

Alcohol, marijuana, and tobacco use patterns among youth in Canada

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Abstract The authors characterized changes in the prevalence of alcohol, tobacco, and marijuana use over time, and examined age of onset, co-morbid use and sociodemographic factors associated with ever using alcohol, tobacco, or marijuana in a nationally representative sample of Canadian youth. Data were collected from students in grades 7–9 as part of the Canadian Youth Smoking Survey ($n = 19,018$ in 2002; $n = 29,243$ in 2004). Descriptive analyses examined age of onset, co-morbid substance use and changes over time. Logistic regression models were used to examine factors associated with ever trying alcohol, tobacco, or marijuana with the 2004 data. Alcohol was the most prevalent substance used by youth and it was also the only substance which exhibited increased rates of use between 2002 and 2004. Co-morbid substance use was common, and it was rare to find youth who had used marijuana or tobacco without also having tried alcohol. As expected, youth who had poorer school performance were more likely to drink and smoke marijuana or tobacco, as were youth with more disposable income. Such timely and

relevant data are important for guiding future policy, programing, and surveillance activities.

Keywords MeSH terms · Adolescent · Youth · Cannabis · Alcohol · Prevalence · Prevention · Public health · Tobacco

Introduction

Despite the health risks and public harm associated with heavy drinking, tobacco, and marijuana use [1–4], the abuse of these substances remains common within Canada. According to the 2004 Canadian Addiction Survey (CAS), among Canadians aged 15 years and older, 12.5% were considered heavy drinkers and 14.1% reported using marijuana [5]. Rates of tobacco use also remain as high as 19% of Canadians aged 15 years and older were current smokers in 2005 according to the Canadian Tobacco Use Monitoring Survey (CTUMS) [6]. Considering that co-morbid use of these substances is common and that onset typically occurs among youth [7–9], preventing alcohol, tobacco, and marijuana use among youth populations should be a public health priority.

At the present time in Canada (and in many other jurisdictions), youth-focused substance use prevention and surveillance efforts primarily address tobacco use. Fewer resources are targeted to alcohol and marijuana use, or to support more comprehensive multi-substance prevention programing [8], despite the available evidence which suggests that alcohol and marijuana use should also be considered priorities along with tobacco control. For instance, among youth and young adults in Canada, alcohol use is substantially more prevalent than tobacco use [10], and the prevalence of occasional marijuana use is now

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similar to that of tobacco use [11]. Although tobacco use is associated with greater long-term health consequences, the majority of acute health problems associated with alcohol and marijuana use (e.g., injuries resulting from accidents) occur among youth populations [2]. Moreover, young drinkers and drug users are also more likely to have poorer academic performance and engage in risky sexual and antisocial behavior [7]. Given the apparent concurrent development of substance use among youth populations, there is a need to better understand the factors associated with the prevalence and onset of alcohol, tobacco and marijuana use at an early age. The prevalence rates of ever trying alcohol, tobacco, and marijuana have been presented elsewhere [12], however, the current study seeks to examine the use of these substances in greater detail, including: (1) characterizing changes in the prevalence of alcohol, tobacco, and marijuana use over time among Canadian youth, (2) examining binge drinking and intentions to try tobacco, (3) examining age of onset and co-morbid use of alcohol, tobacco and marijuana, and (4) examining sociodemographic factors associated with ever using alcohol, tobacco, and marijuana.

Methodology

Design

This study used nationally representative data collected as part of the 2002 and 2004 waves of the Canadian Youth Smoking Survey (YSS) [12, 13] during the 2002 and 2004 academic years; both waves of data collection used the same sampling methodology and research design. In brief, the target population for each wave of the YSS consisted of all young Canadian residents in grades 5–9 attending public and private schools in 10 Canadian provinces; youth residing in the Yukon, Nunavut, and the Northwest Territories were excluded from the target population, as the youth were living in institutions or on First Nation Reserves, and the youth attending special schools or schools on military bases. The sample design consisted of a two-stage stratified clustered design with schools as primary sampling units and classes as secondary sampling units. All of the students in the selected classes were surveyed. The sample design featured three levels of stratification: province, grade level, and census metropolitan area. The sample of schools was selected systematically with probability proportional to school size. The selection of the secondary sampling units (classes) was conducted by field staff that randomly selected one class in the desired grade. Detailed information on the sample design, methods, and survey rates for the 2002 and 2004 waves of the YSS are available from Statistics Canada [12, 13].

