 1.175)	0.828* 0.657* 0.933 0.922 0.789	(0.686, 0.999) (0.482, 0.895) (0.751, 1.158) (0.717, 1.186) (0.622, 1.001)
Race [b] White	1.259*	(1.050, 1.510)	0.867	(0.698, 1.077)
Overall self-esteem score [b] Less than median (score<=8) Median to <90 percentile (score 9-11)	2.021* 1.140	(1.578, 2.588) (0.898, 1.448)	2.729* 1.742*	(1.970, 3.781) (1.265, 2.400)
School grade (Level 3 and 4) [b] Level 3 Level 2 and lower	1.080 1.526*	(0.873, 1.335) (1.024, 2.272)	1.309* 1.400	(1.061, 1.615) (0.813, 2.410)

Table 3: Multivariable logistic regression of susceptibility to smoking stratified by family smoking status

*: Significant at the p = 0.05 level

	Intentions to Quit			
	Model 1		Model 2	
Characteristics of sample (Reference category)	Odds Ratio Estimate	95% CI	Odds Ratio Estimate	95% CI
Home Smoking Ban				
Total	1.008	(0.716, 1.419)	1.073	(0.735, 1.564)
Gender (female)				
Male	0.789	(0.540, 1.153)	0.810	(0.548, 1.198)
Grade (12)				
9	0.547*	(0.326, 0.917)	0.580	(0.334, 1.005)
10	0.832	(0.529, 1.308)	0.784	(0.488, 1.260)
11	0.860	(0.551, 1.343)	0.819	(0.517, 1.298)
Provinces (Ontario) [b]				
Atlantic	1.278	(0.879, 1.860)	1.252	(0.847, 1.852)
Quebec	0.763	(0.445, 1.310)	0.692	(0.396, 1.212)
Saskatchewan	0.749	(0.494, 1.135)	0.695	(0.452, 1.068)
Alberta	0.859	(0.534, 1.380)	0.927	(0.568, 1.514)
British Columbia	0.968	(0.560, 1.674)	0.932	(0.521, 1.667)
Race [b]				
White	1.294	(0.893, 1.874)	1.333	(0.900, 1.976)
Overall self-esteem score [b]				
Less than median (score<=8)	1.235	(0.757, 2.014)	1.258	(0.752, 2.105)
Median to <90 percentile (score 9-11)	0.901	(0.562, 1.443)	0.985	(0.599, 1.619)
School grade (Level 3 and 4) [b]				
Level 3	0.843	(0.591, 1.202)	0.842	(0.581, 1.220)
Level 2 and lower	0.739	(0.417, 1.310)	0.711	(0.383, 1.319)
Any family member smoking (None) [b]				
1+	N/A	N/A	1.028	(0.673, 1.569)

Table 4: Multivariable logistic regression of intentions to quit among current smokers

*: Significant at the p = 0.05 level

	Intentions to Quit			
	0 Family Smokers		1+ Family Smokers	
Characteristics of sample (Reference category)	Odds Ratio Estimate	95% CI	Odds Ratio Estimate	95% CI
Home Smoking Ban				
Total	1.596	(0.540, 4.711)	1.015	(0.687, 1.498)
Gender (female)				
Male	0.785	(0.377, 1.633)	0.758	(0.486, 1.183)
Grade (12)				
9	0.242*	(0.070, 0.835)	0.730	(0.408, 1.306)
10	0.301*	(0.121, 0.751)	1.082	(0.628, 1.863)
11	0.326*	(0.126, 0.839)	1.151	(0.693, 1.912)
Provinces (Ontario)				
Atlantic	0.985	(0.373, 2.601)	1.365	(0.892, 2.091)
Quebec	0.544	(0.190, 1.556)	0.768	(0.405, 1.459)
Saskatchewan	0.657	(0.246, 1.750)	0.716	(0.445, 1.151)
Alberta	0.539	(0.188, 1.539)	1.161	(0.676, 1.996)
British Columbia	1.047	(0.318, 3.446)	0.898	(0.461, 1.747)
Race				
White	1.453	(0.600, 3.519)	1.209	(0.787, 1.856)
Overall self-esteem score				
Less than median (score<=8)	0.920	(0.593, 4.640)	1.231	(0.677, 2.236)
Median to <90 percentile (score 9-11)	1.055	(0.311, 2.374)	1.019	(0.569, 1.827)
School grade (Level 3 and 4)				
Level 3	1.659	(0.436, 1.941)	0.844	(0.549, 1.296)
Level 2 and lower	0.860	(0.283, 3.929)	0.638	(0.318, 1.280)

Table 5: Multivariable logistic regression of intentions to quit stratified by family smoking status

*: Significant at the p = 0.05 level

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STROBE Statement—Checklist of items that should be included in reports of cross-sectional studies

	Item No	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6-7
Bias	9	Describe any efforts to address potential sources of bias	7-8
Study size	10	Explain how the study size was arrived at	5-7
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7-8
		(b) Describe any methods used to examine subgroups and interactions	7-8
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	7-8
		(e) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-8
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8, Table 1
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted	8-9, Table 2

		estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	
		(b) Report category boundaries when continuous variables were categorized	6-7
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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