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Characterizing polysubstance use: What do we know about use of cigarettes, vaping products, cannabis, and alcohol among Canadians?

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Release date: April 19, 2023



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DOI: <https://www.doi.org/10.25318/82-003-x202300400002-eng>

ABSTRACT

Introduction

Polysubstance use—the use of multiple substances on the same or different occasions—is a risk factor for substance use disorder. However, national surveillance of substance use in Canada has often focused on use of a single substance. To better understand and address polysubstance use, this study characterized the use of vaping products, cigarettes, inhaled cannabis, and alcohol among Canadians aged 15 years and older.

Methods

Nationally representative data from the 2020 Canadian Tobacco and Nicotine Survey were analyzed. Polysubstance use was assessed as use of at least two of the following in the past 30 days: smoking cigarettes, using vaping products (containing nicotine or flavours), using cannabis (in smoked and/or vaped form) and drinking alcohol (daily or weekly frequency).

Results

In 2020, past-30-day use of the examined substances was 4.7% for vaping products (1.5 million), 10.3% for cigarettes (3.2 million), 11.0% for inhaled cannabis (3.4 million), and 37.6% for weekly or daily use of alcohol (11.7 million). Polysubstance use was reported by 12.2% of Canadians (3.8 million) and was more prevalent among young Canadians, men and those who vaped. The most common combination of substances among polysubstance users included inhaled cannabis and weekly or daily use of alcohol (29.0%, or 1.1 million).

Conclusion

The use of vaping products, cigarettes, inhaled cannabis, and alcohol—individually and in combination—is substantial among Canadians. Frequent consumption of alcohol was most prevalent overall and, in contrast to the other examined substances, was common among Canadians of all ages. Findings may inform a polysubstance use approach for prevention policies and programs.

Keywords

substance use, polysubstance use, substance use disorder

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Polysubstance use refers to the use of more than one substance on the same or different occasions.¹ Polysubstance use is a recognized risk factor (among others) for developing substance use disorder, defined as the cluster of cognitive, behavioural and physiological symptoms indicating continued substance use despite severe substance-related problems.^{1,2} In particular, polysubstance use during adolescence is linked with adverse outcomes later in life, including substance use disorder and mental health disorders.^{1,3,4}

Despite this evidence, national surveillance of substance use in Canada often focuses on use of a single substance,⁵⁻⁷ and this may obscure the complexity and interrelationships of substance use behaviour. Notable exceptions are analyses of substance use among Canadian youth using nationally representative surveys, which have shown substantial use of alcohol, tobacco, cannabis, and drugs in 2004, 2006 and 2008/2009,^{8,9} as well as the COMPASS prospective cohort study, which has shown increasing trends in youth polysubstance use (including use of alcohol, cigarettes, cannabis, and e-cigarettes) from 2013/2014 to 2017/2018.¹⁰

Given the health risks associated with polysubstance use, and the lack of recent national data encompassing Canadians of various ages, the current analysis aimed to characterize polysubstance use among the Canadian population aged 15 years and older.

Methods

Data source

Nationally representative data from the 2020 Canadian Tobacco and Nicotine Survey (CTNS) were analyzed.¹¹ The CTNS is a general population survey of tobacco, vaping, alcohol and cannabis use among Canadians aged 15 years and older in all 10 provinces. Data were collected between December 8, 2020, and January 16, 2021, from 8,112 respondents, weighted to represent 31.3 million Canadians.

Measures

The CTNS uses the question “During the past 30 days, how often did you _____?” to consistently assess use of substances, including smoking cigarettes, vaping (e-liquid with or without nicotine; excludes cannabis), smoking cannabis, vaping cannabis and drinking alcoholic beverages. Response options included daily; less than daily, but at least once a week; less than weekly, but at least once in the past month; and not at all. Smoking and vaping cannabis were combined to generate a variable assessing use of cannabis in smoked and/or vaped form (i.e., inhaled cannabis). Use of cigarettes, use of inhaled cannabis, and use of vaping products were each recoded into distinct dichotomous variables reflecting past-30-day use (daily, weekly and monthly frequency of use vs. no use). Given the widespread consumption of alcohol (64% of Canadians aged 15 years and older consumed alcohol in the past 30 days),¹¹ and the likelihood of overestimation of polysubstance use in assessing past-30-day alcohol use, a higher threshold was applied, producing a dichotomous variable reflecting daily or weekly frequency of use in the past 30 days (vs. monthly use or no use).

The number of substances used by Canadians in the past 30 days was also analyzed (none, one, two, three, four). Polysubstance use was assessed as the use of two or more substances in the past 30 days.

Analysis

The prevalence of substance use was examined by age group (youth aged 15 to 19, young adults aged 20 to 24, and adults aged 25 years and older), by gender (men and women) and among Canadians who reported use of the examined substances (as defined above). Pairwise comparisons were conducted using z-tests, with a p-value set at < 0.05. Analyses were conducted using Stata 17.

