Medicinal Substance Abuse Among Canadian Youth: Findings From the 2012/2013 Youth Smoking Survey

Cesar Leos-Toro BSc, David Hammond PhD, Stephen Manske EdD.

School of Public Health & Health Systems, University of Waterloo Canada

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Corresponding author

David Hammond
University of Waterloo
School of Public Health & Health Systems
200 University Ave W.
Waterloo, ON N2L 3G1
Tel. (519) 888-4567 ext. 36462
dhammond@uwaterloo.ca

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Background: Medicinal substance abuse is prevalent in Canada; however, very little is known about patterns of abuse among youth. The current study characterized use of medicinal substances (MSs) such as prescription medications and selected over-the-counter substances, as well as licit and illicit controlled, non-medicinal substances (NMSs), using a nationally representative sample of youth.

Methods: Cross-sectional, nationally representative data for grades 7-12 were obtained from Health Canada's 2012/2013 Youth Smoking Survey (n=38,667). Multinomial regression analyses were conducted to examine sub-group differences in medicinal substance abuse and comorbid abuse of both medicinal and non-medicinal substances.

Results: Approximately 5% of youth reported abusing medicinal substances in the last year. Dextromethorphan, a substance found in many cough and cold syrups (2.9%) was the most widely abused followed by pain medications (2.6%), sleeping medications (1.8%), stimulants (1.7%) and sedatives (1.0%). Abuse of non-medicinal substances aside from tobacco and alcohol was reported by 21.3% of the population and abuse of any substances was detected in 23% of the surveyed population. Girls at each reported higher rates of abuse of medicinal substances than boys. Regional differences were also observed with regard to the type of substance abuse across Canada.

Interpretation: A substantial minority of Canadian youth reported abusing medicinal substances, including over-the-counter medications (e.g., cough syrup) and prescriptions medications (e.g., pain medication). In contrast to non-medicinal substances, girls were more likely to report abuse of medicinal substances compared to boys.

Trial registration: N/A

Key words: medicinal substance abuse, prescription opioids, polysubstance, girls' health

BACKGROUND

Controlled substance abuse has been associated with numerous economic, social and health consequences.[1,2,3,4,5,6] Controlled substances are drugs that have been identified by the Canadian Federal Government as having an elevated potential for abuse or addiction, and are listed in Schedules I to V of Canada's 1996 Controlled Drugs and Substances Act (CDSA).[7] Abuse of controlled medication refers to the consumption of substances intended for medical treatment with the purpose of "getting high", whereas misuse refers to a deviation from prescribed instructions, such as taking an additional sleeping pill when the first did not have the desired effect.[8] Comprehensive cost analyses of controlled substance abuse have yet to be conducted in Canada since one was undertaken in 2006 with limited data from 2002; however medicinal substance abuse is known to contribute considerably to the annual estimated costs related substance abuse calculated at $40B .[9,10]

Prescription opioids are the most commonly abused type of medicinal substances. Indeed, prescription opioid abuse ranks third in terms of substance use burden after tobacco and alcohol; these measures are based on the best available evidence and rely greatly on variable provincial and locally captured indicators as they relate to mortality, morbidity and diversion of substances.[11] Approximately 80% of prescription opioids are dispensed in community settings without post-dispensing control mechanisms, allowing for increased supply of these substances in homes across the country.[12] Young Canadians are particularly vulnerable to prescription opioid abuse and other substances available over the counter (OTC); however, there are gaps in knowledge in characterizing their abuse.[13] According to available data from the Ontario Student Drug Use and Health Survey (OSDUHS), prescription opioid abuse is the most commonly reported controlled medication abused among Ontario youth with rates of use in the past year ranging from 15-20% of secondary students reporting non-medical use, compared to 6% in the general population.[14,15]

Other medications liable to abuse include benzodiazepines and stimulants.[15] Dextromethorphan (DXM), a synthetic opioid in many antitussives (i.e., cold medications) is not currently listed in the CDSA but has been observed to lead to mania or psychosis at elevated levels of consumption.[16,17,18] Recent estimates in Ontario suggest an increase in recreational use of DXM from 7% to 10% among students in grades 7 through 12 from 2011 to 2013.[19] This is consistent with higher levels of stimulant use among young Canadians compared to the general population.[6]

Youth is a critically important period for substance use. Adolescence marks a critical period of substantial growth and change of neural regions which influence impulsivity and potentially destructive

behaviours such as substance abuse.[20,21,22,23] Abuse of controlled substances has been associated with short- and long-term psychological and physiological health effects, including fatalities.[24,25,26,27] Patterns of substance abuse and misuse among youth, also predict use in adulthood.[28,29,30] To date, however, there are no national estimates of medicinal substance abuse among Canadian youth.

