

Marijuana and tobacco use among young adults in Canada: are they smoking what we think they are smoking?

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Abstract The authors characterized marijuana smoking among young adult Canadians, examined the co-morbidity of tobacco and marijuana use, and identified correlates associated with different marijuana use consumption patterns. Data were collected from 20,275 individuals as part of the 2004 Canadian Tobacco Use Monitoring Survey. Logistic regression models were conducted to examine characteristics associated with marijuana use behaviors among young adults (aged 15–24). Rates of marijuana use were highest among current smokers and lowest among never smokers. Marijuana use was more prevalent among males, young adults living in rural areas, and increased with age. Young adults who were still in school were more likely to have tried marijuana, although among those who had tried, young adults outside of school were more like to be heavy users. Males and those who first

tried marijuana at an earlier age also reported more frequent marijuana use. These findings illustrate remarkably high rates of marijuana use and high co-morbidity of tobacco use among young adult Canadians. These findings suggest that future research should consider whether the increasing popularity of marijuana use among young adults represents a threat to the continuing decline in tobacco use among this population.

Keywords Adolescent · Adult · Cannabis · Prevalence · Prevention · Public health · Tobacco · Youth

Introduction

Marijuana is the most commonly used illicit drug in Canada. According to the 2004 Canadian Addiction Survey (CAS), 45% of Canadian adults aged 18 years and older reported using marijuana at least once in their lifetime and 14% reported using marijuana in the past-year [1]. This represents a steady increase in the prevalence of marijuana use over the past decade as rates of ever use and past-year marijuana use in 1994 were only 28% and 7%, respectively [2].

Marijuana use among young adults (ages 18–24) is an area of particular concern. Not only is the prevalence of marijuana use highest among this population (70% report ever using marijuana) [1], but also the frequency of use has also increased dramatically among this population [3]. For instance, rates of past-year use have more than doubled among 18- to 19-year-olds (23–47%) between 1994 and 2004 [1, 3]. Similar increases in marijuana consumption patterns

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have been noted in the United States and European countries [4]. Given the negative consequences associated with both acute and chronic marijuana use [5]; the increasing popularity of marijuana use represents a growing public health concern.

In contrast to marijuana, tobacco use among Canadians has been steadily declining for the past decade. According to the Canadian Tobacco Use Monitoring Survey (CTUMS), the prevalence of current smoking (daily and occasional) among young adults declined from 40% in 1994 to 28% in 2004 [6]. It remains unclear to what extent the increased prevalence of marijuana use threatens further reductions in tobacco use among young adults. Recent research suggests that marijuana use is associated with an increased risk of late initiation of tobacco use and progression to nicotine dependence [7], and may act as a barrier to smoking cessation [8]. Marijuana and tobacco users also share similar sociodemographic profiles, and there is a high co-morbidity of marijuana and cigarette use among young adults [7–10]. In addition, marijuana is commonly smoked in joints (hand-rolled marijuana cigarettes) or pipes [11]. It is also common for tobacco to be added to a joint or pipe to assist burning [11] or to titrate the effect of marijuana [12]. Considering that occasional marijuana use is now more common than tobacco use among young adults in Canada [1, 3], and new evidence has found that young adulthood is a critical period in the progression of tobacco use [13], there is an urgent need to examine the relationship between tobacco and marijuana use among this at-risk population more closely.

Given the increase in marijuana use among young adults and the limited data about the combined use of marijuana and tobacco, the current study seeks to: (1) characterize the prevalence of marijuana smoking among young adult Canadians, (2) examine the co-morbidity of tobacco and marijuana use, and (3) identify sociodemographic and behavioral risk factors associated with different marijuana use consumption patterns.

Methodology

Data were collected as part of the 2004 CTUMS [6]. The target population for CTUMS is all person aged 15 and older (with emphasis on young adults aged 15–24) living in Canada, excluding residents of Yukon, Nunavut, and the Northwest Territories, and full-time residents of institutions. The results presented in this manuscript are based on data collected by Statistics Canada between February and Decem-

ber 2004 using computer-assisted interviews by telephone; only direct reports (i.e., not third-party) with selected persons were accepted. Data were collected using informed consent in accordance with Health Canada's ethical guidelines. To allow provincial comparisons of approximately equal reliability, the overall sample size for the survey was divided equally across all 10 Canadian provinces. Data were collected from 20,275 individuals in 2004, with an overall response rate of 73%. With this sampling frame, it is possible to estimate the smoking prevalence of Canadians aged 15 and older within about $\pm 0.9\%$ each year. Refer to www.gosmokefee.ca/ctums for additional information.

