

# Cigarette Use Among Canadian Undergraduates

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## ABSTRACT

**Objective:** To describe the prevalence of daily cigarette use among Canadian undergraduates. Estimates are also compared to earlier Ontario surveys.

**Methods:** Data are drawn from the Canadian Campus Survey, a national mail survey, conducted in the fall of 1998, with a random sample of 7,800 students from 16 universities.

**Results:** Overall, 17.1% reported daily cigarette smoking and 10.4% reported occasional smoking. Rates of daily smoking differed significantly by region (with rates above average among those attending university in the Atlantic and below average among those attending university in British Columbia and the Prairies), residence (those residing off campus without family reported the highest prevalence rate), and year of study (those in the final year typically reported lower rate of use).

**Interpretation:** University campuses represent an environment with potential gains to be made by tobacco control policies.

*La traduction du résumé se trouve à la fin de l'article.*

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**Acknowledgement:** This study was partially funded by the Brewer's Association of Canada.

Tobacco use on college campuses has recently drawn public health attention for three reasons. First, there is evidence that rates of smoking are increasing among college students.<sup>1,2</sup> For example, in the United States (US), both the Campus Alcohol Survey (CAS) and Monitoring the Future (MTF) surveys found increases in past month smoking between 1993 and 1999, from 22.3% to 32.9% and from 24.5% to 30.6%, respectively. Much of this increase has been attributable to a cohort effect related to earlier increases in cigarette smoking among high school students.<sup>3,4</sup> Second, although the onset of smoking initiation typically pre-dates post-secondary education, some researchers have noted that cigarette smoking among this group remains a transitional behaviour for many. Findings from the American CAS in 1997 found that 11% of students reported their first cigarette while in college, 28% began to smoke regularly while in college, and half of current smokers had attempted to quit during the past year.<sup>2</sup> Third, it seems there may be effective college-based interventions to decrease smoking. Recent data have suggested that smoke-free residences help protect occasional smokers from becoming regular smokers.<sup>5</sup>

These issues are equally relevant in Canada. Cross-national comparisons on high school populations have found similar trends in cigarette smoking between the US and Canada.<sup>6</sup> First, the university population is sizeable – 23% of those 15 years and older have attended university.<sup>7</sup> Second, a sizeable percentage of college-bound high school students are occasional smokers and thus represent a potential target population for intervention programs. For example, the 2001 Ontario Student Drug Use Survey found that 18% of 12<sup>th</sup> graders and 23% of OAC students reported non-daily smoking.<sup>8</sup> And third, recent increases in cigarette smoking have occurred among high school students in Canada, and thus there is a potential cohort diffusion into the post-secondary population. Indeed, rates of cigarette smoking among Ontario students increased from 21.7% in 1991 to 28.3% in 1999, and then declined to 22.3% in 2001.<sup>8</sup> Similar increases have also been noted in the Atlantic.<sup>9</sup> Whether this increase in youthful smoking among this cohort of secondary school students has continued into the post-secondary population remains unknown.

The purpose of this study is to assess rates of daily cigarette smoking among Canadian undergraduates and potential

trends in smoking among Ontario undergraduates between 1988 and 1998.

## METHOD

The 1998 Canadian Campus Survey (CCS) is a mail survey employing a regionally stratified two-stage (university, student) cluster selection of undergraduates enrolled in full-time studies at accredited universities during the 1998-99 academic year. The design resulted in a sample of 7,800 students from 16 universities (51% student completion rate). Four mailings were employed during a five-week period in the 1998 fall semester. Further methodological details are available.<sup>10</sup> To assess trends, we also employed surveys of Ontario undergraduates conducted in 1993 and 1988.<sup>11,12</sup> The 1993 mail survey, administered in the winter semester, employed stratified two-stage (university, students) probability sampling, and resulted in a sample of 5,954 students from seven universities (52.9% student completion rate). The 1988 mail survey, fielded in the fall semester, resulted in 4,911 students (38% response rate) from four Ontario universities, purposively chosen to represent both urban and rural locations and four geographic regions in the province. Although universities were not randomly selected, students within each university were randomly selected.