The current study characterized rates of use of selected over the counter medications as well as licit and illicit controlled substances using a nationally representative sample of youth. This study examined prevalence of use among Canadian youth by socio-demographic factors, concurrent substance use behaviours and region of residence.

METHODS

Participants

Cross-sectional data were obtained from the 2012/2013 Youth Smoking Survey (YSS), conducted with 38,667 participants from grade seven through grade twelve in 450 schools from all Canadian jurisdictions excluding Manitoba, Yukon, Northwest Territories and Nunavut. The survey included Canadian residents attending private, public, and Catholic schools with the exception of youth that were institutionalized at the time of the survey, living on First Nations Reserves or attending special schools (e.g. schools for the hearing or visually impaired), virtual schools, daycares or schools on military bases.

Design

The 2012/2013 YSS was based on a stratified single stage design. Stratification was based on health region smoking rate and whether the school was an elementary or secondary school. Lists of schools were divided into two strata based on smoking rates of students aged 15 to 19 within the health region determined by current Canadian Community Health Survey data and the school's postal code in all provinces except Quebec, Ontario and Alberta where schools were divided into three strata. The third stratum acknowledged the size of major metropolitan areas, Montreal, Calgary/Edmonton and Toronto and ensured representative samples from these centres. Detailed information on the sample design, methods and survey rates for this wave of YSS data is available through Health Canada as well as the YSS website www.yss.uwaterloo.ca.[31,32] The University of Waterloo Human Research Ethics Committee and Health Canada's Research Ethics Board reviewed all necessary YSS protocols and materials before its implementation.

Measures

The 2012/2013 YSS collected information on sex, grade, ethnicity, spending money, region of residence, tobacco use and alcohol binging, as well as information about different substances deemed commonly abused by young people. The jurisdictions in provinces of Newfoundland & Labrador, Prince Edward Island, Nova Scotia and New Brunswick were coded as a region defined as 'East', Quebec and Ontario were coded 'Central', Saskatchewan and Alberta 'Prairies', and British Columbia defined the 'West'. Ethnicity was assessed by asking, "How would you describe yourself? *(Mark all that apply)*". Responses were categorized as 'White', 'Aboriginal (First Nations, Métis, Inuit)', and 'Other', which included Black, Asian, Latin/American, Other or multiple categories. 'Never smokers' reported that they had not "ever tried cigarette smoking, even just a few puffs", 'Ever Smokers' were defined as those that had tried a cigarettes, "Have you ever tried cigarette smoking, even just a few puffs?" and, "Have you ever smoked 100 or more whole cigarettes in your life?" , and 'Experimental Smokers' reported they had ever tried smoking, even just a few puffs but reported smoking less than 100 or more whole cigarettes in their lives, Binge drinking was determined by asking respondents, "In the last 12 months, how often did you have a drink of alcohol that was more than just a sip?" and, "In the last 12 months, how often did you have 5 drinks of alcohol or more on one occasion?" Marijuana use was assessed based on the way respondents answered, "In the last 12 months, how often did you use marijuana or cannabis?" and validated using an additional question, "How old were you when you first used marijuana or cannabis?"

Information on medicinal substance (MS) and non-medicinal substance (NMS) abuse was drawn from the last section of the YSS: "If you have ever used or tried any of the following drugs, mark the age at which you first used or tried. Then mark if you have used or tried the drug in the last 12 months." The subsequent probe asked participants if they had used the listed substances "to get high and not for medical purposes". The MSs and NMSs of interest are listed in Table 2.

Analysis

IBM SPSS Statistics for Windows Version 22.0 (Armonk, NY: IBM Corp.) was used for all of the analyses in this report. All results represent "weighted" data. The development of the survey weights was accomplished in two stages. In the first stage a weight (W_{1j}) was created to account for the school selection within health region and school strata. A second weight (W_{2jg}) was calculated to adjust for student non-response. Finally, the weights were calibrated to the province, sex and grade distribution so that the total of the survey weights by sex, grade and province would equal the actual enrolments in those groups. Multinomial regression models were fitted to examine correlates of medicinal, non-

medicinal and concurrent use of both medicinal and non-medicinal substance abuse (where 0=No Substance Abuse, 1=Medicinal Substance Abuse, 2=Non-Medicinal Substance Abuse and 3=Concurrent Abuse of Medicinal and Non-Medicinal Substances). Six variables were included in the model: sex, grade, ethnicity, region of residence, spending money, smoking status and a positive response to alcohol binging. Accepted statistical significance of results was set at $p<0.01$.