Participants

The YSS was conducted with Canadian respondents in grades 5–9 inclusive, in both 2002 ($n = 19,018$) and 2004–2005 ($n = 29,243$). The current data includes youth in grades 7–9 who responded to the substance use section of the 2002 ($n = 11,757$) and 2004 ($n = 16,705$) surveys.

Measures

The YSS collected information on age, gender, smoking behavior, as well as alcohol and marijuana use. Alcohol use was assessed by asking respondents, “Have you ever had a drink of alcohol; that is, more than just a sip?” (yes, no). Those that answered “yes”, were asked, “Have you ever had five drinks or more of alcohol on one occasion?” (yes, no). Tobacco use was defined how the respondents answered, “Have you ever smoked a whole cigarette?” (yes, no). Those that answered “no”, were asked, “Have you ever seriously thought about trying smoking?” (yes, no). Respondents were also asked whether they “have ever used or tried marijuana or cannabis (a joint, pot, weed, hash)” (yes, no). Respondents who reported trying or using alcohol, marijuana, or tobacco were asked “What age were you when you first did this?” to measure age of initiation (response categories started at ‘8 years of age or younger’ and increased by one year increments). Respondents were also asked to report, “How are you doing in school compared to other students in your class?” (better than average, average, below average) and “How much money do you usually get each week to spend on yourself or to save?” (\$0, \$1–5, \$6–10, \$11–20, \$21–40, \$41–100, and more than \$100) to measure academic achievement and spending money. Based on the response distribution, response categories for spending money were collapsed (\$0, \$1–20, \$20, or more).

Analyses

Descriptive analyses of alcohol, tobacco, and marijuana use were examined according to year of data collection and sex. Descriptive analyses examining age of onset and co-morbid substance use were also performed. Using the 2004 data, we then conducted three logistic regression models to examine characteristics associated with ever trying alcohol, ever smoking a whole cigarette, and ever trying marijuana among the most recent sample of youth (Table 1). Survey weights were used to adjust for nonresponse between provinces and groups, thereby minimizing any bias in the analyses caused by differential response rates across regions or groups. The statistical package SAS 8.02 was used for all analyses [14].

Table 1 Logistic regression analyses examining factors associated with alcohol, tobacco, and marijuana use among youth (grades 7–9) in 2004, Canada

Parameters		Adjusted OR ^a (95% CI)		
		Model 1 Ever tried alcohol versus Never tried alcohol	Model 2 Ever smoked a whole cigarette versus Never smoked a whole cigarette	Model 3 Ever tried marijuana versus Never tried marijuana
Sex	Female	1.00	1.00	1.00
	Male	1.32 (1.16,1.52)**	0.55 (0.45,0.68)**	1.31 (1.08,1.59)*
Grade	7	1.00	1.00	1.00
	8	1.75 (1.48,2.07)**	1.02 (0.77,1.36)	1.62 (1.23,2.15)**
	9	2.34 (1.98,2.77)**	1.25 (0.94,1.66)	3.19 (2.47,4.13)**
Academic achievement	Better than average	1.00	1.00	1.00
	Average	1.28 (1.11,1.47)**	1.79 (1.41,2.28)**	1.57 (1.27,1.94)**
	Below average	2.34 (1.98,2.77)**	3.14 (2.26,4.37)**	2.73 (1.99,3.76)**
Weekly spending money	\$0	1.00	1.00	1.00
	\$1–\$20	1.01 (0.85,1.19)	1.16 (0.83,1.49)	1.21 (0.92,1.59)
	\$21 or more	1.64 (1.35,2.00)**	1.51 (1.12,2.04)*	1.52 (1.14,2.02)*
Substance use	Never tried tobacco or marijuana	1.00	–	–
	Tried tobacco only	7.24 (4.42,11.86)**		
	Tried marijuana only	14.44 (8.26,25.25)**		
	Tried both tobacco and marijuana	26.95 (15.28,47.56)**		
	Never tried alcohol or marijuana	–	1.00	–
	Tried alcohol only		7.82 (4.72,12.96)**	
	Tried marijuana only		51.05 (19.08,136.54)**	
	Tried both alcohol and marijuana		95.85 (57.45,159.90)**	
	Never tried alcohol or tobacco	–	–	1.00
	Tried alcohol only			4.98 (8.59,26.12)**
	Tried tobacco only			51.91 (21.08,127.80)**
	Tried both alcohol and tobacco			188.10 (105.24,336.20)**
	<i>c</i> statistic	0.732	0.879	0.884