Marijuana use was measured by asking: (1) Have you ever used or tried marijuana, cannabis or hashish? (1 = at least once, 0 = no); (2) Have you used it in the past 12 months? (1 = yes, 0 = no); (3) How often did you use marijuana, cannabis, or hashish in the past 12 months? (less than once a month, 1–3 times a month, once a week, more than once a week, every day); and, (4) How old were you when you first did this? (age in years). Respondents also reported their sex (male, female), age (age in years), the characteristic of the community in which they live (urban, rural), and if they were currently attending school, college or university (yes, no). Respondents were also asked to report tobacco use. Respondents were classified as never smokers (a person who has never smoked or smoked less than 100 cigarettes), current smokers (a person who currently smokes cigarettes daily or occasionally and has smoked more than 100 cigarettes), or former smokers (a person who has smoked at least 100 cigarettes, but currently does not smoke) based on their self-reported tobacco use. Age of smoking onset was measured by asking respondents at what age they smoked their first cigarette (age in years).

In Step 1, descriptive analyses of marijuana use behavior and respondent characteristics were examined according to age and sex. In Step 2, three logistic regression models were conducted to examine characteristics related to ever trying marijuana, using marijuana in the past 12 months, and weekly use of marijuana among young adults who are current marijuana smokers (used marijuana in past year). Survey weights were used to adjust for non-response between provinces and groups, thereby minimizing any bias in the analyses caused by differential response rates across regions or groups. A full description of the sampling design and survey statistics is available [14]. The statistical package SAS 8.02 was used for all analyses [15].

Table 1 Descriptive statistics for young adults aged 15–24 by sex, Canada 2004

			Male (%)	Female (%)	Both sexes (%)
Ages 15–24	Ever used marijuana	Yes	46.1	43.2	44.7
		No	53.9	56.8	55.3
	Used marijuana in past 12 months	Yes	28.6	22.3	25.6
		No	71.4	77.7	74.4
	Frequency of use	Monthly	14.4	13.7	14.0
		Weekly	8.7	4.9	6.9
		Daily	4.3	2.1	3.2
	Community	Urban	83.2	84.1	83.7
		Rural	16.8	15.9	16.3
	Smoking status	Current smoker	24.2	21.6	23.0
		Former smoker	6.9	8	7.4
		Never smoker	68.9	70.4	69.6
Ages 15–19	Ever used marijuana	Yes	37.9	37.7	37.8
		No	62.1	62.3	62.2
	Used marijuana in past 12 months	Yes	25.2	22.9	24.0
		No	74.8	77.1	76.0
	Frequency of use	Monthly	12.9	13.4	13.2
		Weekly	7.1	5.4	6.2
		Daily	3.7	2.2	3.0
	Community	Urban	81	82.2	81.6
		Rural	19	17.8	18.4
	Smoking status	Current smoker	18.2	18.0	18.1
		Former smoker	3.6	4.1	3.9
		Never smoker	78.2	77.9	78.0
Ages 20–24	Ever used marijuana	Yes	54.1	48.5	51.3
		No	45.9	51.5	48.7
	Used marijuana in past 12 months	Yes	32.0	21.8	27.0
		No	68.0	78.2	73.0
	Frequency of use	Monthly	15.8	13.9	14.9
		Weekly	10.4	4.5	7.5
		Daily	4.9	2.0	3.5
	Community	Urban	85.4	86.0	85.7
		Rural	14.6	14.0	14.3
	Smoking status	Current smoker	30.1	25.1	27.6
		Former smoker	10.1	11.8	10.9
		Never smoker	59.8	63.1	61.5

Results

Descriptive statistics are presented in Table 1. The results of the logistic regression analyses are presented in Table 2.