RESULTS

Sample Characteristics & Prevalence Estimates

Weighted sample characteristics are shown in Table 1. Table 2 presents prevalence data for 5 MSs, and 11 NMSs from the previous year. More than 2 in 10 young people reported abuse of at least one of the listed MSs and NMSs. DXM and pain relievers or tranquilizers were the substances that were most frequently reported to have been abused in the last 12 months followed by sleeping medicine, stimulant and sedative abuse. Of those sampled, 17.7% abused NMSs exclusively, 1.7% abused MSs exclusively and 3.6% reported concurrent abuse of both MSs and NMSs.

Correlates of Medicinal Substance Abuse vs Substance Abstinence

Table 3 outlines the results of multinomial regression analyses examining factors associated with medicinal, non-medicinal and concurrent substance abuse. Compared to substance abstinent youths, as students progressed from grade 7 through 12, they were not more likely to abuse MSs. Compared to boys, girls were 1.6 times as likely to abuse MSs, with no differences between ethnic groups.

Regional discrepancies were observed between Western and Central Canada. Young people in Western Canada reported significantly more abuse of MSs than youth in Central Canada. Individuals who reported having spending money each week were more likely to abuse MSs. Students who did not report weekly spending money were less likely to report MS abuse than those that reported receiving $1 to $20 or more than $20. In addition MS abuse was positively associated with smoking and alcohol use, as shown in Table 3.

Correlates of Concurrent use of Medicinal and Non-Medicinal Substances vs Substance Abstinence

As Table 3 indicates, progression through the grades was associated with an increased likelihood of concurrent abuse of medicinal and non-medicinal substances with girls more likely to participate in dual abuse of substances than boys. Youth who identified as Aboriginal (First Nations, Métis, Inuit) and Other (Asian, Latin American/Hispanic, Black, and Other) ethnicities were more likely than White

children to abuse medicinal and non-medicinal substances concurrently. However, those reporting an Other ethnicity were about half as likely as Aboriginals to be dual substance abusers.

Respondents from the Eastern provinces were consistently more likely to abuse substances concurrently than those residing in the Central and Prairie provinces. Children in the Prairies were about half as likely as those in Central provinces to be dual abusers. Those living in the Western Region were more than twice as likely to abuse MSs and NSs concurrently. Having spending money was associated with an increased likelihood of abusing both medicinal and non-medicinal substances. The prevalence of comorbid use increased with greater tobacco use and binge drinking.

INTERPRETATION

Findings from the only nationally representative survey of substance abuse among Canadian youth between Grades 7 to 12 indicate that 5.3% reported abusing medicinal substances (MSs) which include controlled medicinal substances and selected OTC medications. Dextromethorphan, a substance in many cough and cold syrups, was the most widely reported medicinal substance abused, with a prevalence of 3%, followed by pain medications (2.6%), sleeping medications (1.8%), stimulants (1.7%) and sedatives (1.0%). Nearly a quarter (23%) of the surveyed population report some substance abuse.

Medicinal substance abuse was consistently more prevalent among girls than boys at each grade level. Risk behaviour and illicit drug use is typically less prevalent among girls. The elevated rates of MS abuse observed in the current study may be a reflection of beliefs that MSs are safer alternatives to NMSs, easier to access, carry less potential for interfacing with criminal organizations or police, and perhaps being more socially acceptable.[33,34] Regional differences were also apparent. Youth in the western provinces were more likely to abuse MSs, whereas youth in the prairies were the least likely to report concurrently abusing MSs and NMSs. These differences may be influenced by the socioeconomic context of each of these regions. Our findings indicate a greater likelihood of adolescents abusing all substances when they have disposable income but, those receiving more than twenty dollars of spending money are more likely than those receiving up to twenty dollars each week to be dual abusers of MSs and NMSs. Tobacco and alcohol were associated with greater MS and dual substance abuse, similar to previous research.[35]

Direct comparisons with national estimates from other studies are not possible due to a lack of data. According to the Canadian Alcohol and Drug Use Monitoring Survey (CADUMS), which surveys Canadians aged 15 and older, abuse of DXM was not reportable among youth because less than 1% of