Prevalence of daily smoking refers to smoking one or more cigarettes daily. For 1993 and 1988, this refers to reported cigarettes consumed daily during the past 12 months, while in 1998, it refers to the number of cigarettes smoked daily currently (i.e., "How many cigarettes do you smoke each day now?"). Occasional smoking is based on the percentage who responded to the following item: "At the present time, do you smoke cigarettes daily, occasionally or not at all?" Our analysis employed Taylor linearization methods in order to ensure proper variance estimation for weighted complex sampling.<sup>13</sup> Subgroup and logit analyses were conducted by gender, year of study, living arrangement and region. Year of study was chosen over age since it provides more campus-relevant risk factor information. The significance of group effects was determined by adjusted Wald statistics,  $\chi^2$ - and F-based statistics which correct for the stratification and clustering features of the survey design. Trend comparisons were evaluated via confidence interval differences.<sup>14</sup>

**TABLE I**

### Prevalence of Daily Cigarette Smoking, Canadian Undergraduates, 1998

	N	%	95% CI	Adjusted OR (n=7732)
Total	7800	17.1	14.8 – 19.7	
Gender				W=1.38; p=0.265
Male	2884	16.0	13.8 – 18.6	0.87
Female	4916	18.0	15.0 – 21.6	–
Region				W=4.20; p=0.040
British Columbia	1795	11.3	8.5 – 14.7	0.71**
Prairies	1467	13.8	11.3 – 16.9	0.83**
Ontario	1277	18.5	14.1 – 23.9	1.19
Quebec	2306	19.2	15.6 – 23.3	1.18
Atlantic	955	18.9	15.1 – 23.4	1.22*
Year of Study				W=9.13; p=0.004
First	1903	17.0	14.1 – 20.2	1.23*
Second	1910	19.2	16.1 – 22.9	1.39**
Third	2044	17.9	15.8 – 20.2	1.28
Fourth	1943	14.2	10.6 – 18.8	–
Residence				W=21.63; p<0.001
University housing	1254	15.6	12.1 – 19.9	0.68**
Off campus with parents	3433	15.2	13.3 – 17.4	0.70**
Off campus without family	3072	20.4	17.8 – 23.3	–

Note: adjusted OR based on main-effects model; region is effect-coded

**TABLE II**

### Prevalence of Daily Cigarette Smoking, Ontario Undergraduates, 1988-1998

		1988 (n=4537)	1993 (n=5850)	1998 (n=1275)
Total	% (95% CI)	14.0	16.5 (14.1 – 19.2)	18.5 (14.6 – 23.9)
Males		12.9	17.2 (13.9 – 21.0)	17.3 (13.7 – 21.7)
Females		14.6	15.9 (13.1 – 19.2)	19.5 (12.8 – 28.6)

Note: CIs not presented for 1988 due to non-random selection of university units

## RESULTS

Overall, 17.1% of undergraduates interviewed in 1998 report daily smoking (Table I). In addition to daily smoking, a sizeable percentage of students report occasional smoking (data not tabled). In total, 10.4% (9.4%-11.4%, 95% CI) report occasional smoking, a rate that does not differ significantly by gender, year of study or living arrangement. Results of the multivariable logistic model (column 4) show that the prevalence of daily smoking is significantly related to region, year and residence. Effect-coded contrasts showed that students attending universities in British Columbia and the Prairies report lower than average smoking (OR=0.71 and 0.83, respectively), while those attending university in the Atlantic report above average smoking (OR=1.22). Year of study shows that those in the final year of study report the lowest rate, significantly so compared to first and second year students. Those living off campus without family report the highest rate of daily smoking, 1.4 times higher than those living off campus with parents and 1.5 times higher than those living in university housing.

Given the potential policy implications of residential status, we also examined the robustness of the residence effect by evaluating the residence-by-sex, -by-year, and -by-region for potential moderating effects. Of the three interaction terms, only the residence-by-region effect was statistically significant ( $\chi^2=18.83$ ,  $p=0.016$ ). This interaction revealed that 1) residential differences in smoking were not significant in the Prairies or Ontario, 2) daily smoking among those residing off-campus without family was especially elevated in Quebec: 25% versus 16% in BC, 15% in the Prairies, 20% in Ontario and 23% in the Atlantic, and 3) daily smoking was elevated among Ontario students living in residence: 19% versus 13% in BC, 11% in the Prairies, 14% in Quebec and 17% in the Atlantic.