Note: ^a Odds ratios adjusted for all other variables in the table and controlling for spending money per week

Model 1: 1 = Ever tried alcohol ($n = 7,806$), 0 = Never tried alcohol ($n = 5,885$)

Model 2: 1 = Ever smoked a whole cigarette ($n = 1,718$), 0 = Never smoked a whole cigarette ($n = 12,008$)

Model 3: 1 = Ever tried marijuana ($n = 2,107$), 0 = Never tried marijuana ($n = 11,568$)

* $p < 0.01$, ** $p < 0.001$

Results

Descriptive statistics among Canadian youth in grades 7–9 by gender and year of data collection are presented in Table 2.

Prevalence of alcohol use

Alcohol had the highest prevalence of use among Canadian youth (Fig. 1). In 2002, 54.5% (648,000) of youth reported

having ever tried alcohol, of which 41% (265,000) reported binge drinking at least once; rates of alcohol use ($\chi^2 = 31.1$, $df = 1$, $p < 0.001$) and binge drinking ($\chi^2 = 13.9$, $df = 1$, $p < 0.001$) were higher among males than females. In 2004, 62.3% (745,000) of youth reported having ever tried alcohol, of which 36.6% (271,000) reported binge drinking at least once; although rates of having ever tried alcohol were higher among males than females ($\chi^2 = 49.0$, $df = 1$, $p < 0.001$), rates of binge drinking did not differ by sex.

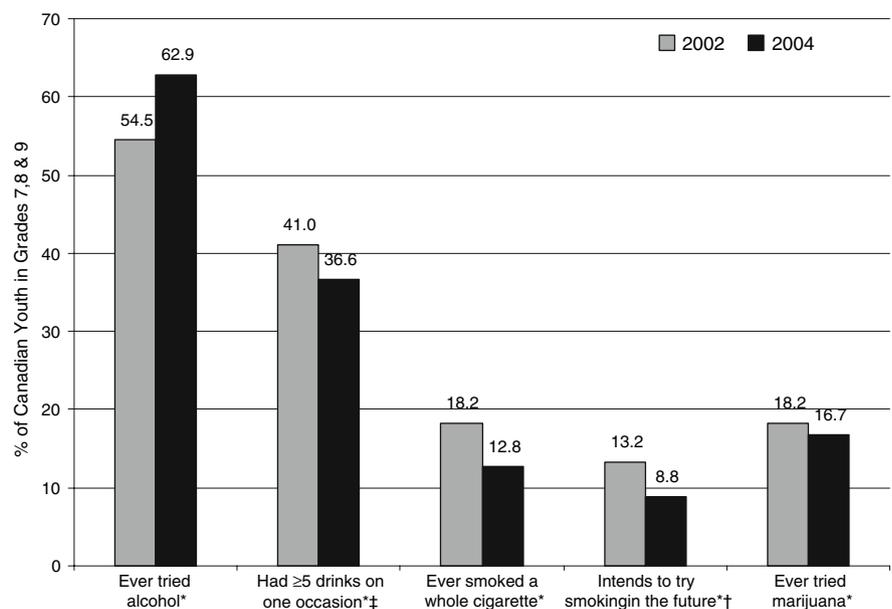
Table 2 Descriptive statistics for the sample of youth in grades 7–9 by gender and year of data collection (2002, 2004), Canada