Canadians reported its abuse, in contrast to the current estimate of 3%. CADUMS was not able to report prevalence of abuse of many MSs due to high sampling variability and much lower samples sizes among youth than the current study, sustaining a continued dearth of comparable prevalence estimates. Discrepancies between OSDUHS findings for other substances and the ones reported here reflect differences in survey designs. Where the YSS explicitly asks about consuming substances in order to "get high and not for medical reasons", OSDUHS asks children whether they have used particular substances without a prescription or without a doctor telling them to take it; the resulting findings from OSDUHS are not necessarily indicative of the way the United States Food and Drug Association has operationalized abuse but simply a way they have chosen to categorize a type of substance misuse.[36]

Limitations

While this study is particularly strong due to its generalizability among Canadian youth, it has several limitations common to survey research, including non-response and potential sample bias. The 2012/13 YSS captures a nationally representative sample of boys and girls attending mainstream school settings; however, it excludes youth that were not or could not be present on the day the survey was administered, does not account for on-reserve schools, alternative schools where high-risk youth may attend or account for excluded regions where there may be greater proportions of at-risk youths. Thus, the current estimates of MSs may conservatively estimate the current prevalence of substance abuse among youth today.

Conclusion

The current findings indicate that almost one quarter of Canadian youth from Grades 7 to 12 reported abusing of medicinal or non-medicinal substances, including 5% who abuse medicinal substances. Cough and cold syrups as well as pain medications were the most widely abused of the medicinal substances. Our findings suggest that girls are at a higher risk than boys of abusing medicinal substances at every grade level with abuse becoming increasingly prevalent as they progress through their secondary education. These analyses contribute important information to the fragmented literature that exists today about substance abuse in general. In recognition of the growing concerns around medicinal substance abuse, the Government of Canada has identified prevention of medicinal substance abuse among youth as a priority, including a national media campaign. [37]

Financial Support

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Impact from 2004 to 2007 and a contract between Health Canada and the Propel Centre for Population Health Impact from 2008-2011. The YSS consortium includes Canadian tobacco control researchers from all provinces and provided training opportunities for university students at all levels. The views expressed herein do not necessarily represent the views of Health Canada. This study was supported by a Canadian Institutes of Health Research New Investigator Award (D. Hammond), a Canadian Cancer Society Research Institute Junior Investigator Award (D. Hammond) and also partially funded by Canadian Cancer Society Grant #701019 (S.Manske).

Table 1 – Sample Characteristics among Youth in Grades 7-12, Youth Smoking Survey, Canada, 2012 (n=38,667)

		Total	All Grades		Grade 7		Grade 8		Grade 9		Grade 10		Grade 11		Grade 12	
			Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Ethnicity	White	65.1%	65.2%	65.1%	65.2%	66.2%	63.1%	64.4%	67.7%	66.0%	65.9%	66.2%	67.2%	65.4%	61.9%	61.9%
	Aboriginal	2.9%	2.6%	3.1%	2.3%	2.6%	2.4%	2.5%	2.5%	3.6%	2.9%	3.4%	2.9%	3.0%	2.8%	3.5%
	Other	32.0%	32.1%	31.8%	32.6%	31.3%	34.5%	33.1%	29.9%	30.3%	31.2%	30.4%	29.9%	31.6%	35.3%	34.6%
Region	East	7.1%	7.4%	6.9%	7.5%	6.5%	7.2%	6.6%	7.3%	6.7%	7.2%	7.0%	7.3%	7.0%	7.8%	7.3%
	Central	65.3%	65.2%	65.4%	65.7%	67.3%	66.7%	67.1%	67.2%	66.5%	66.0%	63.9%	65.1%	64.1%	60.0%	63.5%
	Prairies	14.7 %	14.7%	14.6%	13.8%	14.9%	13.8%	14.2%	14.1%	13.9%	15.0%	14.6%	14.7%	14.0%	17.3%	16.2%
	West	12.9%	12.7%	13.1%	13.0%	11.3%	12.3%	12.0%	11.4%	13.0%	11.8%	14.5%	13.0%	14.8%	14.8%	13.0%
Spending Money	Zero	20.0%	19.7%	20.4%	25.0%	27.7%	24.8%	26.9%	21.1%	21.5%	20.1%	18.1%	14.9%	17.1%	11.5%	10.9%
	$1 to $20	30.5%	30.8%	30.2%	40.8%	41.5%	38.2%	37.6%	33.6%	34.0%	30.5%	29.2%	21.9%	21.7%	19.4%	16.9%
	$21+	30.1%	29.0%	31.1%	12.8%	11.9%	14.1%	16.8%	22.3%	26.6%	29.7%	34.6%	44.7%	42.6%	51.4%	55.2%
	Not Stated	19.4%	20.6%	18.2%	21.3%	18.9%	22.9%	18.8%	23.0%	17.8%	19.6%	18.1%	18.6%	18.6%	17.7%	17.1%
Smoking Status	Never Smoker	86.2%	87.3%	85.2%	97.8%	95.8%	93.9%	93.4%	88.6%	88.4%	85.2%	84.5%	81.1%	78.2%	76.6%	70.2%
	Ever Smoker	4.8%	3.9%	5.8%	0.6%	0.9%	1.6%	2.1%	7.6%	8.0%	3.7%	10.0%	5.6%	8.7%	8.3%	14.2%
	Experimental Smoker	8.9%	8.8%	9.2%	1.7%	3.3%	4.5%	4.5%	3.7%	3.6%	11.1%	5.6%	13.2%	13.2%	15.1%	15.5%
Binged on Alcohol in Last 12mos.		26.4%	26.0%	26.8%	2.4%	3.2%	7.5%	7.3%	21.1%	19.9%	32.9%	32.6%	42.6%	46.6%	50.8%	51.7%