Prevalence of marijuana use

In 2004, approximately 45% (1.9 million) of Canadians between the ages of 15 and 24 reported ever trying marijuana and 26% (1.1 million) reported using marijuana in the last 12 months. Overall, 14% (590,000) reported using marijuana three or less times per month, and 10% (430,000) of all young adults report using marijuana weekly or daily. Among users in the past 12 months, 55% reported using marijuana three or less times per month and 40% report using marijuana weekly or daily. Across all groups, rates of marijuana use were higher among males than females, and among

respondents aged 20–24 than respondents aged 15–19 (Fig. 1).

Marijuana use by smoking status

Of the young adults aged 15–24 in this study, 23% (960,000) were current smokers, 7% (310,000) were former smokers, and 70% (2.93 million) were never smokers. Rates of marijuana use were highest among current smokers and lowest among never smokers (Fig. 2). Among current smokers, 34% report using marijuana at least once a week and 13% report using marijuana everyday. Among former and never smokers, rates of weekly marijuana use are lower (17% and 11%, respectively), as are rates of daily use (6% and 2%, respectively). Interestingly, 33% of former smokers and 16% of never smokers report using marijuana in the previous 12 months.

Table 2 Logistic regression analyses examining the relationship between demographic characteristics and marijuana use behaviors among young adult (ages 15–24) Canadians

		Adjusted Odds ratio ^a (95% CI)		
		Model 1	Model 2	Model 3
Parameters	Coding	Marijuana use in past 12 months (all young adults)	Marijuana use in past 12 months (current smokers ^b only)	Weekly marijuana use (current marijuana smokers ^c only)
Sex	Female	1.00	1.00	1.00
	Male	1.58 (1.43, 1.76)***	1.85 (1.55, 2.21)***	1.83 (1.51, 2.23)***
Age in years	15–19	1.00	1.00	1.00
	20–24	0.94 (0.84, 1.06)	0.78 (0.65, 0.95)*	1.13 (0.91, 1.40)
Smoking status	Never smoker	1.00		1.00
	Current smoker	6.35 (5.65, 7.14)***		3.05 (2.46, 3.77)***
	Former smoker	3.07 (2.54, 3.71)*		1.63 (1.15, 2.30)*
Currently attending school	Yes	1.00	1.00	1.00
	No	0.84 (0.74, 0.94)**	0.79 (0.66, 0.96)*	1.47 (1.20, 1.80)***
Community	Urban	1.00	1.00	1.00
	Rural	0.77 (0.69, 0.87)***	0.73 (0.60, 0.88)**	1.13 (0.90, 1.40)
Age of first tobacco use	Each year older		0.93 (0.89, 0.96)***	
Age of first marijuana use	Each year older			0.84 (0.80, 0.88)***
<i>c</i> statistic		0.71	0.62	0.71

Note: ^a Odds ratios adjusted for all other variables in the table

^b Daily and non-daily smokers

^c Has smoked marijuana in past 12 months

Model 1: 1 = Used marijuana in past 12 months ($n = 2,164$), 0 = Has not used marijuana in past 12 months ($n = 6,887$)

Model 2: 1 = Used marijuana in past 12 months ($n = 1,048$), 0 = Has not used marijuana in past 12 months ($n = 1,060$)

Model 3: 1 = Uses marijuana at least once a week ($n = 846$), 0 = Uses marijuana less than weekly ($n = 1,177$)

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Age of initiation—marijuana use

Among respondents aged 15–24 who reported ever using marijuana, the mean age for first use was 15.6 years, with identical means for both males and females. However, young adults who had smoked tobacco (current and former smokers) reported trying marijuana at a younger age (mean 15.1 years of age) than never smokers (mean 16.1 years of age). Interestingly, 33% (1,400,000) of young adult Canadians reported that they had both smoked and used marijuana, of which 14% (200,000) reported that they had used marijuana prior to using tobacco, and 29% (400,000) reported that they started using marijuana at the same time they started using tobacco.

Urban versus rural marijuana use

Young adults from rural communities reported slightly more experimentation and more frequent use of

marijuana than young adults from urban communities. For instance, 47% of respondents from rural communities reported ever trying marijuana compared to only 44% of respondents from urban communities. Among young adults who reported using marijuana in the last 12 months, 38% of urban respondents and 42% of rural respondents reported weekly or daily use of marijuana.