	2002			2004			% Change	
	Males <i>n</i> = 5,863 (%)	Females <i>n</i> = 5,894 (%)	χ^2	Males <i>n</i> = 7,771 (%)	Females <i>n</i> = 8,934 (%)	χ^2	Male (%)*	Female (%)*
Ever tried alcohol	Yes	57.1	$\chi^2 = 31.3$, <i>df</i> = 1, <i>p</i> ≤ 0.001	65.6	60.0	$\chi^2 = 49.0$, <i>df</i> = 1, <i>p</i> ≤ 0.001	14.9*	16.1*
	No	42.9		34.4	40.0			
Had ≥5 drinks on one occasion	Yes	42.9	$\chi^2 = 13.9$, <i>df</i> = 1, <i>p</i> ≤ 0.001	35.2	36.9	$\chi^2 = 2.9$, <i>df</i> = 1, <i>p</i> = 0.08	-17.9*	-4.9
	No	57.1		64.8	63.1			
Ever smoked a whole cigarette	Yes	17.0	$\chi^2 = 8.1$, <i>df</i> = 1, <i>p</i> ≤ 0.01	11.1	14.5	$\chi^2 = 6.7$, <i>df</i> = 1, <i>p</i> ≤ 0.01	-34.7*	-25.6*
	No	83.0		88.9	85.5			
Intends to try smoking in the future ^a	Yes	13.1	$\chi^2 = 5.3$, <i>df</i> = 1, <i>p</i> ≤ 0.05	7.5	10.3	$\chi^2 = 14.8$, <i>df</i> = 1, <i>p</i> ≤ 0.001	-42.7*	-23.1*
	No	86.9		92.5	89.7			
Ever tried marijuana	Yes	19.5	$\chi^2 = 27.5$, <i>df</i> = 1, <i>p</i> ≤ 0.001	17.5	16.0	$\chi^2 = 13.8$, <i>df</i> = 1, <i>p</i> ≤ 0.001	-10.2*	-4.8
	No	80.5		82.5	84.0			

Note: * Statistically significant difference between 2002 and 2004, *p* < 0.05

^a Never smokers only

Fig. 1 Prevalence of alcohol, tobacco, and marijuana use Canada, 2002 & 2004. Source: 2002 and 2004 Canadian Youth Smoking Survey * Significant difference *p* < 0.05 between 2002 and 2004, ‡ Only among those who have ever tried alcohol, † Never smokers only



Prevalence of tobacco use

In 2002, 18.2% (223,000) of youth reported having ever smoked a whole cigarette, with 13.2% (111,000) of never smokers reporting that they intend to try smoking in the future. Rates of having smoked a whole cigarette ($\chi^2 = 8.1$, *df* = 1, *p* < 0.001) and intending to smoke in the future among never smokers ($\chi^2 = 5.3$, *df* = 1, *p* < 0.001) were higher among females than males. In 2004, 12.8% (157,000) of youth reported having ever smoked a whole cigarette, with 8.8% (90,000) of never

smokers reporting that they intend to try smoking in the future. Rates of having smoked a whole cigarette ($\chi^2 = 6.7$, *df* = 1, *p* < 0.001) and intending to smoke in the future among never smokers ($\chi^2 = 14.8$, *df* = 1, *p* < 0.001) were higher among females than males.

Prevalence of marijuana use

In 2002, 18.2% (216,000) of youth reported having ever tried marijuana; the prevalence of having ever tried marijuana was

higher among males than females ($\chi^2 = 27.5$, $df = 1$, $p < 0.001$). In 2004, more youth reported having ever smoked marijuana than tobacco. Overall, 16.7% (198,000) of youth reported having ever tried marijuana; the prevalence of having ever tried marijuana was higher among males than females ($\chi^2 = 13.8$, $df = 1$, $p < 0.001$).

Differences in substance use patterns over time

From 2002 to 2004, the prevalence of having ever tried alcohol increased by 15.4% (14.9% among males, 16.1% among females), having ever smoked a whole cigarette decreased by 29.7% (34.7% among males, 25.6% among females), having intentions to try smoking among never smokers decreased by 33.3% (42.7% among males, 23.1% among females), and having ever tried marijuana decreased by 8.2% (10.2% among males, 4.8% among females). Over the same period of time, the prevalence of binge drinking among youth who have tried alcohol decreased by 11.2% (15.2% among males, 6.2% among females). This represents approximately 98,000 more youth who have tried alcohol and 6,000 more binge drinkers, 66,000 fewer youth who have ever smoked a whole cigarette and 22,000 fewer youth who intend to try smoking in the future, and 18,000 fewer youth who have ever tried marijuana.

Age of initiation

Among respondents who reported having ever tried alcohol, the mean age for first use was 11.6 (± 1.9) years in 2002 and 12.4 (± 0.5) years in 2004. Among respondents who reported ever smoking a whole cigarette, the mean age for first use was 11.5 (± 1.8) years in 2002 and 12.0 (± 1.7) years in 2004. Among respondents who reported having ever tried marijuana, the mean age for first use was 12.6 (± 1.3) years in 2002 and 12.7 (± 1.5) years in 2004. Ages of onset for all the three substances were similar between males and females. Between 2002 and 2004, the distributions for the age of onset for tobacco and marijuana use all shifted toward slightly older ages of substance onset (Fig. 2). Over the same period of time, alcohol use also shifted toward a slightly older age of onset, although in 2004 there was a notable increase in the prevalence of alcohol onset of use among youth eight years of age or younger. As the distributions in Fig. 2 illustrate, it also appears that alcohol and tobacco onset typically occur prior to experimentation with marijuana.