Table 2 – Abuse of Medicinal and Non-Medicinal Substances in the Last 12 Months among Youth in Grades 7-12, Youth Smoking Survey, Canada, 2012

		All Grades	All Grades		Grade 7		Grade 8		Grade 9		Grade 10		Grade 11		Grade 12	
		All	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Medicinal Substances	Any	5.3%	5.8%	4.9%	2.6%	2.0%	3.9%	3.1%	5.8%	3.7%	5.4%	4.9%	7.6%	6.7%	9.7%	9.1%
	Dextromethorphan	2.9%	3.0%	2.7%	1.8%	1.5%	2.2%	2.0%	2.4%	1.9%	2.7%	2.5%	3.8%	3.3%	5.4%	5.4%
	Pain Medications	2.6%	2.8%	2.3%	0.8%	0.6%	1.7%	1.3%	2.4%	1.5%	2.4%	2.5%	4.3%	3.4%	5.7%	4.7%
	Sleeping Medications	1.8%	2.0%	1.6%	0.9%	0.5%	1.0%	0.9%	2.0%	0.9%	2.0%	1.5%	2.8%	1.7%	3.5%	4.4%
	Stimulants	1.7%	1.6%	1.8%	0.8%	0.4%	0.8%	0.7%	2.2%	1.4%	1.1%	1.9%	2.0%	2.6%	3.1%	3.6%
	Sedatives	1.0%	0.9%	1.1%	0.3%	0.1%	0.4%	0.6%	0.2%	0.7%	1.0%	1.3%	1.3%	1.6%	2.4%	2.5%
Non-Medicinal Substances	Any	21.3%	20.4%	22.1%	2.4%	4.6%	7.4%	7.6%	15.3%	15.3%	23.9%	27.1%	34.3%	36.0%	40.0%	42.9%
	Marijuana	20.7%	19.8%	21.5%	1.7%	4.2%	6.8%	6.8%	14.4%	14.8%	23.3%	26.3%	34.0%	35.4%	39.7%	42.2%
	Hallucinogens	2.4%	1.7%	3.1%	0.4%	0.2%	0.9%	0.6%	1.4%	1.8%	1.7%	3.3%	3.0%	6.1%	2.9%	6.7%
	MDMA	2.3%	2.1%	2.6%	0.2%	0.1%	0.9%	0.7%	1.2%	1.5%	2.3%	2.2%	3.9%	4.0%	4.4%	7.1%
	Salvia	1.8%	1.1%	2.6%	0.3%	0.1%	0.3%	0.5%	0.4%	1.8%	0.9%	3.2%	2.6%	4.2%	2.1%	5.6%
	Cocaine	1.7%	1.1%	2.2%	0.4%	0.4%	0.6%	0.6%	0.9%	1.1%	1.2%	2.4%	1.7%	3.8%	1.9%	4.9%
	Amphetamines	1.6%	1.2%	1.9%	0.4%	0.4%	1.3%	0.8%	1.2%	1.1%	1.4%	2.2%	1.8%	3.8%	1.0%	3.3%
	Spice	1.3%	1.0%	1.5%	0.6%	0.4%	0.8%	1.2%	0.8%	1.2%	1.2%	1.7%	1.5%	2.2%	1.1%	2.3%
	Solvents	0.8%	0.6%	1.0%	0.5%	0.3%	0.6%	0.8%	1.1%	0.9%	0.5%	1.2%	0.5%	1.2%	0.3%	1.6%
	Heroin	0.6%	0.3%	0.8%	0.2%	0.3%	0.4%	0.4%	0.2%	0.5%	0.3%	0.8%	0.4%	1.2%	0.3%	1.7%
	Bath Salts	0.5%	0.3%	0.8%	0.3%	0.1%	0.3%	0.4%	0.2%	0.6%	0.3%	0.8%	0.4%	1.5%	0.4%	1.5%
	BZP/TFMPP	0.4%	0.2%	0.6%	0.0%	0.0%	0.1%	0.4%	0.4%	0.5%	0.3%	0.5%	0.4%	0.9%	0.2%	1.5%
Medicinal Substance Abuse Only		1.7%	2.2%	1.3%	1.9%	1.5%	2.2%	1.9%	2.4%	1.4%	1.6%	1.4%	2.1%	1.0%	2.8%	0.6%
Non-Medicinal Substance Abuse Only		17.7%	16.8%	18.6%	1.7%	4.0%	5.8%	6.4%	11.9%	13.0%	20.2%	23.6%	28.8%	30.3%	33.2%	34.4%
Concurrent Abuse of Both Medicinal and Non-Medicinal Substances		3.6%	3.6%	3.6%	0.7%	0.5%	1.7%	1.2%	3.4%	2.3%	3.7%	3.4%	5.5%	5.6%	6.8%	8.5%
Any Substance Abuse		23.0%	22.6%	23.4%	4.3%	6.0%	9.7%	9.4%	17.7%	16.7%	25.5%	28.5%	36.5%	37.0%	42.9%	43.5%