Factors associated with using marijuana in the past year (all young adults)

Males were more likely than females to report using marijuana in the past year (OR 1.58, 95% CI 1.43–1.76). When compared to never smokers, respondents were substantially more likely to have used marijuana in the past year if they were current smokers (OR 6.35, 95% confidence interval: 5.65, 7.14) or former smokers (OR 3.07, 95% confidence interval: 2.54, 3.71). Respondents who were not attending school were less

Fig. 1 Prevalence of marijuana use frequency of marijuana use by age, Canada, 2004

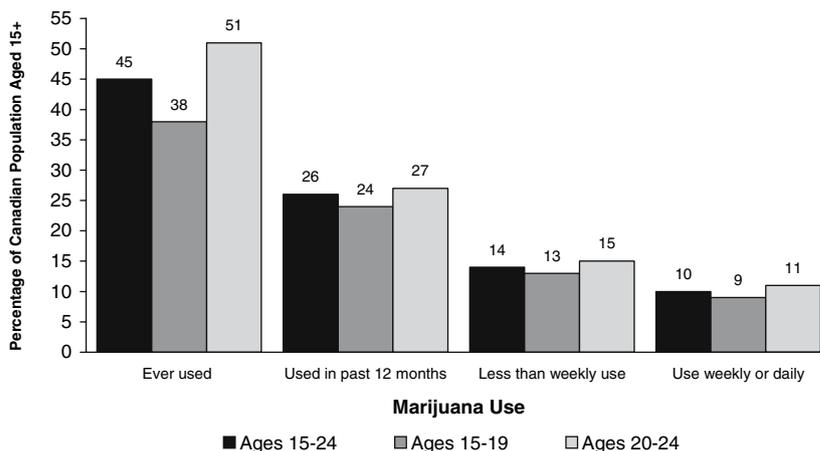
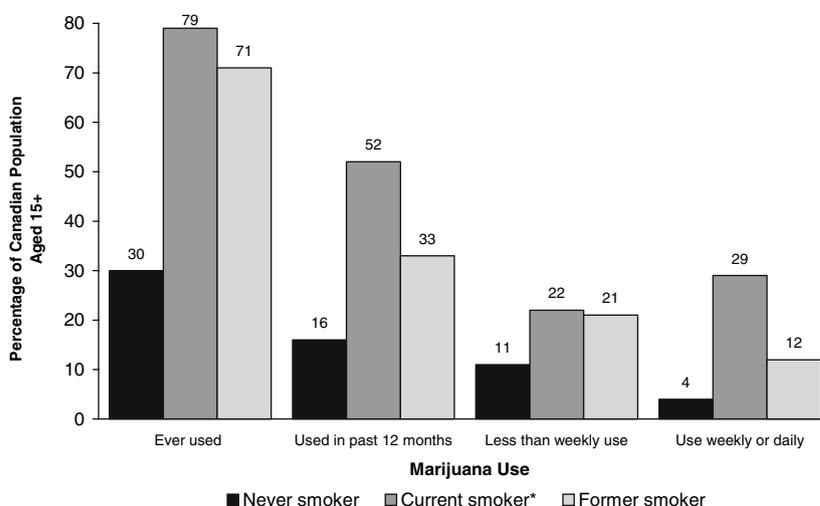


Fig. 2 Prevalence of marijuana and tobacco use among young adults (aged 15–24) *Marijuana use by smoking status, Canada, 2004



likely than respondents attending school (OR 0.84, 95% confidence interval: 0.74, 0.94) to report using marijuana in the past year. Respondents living in a rural community were less likely than respondents in an urban community (OR 0.77, 95% confidence interval: 0.69, 0.87) to report using marijuana in the past year.

Factors associated with using marijuana in the past year (current smokers only)

Male smokers were more likely than female smokers to report using marijuana in the past year (OR 1.85, 95% confidence interval: 1.55, 2.21), whereas older smokers were less likely than younger smokers (OR 0.78, 95% confidence interval: 0.65, 0.95) to report using marijuana in the past year. Smokers who were not attending school were less likely than smokers attending school (OR 0.79, 95% confidence interval: 0.66, 0.96) to report

using marijuana in the past year. Smokers living in a rural community were less likely than smokers in an urban community (OR 0.73, 95% confidence interval: 0.60, 0.88) to report using marijuana in the past year. The older current smokers are when they first start smoking tobacco the less likely they are to have used marijuana in the past year (OR 0.93, 95% confidence interval: 0.89, 0.96).