Co-morbid substance use

As shown in Fig. 3, in 2002, the largest subpopulation of youth consisted of those who reported having never

experimented with alcohol, tobacco, or marijuana (44%, representing approximately 522,000 youth); the prevalence of non-experimenters decreased by 17.7% between 2002 and 2004. The largest subpopulation of youth in 2004 consisted of those who reported only having ever tried alcohol without having tried cigarettes or marijuana (43.2%, representing approximately 509,000 youth); the prevalence of alcohol-only users increased by 35.8% between 2002 and 2004. Over both waves of data collection, very few youth reported only having ever smoked a whole cigarette without also having tried alcohol or marijuana (0.9% in 2002, 0.4% in 2004) or having ever smoked a whole cigarette and ever tried marijuana without also having tried alcohol (0.3% in 2002, 0.2% in 2004). Interestingly, 11.9% (141,000) of youth in 2002 and 8.8% of youth in 2004 (103,000) reported that they had tried alcohol, tobacco, and marijuana.

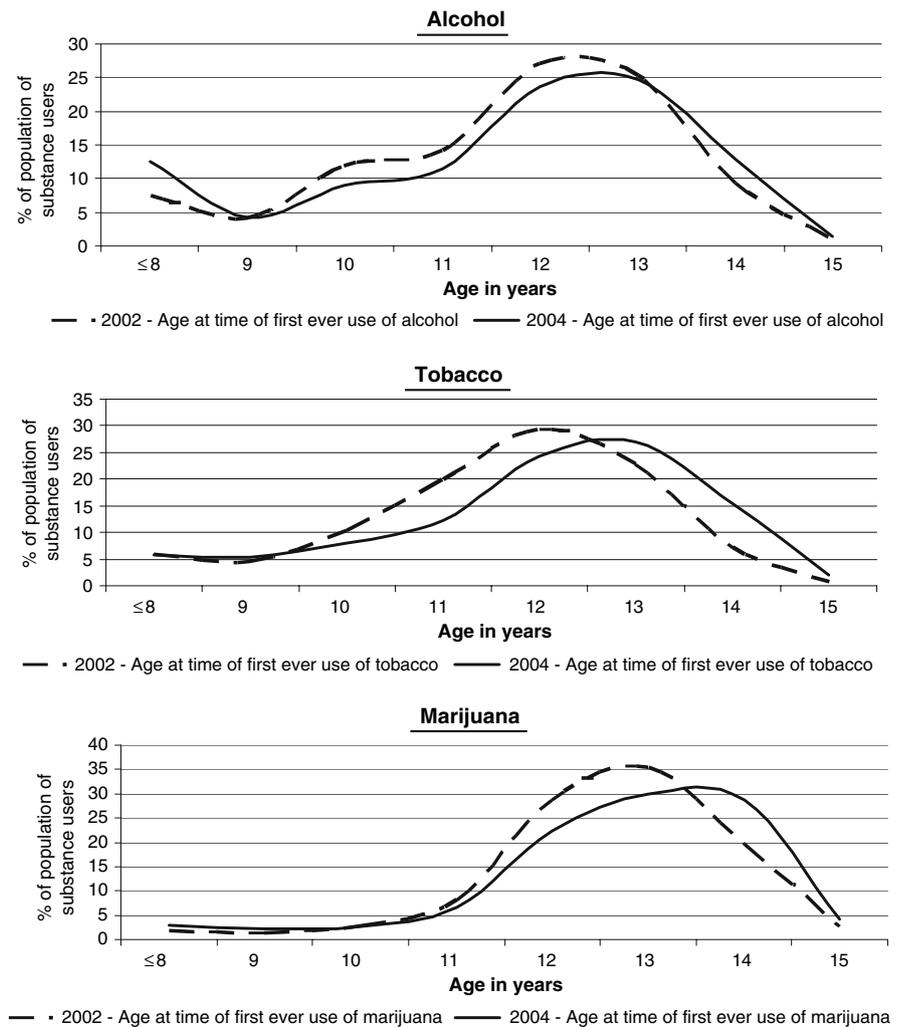
Factors associated with ever using alcohol