Table 3 - Multinomial Logistic Regression Analyses Examining Factors Associated with Medicinal and Non-Medicinal Substance Abuse Among Youth in Grades 7-12, Youth Smoking Survey, Canada, 2012.

Characteristic or Behaviour			Reference Category	MEDICINAL SUBSTANCE ABUSE			NON-MEDICINAL SUBSTANCE ABUSE			CONCURRENT ABUSE OF BOTH MEDICINAL AND NON-MEDICINAL SUBSTANCES		
				Model 1			Model 2			Model 3		
				OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Grade			---	1.033	(0.981-1.087)	0.216	1.359	(1.327-1.393)	<0.001	1.274	(1.216-1.334)	<0.001
Sex			Male	1.654	(1.412-1.937)	<0.001	0.956	(0.894-1.022)	0.185	1.181	(1.043-1.336)	0.009
Ethnicity	Aboriginal	v.	White	1.250	(0.778-2.010)	0.356	2.481	(2.076-2.964)	<0.001	2.090	(1.541-2.835)	<0.001
	Other	v.	White	1.038	(0.872-1.235)	0.676	0.942	(0.869-1.022)	0.152	1.232	(1.064-1.427)	0.005
	Other	v.	Aboriginal	0.830	(0.514-1.340)	0.446	0.380	(0.316-0.456)	<0.001	0.590	(0.431-0.807)	0.001
Region	Central	v.	East	1.015	(0.735-1.402)	0.930	0.949	(0.833-1.080)	0.424	0.745	(0.602-0.923)	0.007
	Prairies	v.	East	1.225	(0.855-1.756)	0.269	0.661	(0.567-0.771)	<0.001	0.435	(0.333-0.567)	<0.001
	West	v.	East	1.379	(0.950-2.002)	0.091	1.115	(0.950-1.309)	0.183	0.950	(0.722-0.1.252)	0.717
	Prairies	v.	Central	1.207	(0.977-1.491)	0.080	0.697	(0.630-0.771)	<0.001	0.583	(0.482-0.707)	<0.001
	West	v.	Central	1.359	(1.084-1.703)	0.008	1.175	(1.055-1.310)	0.004	1.275	(1.041-1.561)	0.019
	West	v.	Prairies	1.126	(0.857-1.478)	0.394	1.687	(1.474-1.931)	<0.001	2.185	(1.696-2.816)	<0.001
Spending Money	$1 to $20	v.	Zero	1.478	(1.181-1.848)	0.001	1.512	(1.356-1.686)	<0.001	1.091	(0.876-1.358)	0.438
	$21+	v.	Zero	1.326	(1.181-1.848)	0.001	1.652	(1.488-1.835)	<0.001	1.706	(1.403-2.075)	<0.001
	Not Stated	v.	Zero	1.010	(0.778-1.311)	0.941	0.937	(0.828-1.060)	0.301	0.772	(0.602-0.989)	0.041
	$21+	v.	$1 to $20	0.897	(0.733-1.098)	0.292	1.093	(1.003-1.190)	0.041	1.564	(1.327-1.844)	<0.001
	Not Stated	v.	$1 to $20	0.683	(0.546-0.855)	0.001	0.620	(0.557-0.690)	<0.001	0.708	(0.565-0.886)	0.003
	Not Stated	v.	$21+	0.762	(0.600-0.967)	0.025	0.567	(0.513-0.627)	<0.001	0.452	(0.371-0.552)	<0.001
Smoking	Experimental	v.	Never Smoker	1.847	(1.345-2.536)	<0.001	8.578	(7.789-9.446)	<0.001	16.944	(14.487-19.817)	<0.001
	Ever Smoker	v.	Never Smoker	0.662	(0.254-1.725)	0.399	14.292	(12.258-16.663)	<0.001	57.206	(47.223-69.299)	<0.001
	Experimental	v.	Ever Smoker	2.788	(1.027-7.569)	0.044	0.600	(0.505-0.713)	<0.001	0.296	(0.242-0.363)	<0.001
			Ever Binged on Alcohol	1.720	(1.403-2.108)	<0.001	7.361	(6.841-7.920)	<0.001	9.915	(8.510-11.552)	<0.001
			Reference Category	*Ref: Substance Abstinence*			*Ref: Substance Abstinence*			*Ref: Substance Abstinence*		