Table II shows the prevalence of daily smoking among Ontario undergraduates interviewed in 1988, 1993 and 1998. Although these data suggest an upward trend between 1988 and 1998 among the total sample (14.0%, 16.5%, 18.5%, respectively), males (12.9%, 17.2%, 17.3%) and females (14.6%, 15.9%, 19.5%), none of these differences are sta-

tistically significant between 1993 and 1998, the years for which we can calculate an appropriate test.

## DISCUSSION

Like all survey research, our findings are influenced by sources of error and other methodological constraints. First, our data are cross-sectional; thus, our interpretations regarding potential mechanisms are limited. For example, we cannot know whether residential effects reflect a selection process – that students seek less controlled environments in order to have greater drinking opportunities – or reflect a causal process – that particular residential arrangements cause greater drinking. In addition, our data are based on self-reports, and are therefore open to reporting errors. As well, there is a potential for non-response bias given a response rate of 51%.

Several key findings deserve highlighting. First, Canadian college students smoke less than their US counterparts. Past month daily smoking of Canadian college students in 1999 was 17.1%<sup>1</sup> versus 19.3% in US college students. Second, although national comparisons are not available, it appears that college students smoke less than university students. For example, 18.5% of Ontario undergraduates interviewed in 1998 reported daily smoking versus 30.9% (25.9%–36.4%) of 12<sup>th</sup> graders interviewed in 1999.<sup>15</sup> This difference is also evident between college-bound and non-college bound students in the US.<sup>1</sup> Finally, we find regional differences similar to those found in the general population (i.e., lower rates in BC and higher rates in Quebec and Atlantic provinces).<sup>16,17</sup>

Regarding trends, it is encouraging that increases in daily smoking in this population do not display a dominant increase as in the US. Still, this upward movement, especially among women, should serve as a public health flag. Indeed, although we felt technically obliged to ignore statistical tests based on the 1988 sample, we feel that this increasing trend warrants public health monitoring, especially given the increasing trend in the US.

Perhaps the most salient factor which is evident in both Canada and the US is the influence of living arrangement. Although smoking rates are higher among those living off-campus without family, 15% of

those living in university housing report daily smoking. One implication is that tobacco controls must extend beyond university residences. A 1999 survey of US colleges found that 27% had a total smoking prohibition (including dormitories) and another 55% prohibited smoking in all public areas, although smoking was allowed in private quarters.<sup>18</sup> Unfortunately, the extent and nature of tobacco control policies on Canadian campuses is largely undocumented. At the University of Toronto, for example, although smoking is prohibited in all university buildings, university residences can establish their own smoking policies.<sup>19</sup> Without knowledge regarding tobacco control, it is difficult to interpret the residence-by-region interaction in our results, but determining whether campus tobacco control policies influence smoking rates, and whether this influence varies by region, is an important matter for future research.

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Received: January 10, 2002

Accepted: September 4, 2002

## RÉSUMÉ

**Objectif :** Décrire la prévalence de la consommation quotidienne de cigarettes chez les étudiants universitaires canadiens de premier cycle. Les estimés sont également comparés à des enquêtes ontariennes réalisées antérieurement.

**Méthode :** Les données proviennent de l'Enquête sur les campus canadiens, une enquête nationale effectuée par courrier au cours de l'automne 1998 auprès d'un échantillon aléatoire de 7 800 étudiants de 16 universités.

**Résultats :** Dans l'ensemble, 17,1% des répondants rapportent fumer la cigarette quotidiennement et 10,4 % ont déclaré être des fumeurs occasionnels. Le taux de fumeurs quotidiens diffère significativement selon la région (avec un taux supérieur à la moyenne nationale dans les Maritimes et inférieur en Colombie-Britannique et dans les Prairies), le lieu de résidence (ceux résidant à hors campus sans leurs parents rapportant la prévalence la plus élevée) et l'année d'étude en cours (ceux en dernière année d'études rapportant un taux inférieur d'usage du tabac).

**Interprétation :** Les campus universitaires représentent un environnement où des politiques de contrôle du tabac pourraient entraîner des gains en matière de tabagisme.