When compared to students who have never tried marijuana or tobacco, students were much more likely to have tried alcohol if they have tried both marijuana and tobacco (OR 26.95, 95% CI 15.28–47.56), only tobacco (OR 7.24, 95% CI 4.42–11.86), or only marijuana (OR 14.44, 95% CI 8.26–25.25). Males were more likely than females to report ever having tried alcohol (OR 1.33, 95% CI 1.16–1.52). Students in grade 8 (OR 1.75, 95% CI 1.48–2.07) and grade 9 (OR 2.34, 95% CI 1.98–2.77) were more likely to report having ever tried alcohol than students in grade 7. When compared to students with above average academic achievement, students were more likely to have tried alcohol if they reported average (OR 1.28, 95% CI 1.11–1.47) or below average (OR 2.00, 95% CI 1.48–2.72) academic achievement. Students with more than \$20 spending money per week were also more likely to have tried alcohol (OR 1.64, 95% CI 1.35–2.00).

Factors associated with ever smoking a whole cigarette

Students who have tried both marijuana and alcohol were almost 100 times more likely to have ever smoked a whole cigarette than students who have never tried alcohol and marijuana (OR 95.85, 95% CI 57.45–159.90). Similarly, students were also much more likely to have ever smoked a whole cigarette if they have only tried either marijuana (OR 51.05, 95% CI 19.08–136.54) or alcohol (OR 7.82, 95% CI 4.72–12.96). Males were less likely than females to report ever smoking a whole cigarette (OR 0.55, 95% CI 0.45–0.68). When compared to students with above average academic achievement, students were more likely to

Fig. 2 Age of onset for alcohol, tobacco, and marijuana use. Age of substance use onset among ever users, Canada, 2002 & 2004. Source: 2002 and 2004 Canadian Youth Smoking Survey



have tried marijuana if they reported average (OR 1.79, 95% CI 1.41–2.28) or below average (OR 3.14, 95% CI 2.26–4.37) academic achievement. Students with more than \$20 spending money per week were more likely to have ever smoked whole cigarette (OR 1.51, 95% CI 1.12–2.04).

Factors associated with ever using marijuana

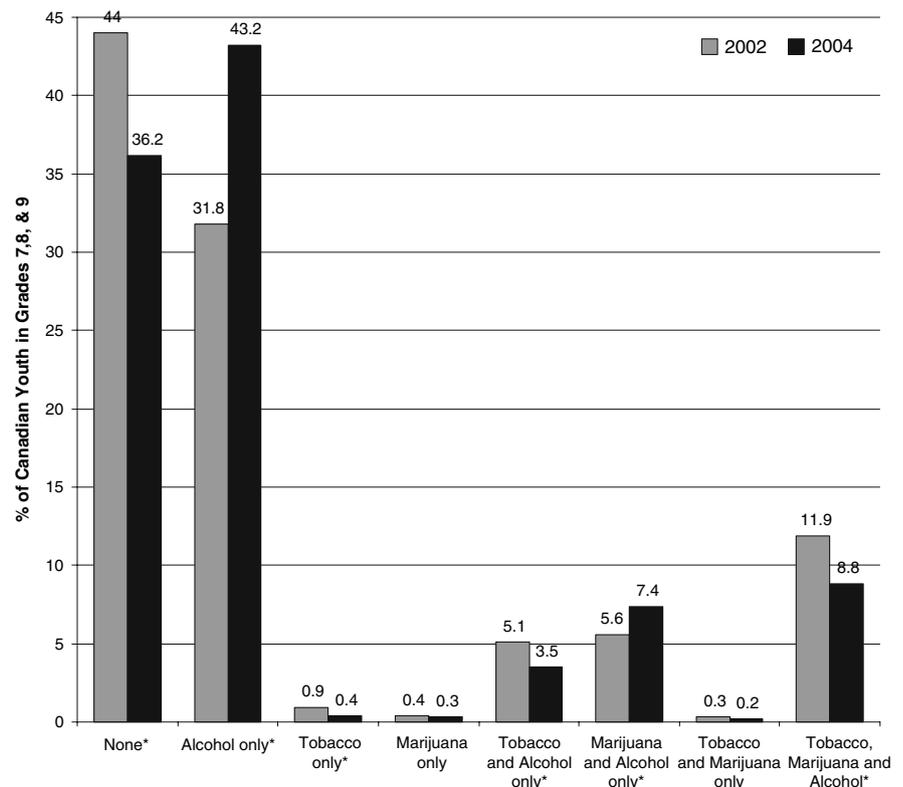
Students who have tried both alcohol and tobacco were over 180 times more likely to have tried marijuana than students who has never tried alcohol and tobacco (OR 188.10, 95% CI 105.24–336.20). Similarly, students were also much more likely to have tried marijuana if they have only tried either tobacco (OR 51.91, 95% CI 21.08–127.80) or alcohol (OR 14.98, 95% CI 8.59–26.12). Males were more likely than females to report ever having tried marijuana (OR 1.31, 95% CI 1.08–1.59). Students in grade 8 (OR 1.62, 95% CI 1.23–2.15) and grade 9 (OR 3.19, 95%