Reference List

[1] Foster K, Spencer D. 'It's just a social thing': Drug use, friendship and borderwork among marginalized young people. Int J Drug Policy 2013;24(3):223-230.

[2] Kirst M, Mecredy G, Chaiton M. The prevalence of tobacco use co-morbidities in Canada. Can J of Public Health 2013;104(3):e210-e215.

[3] Whitesell NR, Asdigian NL, Kaufman CE, Big Crow C, Shangreau C, Keane EM, et al. Trajectories of Substance Use Among Young American Indian Adolescents: Patterns and Predictors. J Youth Adolesc 2014;43(3):437-453.

[4] Werb D, Kerr T, Buxton J, Shoveller J, Richardson C, Montaner J, et al. Crystal methamphetamine and initiation of injection drug use among street-involved youth in a Canadian setting. CMAJ 2013;185(18):1569-1575.

[5] Gruskin S, Plafker K, Smith-Estelle A. Understanding and responding to youth substance use: The contribution of a health and human rights framework. Am J Public Health 2001;91(12):1954-1963.

[6] Canadian Centre on Substance Abuse. Canadian Drug Summary: Prescription Opioids. 2013; Available at: http://nnadaprenewal.ca/wp-content/uploads/2013/03/3-CCSA-Prescription-Opioids-2013-en.pdf. Accessed November 10, 2013.

[7] Senate & House of Commons of Canada. Controlled Drugs & Substances Act. 1996.

[8] United States Food and Drug Administration. Combating Misuse and Abuse of Prescription Drugs: Q&A with Michael Klein, Ph.D. Consumer Health Information USFDA. 2010; Available at http://www.fda.gov/ForConsumers/ConsumerUpdates/ucm220112.htm. Accessed August 28, 2014.

[9] Rehm J, Gnam W, Popova S, Baliunas D, Brochu S, Fischer B, et al. The costs of alcohol, illegal drugs, and tobacco in Canada, 2002. J Stud Alcohol Drugs 2007;68(6):886-895.

[10] Pirie T, Jesseman R, Di Gioacchino L, National Treatment Indicators Working Group. National treatment Indicators Report:2010-2011 Data. 2013; Available at http://www.ccsa.ca/Resource%20Library/NTS-2014-National-Treatment-Indicators-Report-en.pdf. Accessed September 24, 2014.

[11] Fischer B, Argento E. Prescription opioid related misuse, harms, diversion and interventions in Canada: a review. Pain Physician 2012;15(3 Suppl):ES191-203.

[12] Fischer B, Jones W, Rehm J. Trends and changes in prescription opioid analgesic dispensing in Canada 2005-2012: An update with a focus on recent interventions. BMC Health Serv Res 2014;14.

[13] Fischer B, Rehm J, Goldman B, Popova S. Non-medical use of prescription opioids and public health in Canada: An urgent call for research and interventions development. Can J of Public Health 2008;99(3):182-184.

[14] Brands B, Paglia-Boak A, Sproule BA, Leslie K, Adlaf EM. Nonmedical use of opioid analgesics among Ontario students. Can Fam Physician 2010;56(3):256-262.

[15] Fischer B, Gooch J, Goldman B, Kurdyak P, Rehm J. Non-medical prescription opioid use, prescription opioid-related harms and public health in Canada: An update 5 years later. Can J of Public Health 2014;105(2):e146-e149.