Factors associated with weekly marijuana use (current marijuana smokers only)

Male marijuana smokers were more likely than female marijuana smokers to report using marijuana weekly (OR 1.83, 95% confidence interval: 1.51, 2.23). Marijuana smokers were substantially more likely to use marijuana weekly if they were current smokers (OR 3.05, 95% confidence interval: 2.46, 3.77) or former smokers (OR 1.63, 95% confidence interval: 1.15, 2.30)

when compared to never smokers. Marijuana smokers who were not attending school were more likely to smoke marijuana weekly than marijuana smokers attending school (OR 1.47, 95% confidence interval: 1.20, 1.80). The older people are when they first start smoking marijuana the less likely they are to use marijuana on a weekly basis (OR 0.84, 95% confidence interval: 0.80, 0.88).

Discussion

The data presented here suggest that marijuana is consumed by a substantial number of youth and young adults in Canada, despite its status as an illicit drug. Similar to previous research, marijuana use was more prevalent among males, young adults living in rural areas, and increased with age. Young adults who were still in school were more likely to have tried marijuana, although among those who had tried, young adults outside of school were more like to be heavy users. Males and those who first tried marijuana at an earlier age also reported more frequent marijuana use.

These findings are consistent with existing research, which found that the prevalence of marijuana use among Canadians increases with education. Adlaf et al. [1] found that the majority of individuals with post secondary education (52.4%) report having used marijuana compared to just over one-third of those (34.9%) who did not complete high school. Additional research is required to examine the possible mechanisms associated with marijuana use being cultivated in school-based environments.

The current findings highlight important links between marijuana and tobacco use among young adults. Marijuana use was highest among current smokers, with the equivalent of more than 1.4 million young adult Canadians reporting combined use of tobacco and marijuana. Among tobacco users, the likelihood of marijuana use increased with younger age of first smoking a cigarette. This is generally consistent with previous research, which suggests that smokers who use marijuana are more likely to become dependent on marijuana [16] than non-tobacco users. Interestingly, almost half of those who reported smoking both marijuana and cigarettes indicated that they had tried marijuana prior to trying cigarettes or at the same time they started using tobacco. It was also identified that a substantial number of former smokers reported using marijuana. This is the cause for concern considering that marijuana use among former smokers may facilitate smoking relapse [8, 12].

The current findings also highlight several important distinctions between tobacco and marijuana use. Although 26% of all young adults reported using marijuana in the past year, only 3% reported daily use and only 7% reported weekly use. In contrast, 23% of young adult users reported weekly tobacco use. This is consistent with previous research, which indicates that, with very few exceptions, tobacco use is considerably more frequent than regular marijuana use (e.g., 7,9,17). For instance, the 2005 Ontario Student Drug Use Survey (OSDUS) [17] identified that 3% of current marijuana users report smoking marijuana on a daily basis, with the majority of daily users (70.6%) averaging one or less joints per day. In contrast, most people who use tobacco smoke on a daily basis (75%), averaging more than 15 cigarettes per day [6]. Thus, although the toxicity of unfiltered marijuana smoke may be equally or more toxic than cigarette smoke, tobacco users are likely to be exposed to substantially greater levels of toxicants than even frequent marijuana users.

This study has several limitations common to survey research. Although the response rate was high and the data were weighted to help to account for non-response, the findings are nevertheless subject to sample bias. In addition, the findings likely reflect some under-reporting for both tobacco and marijuana use, particularly among the younger age groups, despite efforts to ensure confidentiality and truthful reporting. It should also be noted that the cross-sectional nature of the design does not allow for causal inferences regarding the association between tobacco and marijuana use. Longitudinal data are required to determine the temporal sequence of marijuana and tobacco use, and whether either substance serves as a “gateway” drug for the other. Finally, CTUMS did not ask about the relatively common practice of combining tobacco and marijuana (e.g., blunts) [11], which may have implications for common definitions of tobacco or marijuana use.

Overall, these findings illustrate remarkably high rates of trying marijuana among young adults in Canada, as well as a high co-morbidity of tobacco use. Compared to historical rates, these findings suggest that marijuana use may be on the rise at the same time as tobacco use is falling among young adults. Future research should consider whether the increasing popularity of marijuana use among young Canadians represents a threat to the continuing decline in tobacco use among this key population.

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