CI 2.47–4.13) were more likely to report having ever tried marijuana than students in grade 7. When compared to students with above average academic achievement, students were more likely to have tried marijuana if they reported average (OR 1.57, 95% CI 1.27–1.94) or below average (OR 2.73, 95% CI 1.99–3.76) academic achievement. Consistent with alcohol use, students with more than \$20 spending money per week were also more likely to have tried marijuana (OR 1.52, 95% CI 1.14–2.02).

Discussion

The data presented here suggest that alcohol, tobacco, and marijuana are used by a substantial number of youth in Canada, despite age and legal regulations prohibiting their use. Alcohol was the most prevalent substance used by youth and it was also the only substance which exhibited increased rates of use between 2002 and 2004. Co-morbid substance use was common, and it was rare to find youth

Fig. 3 Prevalence of co-morbid alcohol, tobacco, or marijuana use. Prevalence of different drug and alcohol use subgroups, Canada, 2002 & 2004. Source: 2002 and 2004 Canadian Youth Smoking Survey * Significant difference $p < 0.05$ between 2002 and 2004



who had used marijuana or tobacco without also having tried alcohol. As expected, youth who had poorer school performance were more likely to drink and smoke marijuana or tobacco, as were youth with more disposable income. Such timely and relevant data are important for guiding future policy, programing, and surveillance activities.

Overall, these findings illustrate remarkably high rates of underage youth trying alcohol, as well as a high prevalence of binge drinking and co-morbid use with tobacco and/or marijuana. This is consistent with previous research from both Canada [10, 15, 16] and the United States [9, 17]. Although there were declines from 2002 to 2004 in the prevalence of youth who had tried alcohol in conjunction with tobacco, there were increases in the prevalence of youth who had tried alcohol, and youth who had tried alcohol, and marijuana. Although this reduction in drinking and tobacco use may appear to represent a public health gain (as alcohol is different from tobacco and marijuana in that there are beneficial effects on disease for certain volume and pattern combinations [18]), the high prevalence of both unhealthy binge drinking, and alcohol and marijuana use among the youth in this study are cause for concern. Over two years, almost 100,000 more youth had tried alcohol. Moreover, even though the prevalence of binge drinking had declined, the increase in the absolute number of youth trying alcohol means that the actual number of

binge drinkers from 2002 to 2004 increased by more than 6,000 youth. Considering the inter-relationship between alcohol and tobacco onset [9, 10, 15–17], future research should examine the potential impact that the increasing popularity of alcohol use may have on future youth smoking rates among Canadian youth.

The current findings highlight important limitation in common tobacco control strategies among youth populations. Existing guidelines do not recommend including alcohol prevention activities as part of school-based tobacco control programing (e.g., Centers for Disease Control Best Practices Guidelines for Comprehensive Tobacco Control [19]). The current ethos in school-based programing is to focus prevention activities on one drug with the goal of reducing its prevalence rather than focusing on preventing substance use more globally [15]. However, our data suggest that in 2004, less than 1% of youth reported that they had tried tobacco without also having tried either alcohol or marijuana. Similarly, an even smaller proportion of youth had tried only tobacco and marijuana, without having tried alcohol. These findings suggest that tobacco control prevention efforts for youth populations should at the very least include alcohol prevention activities. Especially considering that rates of alcohol use among youth were higher than tobacco, that the onset occurs at relatively the same age, and that early alcohol use is associated with future alcohol and tobacco

dependence as well as illicit drug use [7]. This evidence, coupled with existing evidence that the school is a common location for purchasing alcohol, tobacco, and drugs [9], suggests that the school environment may be appropriate for polysubstance prevention programming activities. Research should test the impact of combining alcohol and marijuana prevention programs and policies into existing school-based tobacco control initiatives.