[16] Antoniou T, Juurlink DN. Dextromethorphan Abuse. CMAJ 2014.

[17] Amaladoss A, Brien SO. Cough syrup psychosis. CJEM 2011;13(1):53-56.

[18] Gershman JA, Fass AD. Dextromethorphan abuse: A literature review. J Pharm Technol 2013;29(2):66-71.

[19] Boak A, Hamilton HA, Mann RE. Drug use among Ontario students, 1977-2013: Detailed OSDUHS findings (CAMH Research Document Series No. 36) Toronto, ON: Centre for Addition and Mental Health.

[20] Blakemore S, Choudhury S. Development of the adolescent brain: Implications for executive function and social cognition. J Child Psychol Psychiatry 2006;47(3-4):296-312.

[21] Hare TA, Tottenham N, Galvan A, Voss HU, Glover GH, Casey BJ. Biological Substrates of Emotional Reactivity and Regulation in Adolescence During an Emotional Go-Nogo Task. Biol Psychiatry 2008;63(10):927-934.

[22] Casey BJ, Jones RM, Hare TA. The adolescent brain. Ann N Y Acad Sci 2008;1124:111-126.

[23] Steinberg L. Adolescence. 6th ed. New York: McGraw-Hill; 2002.

[24] Burghardt LC, Ayers JW, Brownstein JS, Bronstein AC, Ewald MB, Bourgeois FT. Adult prescription drug use and pediatric medication exposures and poisonings. Pediatrics 2013;132(1):18-27.

[25] Dalsgaard S, Mortensen PB, Frydenberg M, Thomsen PH. ADHD, stimulant treatment in childhood and subsequent substance abuse in adulthood - A naturalistic long-term follow-up study. Addict Behav 2013.

[26] Pasch KE, Velazquez CE, Cance JD, Moe SG, Lytle LA. Youth Substance Use and Body Composition: Does Risk in One Area Predict Risk in the Other? J Youth Adolesc 2012;41(1):14-26.

[27] Huang DYC, Lanza HI, Wright-Volel K, Anglin MD. Developmental trajectories of childhood obesity and risk behaviors in adolescence. J Adolesc 2013;36(1):139-148.

[28] Trenz RC, Scherer M, Harrell P, Zur J, Sinha A, Latimer W. Early onset of drug and polysubstance use as predictors of injection drug use among adult drug users. Addict Behav 2012;37(4):367-372.

[29] De Graaf R, Radovanovic M, Van Laar M, Fairman B, Degenhardt L, Aguilar-Gaxiola S, et al. Early cannabis use and estimated risk of later onset of depression spells: Epidemiologic evidence from the population-based world health organization world mental health survey initiative. Am J Epidemiol 2010;172(2):149-159.

[30] Schmid B, Hohm E, Blomeyer D, Zimmermann US, Schmidt MH, Esser G, et al. Concurrent alcohol and tobacco use during early adolescence characterizes a group at risk. Alcohol Alcohol 2007;42(3):219-225.

[31] Burkhalter R, Cumming T, Rynard V, Manske S. 2012/2013 Youth Smoking Survey Microdata User Guide. Waterloo, Ontario: Propel Centre for Population Health Impact, University of Waterloo, 2013; 1-47.

[32] Health Canada. Summary of Results of the Youth Smoking Survey; Available at http://www.hc-sc.gc.ca/hc-ps/tobac-tabac/research-recherche/stat/_survey-sondage_2012-2013/result-eng.php. Accessed August 3, 2014.

[33] Ford JA. Nonmedical prescription drug use among adolescents: The influence of bonds to family and school. Youth Soc 2009;40(3):336-352.

[34] Currie CL, Wild TC. Adolescent Use of prescription drugs to get high in Canada. Can J Psychiatry 2012;57(12):745-751.

[35] Acquavita SP, McClure EA, Hargraves D, Stitzer M. Environmental tobacco smoke exposure among smokers and non-smokers receiving outpatient substance abuse treatment. Addict Behav 2014;39(12):1718-1722.

[36] Canadian Centre on Substance Abuse Student Drug Use Surveys Working Group. The Value of student alcohol and drug use surveys; Available at http://www.ccsa.ca/Resource%20Library/SDUS-Value-en.pdf. Accessed September 25, 2014.

[37] National Advisory Committee on Prescription Drug Misuse. First do no harm: Responding to Canada's prescription drug crisis; Available at http://www.ccsa.ca/Resource%20Library/Canada-Strategy-Prescription-Drug-Misuse-Report-en.pdf. Accessed October 3, 2013.