These data suggest that in the general population, youth tend to try alcohol and tobacco at roughly the same age¹ while youth tend to be slightly older when they try marijuana for the first time. This pattern has remained consistent in Canada over previous years and is similar to onset patterns reported in the United States [9]. This has important implications for substance use prevention programming. For instance, we identified that the likelihood of a student trying marijuana increased more than 180-fold if the student had previously tried both alcohol and tobacco when compared to a student who had never tried alcohol or tobacco. Even a student who had only previously tried tobacco or alcohol was substantially more apt to also have tried marijuana. This is consistent with the traditional gateway hypothesis of alcohol and tobacco use leading to marijuana use [20], and more recent Canadian research showing that earlier ages of smoking onset are associated with marijuana use among young adults [11]. More recently, a reverse gateway hypothesis (marijuana use leading to tobacco use) has been suggested [21], although it is not supported by these cross-sectional findings. Longitudinal data are required to determine if the temporal sequence of such relationships and to explore if there are sub-populations where marijuana use does precede alcohol and tobacco use (e.g., young adults).

The relationships between substance use and academic achievement identified in this study are consistent with previous research [7, 15, 17]. Youth were more likely to have tried alcohol, marijuana, and tobacco as if they had below average or average grades. However, since this relationship can be a function of both substance use leading to poor achievement or poor achievement leading to substance use [22], we cannot make any causal inferences about the nature of the relationships presented here with these cross-sectional data. We also identified that youth with more than \$20 of weekly spending money were more likely to have tried alcohol, marijuana, and tobacco. Although this is not surprising considering that youth with financial resources available to them would often have better access to such substances, we can not determine if having spending money preceded trying alcohol, tobacco

and/or marijuana or if substance use preceded having a source of spending money. Nevertheless, since youth populations are sensitive to both alcohol and tobacco taxes [23, 24], it is clear that policies designed to increase the price of alcohol and tobacco are critical components of comprehensive prevention programming; as long as marijuana remains classified as an illicit substance, such effective policies will remain irrelevant.

This study has several limitations common to survey research. Although the response rate was high and the data were weighted to help account for nonresponse, the findings are nevertheless subject to sample bias. In addition, the findings likely reflect some under-reporting for alcohol, marijuana, and tobacco use, despite efforts to ensure confidentiality and truthful reporting. The measure of binge drinking may be over-reported since it is not clear if youth interpret five drinks as five “standard” drinks or five sips or five swigs of a single drink given the way the current measure is worded. It should also be noted that the cross-sectional nature of the design does not allow for causal inferences regarding the association between alcohol, marijuana, and tobacco use. Longitudinal data are required to determine the temporal sequence of the onset of use for these substances, and whether either substance serves as a “gateway” drug for the other. The 2002 YSS did not measure past month use of alcohol or marijuana so it was not possible to compare changes in the current use of these substances over time. It is possible that some of the variability in the prevalence rates between 2002 and 2004/2005 may be a function of the differences in the length of the data collection [2002 survey data were collected over a four-month period (Sept.–Dec. 2002); 2004 survey data were collected over a eight-month period (Sept.–Dec. 2004 and Jan.–April 2005)]. The 2004/05 Public Use Microdata File does not provide data on when students completed the survey, so we could not control for this in the descriptive analyses; this does not impact the results presented for the inferential statistics. Finally, the YSS did not ask about the relatively common practice of combining tobacco and marijuana (e.g., blunts) [3], which may have implications for common definitions of ever use of tobacco or marijuana.

Conclusion

The results of this article suggest that alcohol, tobacco, and marijuana are used by a substantial number of youth in Canada despite age and legal regulations prohibiting their use. Moreover, these findings suggest that alcohol use may be on the rise at the same time as tobacco and marijuana use appears to be falling among youth. Considering the high rates of co-morbid substance use and that youth are

¹ The actual ages of initiation may even be younger than eight years of age given that our measure for age of initiation had a lower anchor of 8 years of age.

substantially more likely to use tobacco or marijuana if they have also tried alcohol, such shifts in youth substance use behavior may have important implications not only for future tobacco control and drug control efforts, but also for cancer control more broadly. Furthermore, due to the obvious limitations associated with substance-specific prevention programming, it may be beneficial to examine the benefits of using a more comprehensive poly-substance approach to youth prevention programming.

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