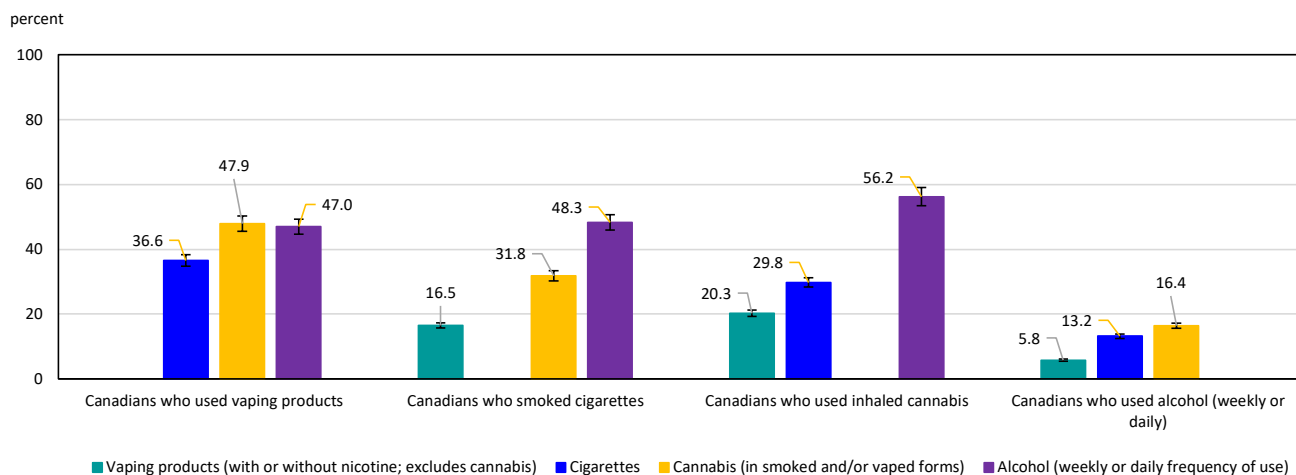
Table 1
Prevalence of substance use among Canadians aged 15 years and older, 2020

Characteristic	Prevalence of use in the past 30 days											
	Vaping products (with or without nicotine; excludes cannabis)			Cigarettes			Cannabis (in smoked or vaped forms)			Alcohol (weekly or daily frequency of use)		
	Weighted %	95% confidence interval		Weighted %	95% confidence interval		Weighted %	95% confidence interval		Weighted %	95% confidence interval	
		from	to		from	to		from	to		from	to
Overall	4.7	4.1	5.2	10.3	9.4	11.2	11.0	10.1	11.8	37.6	36.2	38.9
Gender												
Men	5.7	4.7	6.6	12.1	10.7	13.4	14.1	12.8	15.5	41.3	39.3	43.2
Women	3.6	3.0	4.3	8.6	7.5	9.7	7.9	6.9	8.9	34.0	32.1	35.8
Age group [years]												
Youth (15 to 19)	14.4	12.2	16.6	3.1	2.0	4.3	11.4	9.4	13.3	10.6	8.7	12.5
Young adults (20 to 24)	13.0	10.9	15.1	8.4	6.7	10.1	24.9	22.2	27.6	29.6	26.7	32.5
Adults (25 and older)	3.2	2.6	3.8	11.0	10.0	12.0	9.7	8.8	10.6	40.3	38.8	41.8

Notes: Analyses conducted using weighted data. Respondents with missing data are not included in weighted estimates.

Source: Canadian Tobacco and Nicotine Survey, 2020.

Figure 1
Prevalence of substance use among Canadians aged 15 years and older who reported use of the examined substances, 2020



Notes: Analyses conducted using weighted data. Respondents with missing data are not included in weighted estimates. Whiskers represent 95% confidence intervals.
Source: Canadian Tobacco and Nicotine Survey, 2020.

Results

Prevalence of substance use among Canadians aged 15 years and older

In 2020, among Canadians aged 15 years and older, 4.7% (1.5 million) used vaping products, 10.3% (3.2 million) smoked cigarettes, 11.0% (3.4 million) used inhaled cannabis, and 37.6% (11.7 million) consumed alcohol weekly or daily, in the past 30 days (see Table 1).

Past-30-day use of all examined substances was significantly higher among men compared with women and varied by age group. The use of vaping products was significantly higher among youth (14.4%) and young adults (13.0%), whereas use of inhaled cannabis was significantly higher among young adults (24.9%). The prevalence of cigarette smoking increased significantly with age: 3.1% among youth, 8.4% among young adults and 11.0% among adults. The prevalence of weekly or daily use of alcohol followed a similar pattern: 10.6% among youth, 29.6% among young adults and 40.3% among adults.

The prevalence of substance use among Canadians who reported use of the examined substances is shown in Figure 1. When substance use is examined across groups, the prevalence of vaping product use was significantly greater among Canadians who reported smoking cigarettes (16.5%) and who reported using inhaled cannabis (20.3%). The prevalence of cigarette smoking was significantly greater among those who reported vaping (36.6%) and those who reported using inhaled cannabis (29.8%). Use of inhaled cannabis was highest among those who reported vaping (47.9%), followed by those who reported cigarette smoking (31.8%), and lowest among those

who reported consuming alcohol weekly or daily (16.4%). Consumption of alcohol (weekly or daily) was significantly higher among those who reported inhaled cannabis use (56.2%).

With respect to substance use within groups, among the 1.5 million Canadians who reported vaping, the most commonly used substances were inhaled cannabis (47.9%) and alcohol (47.0%). Among the 3.2 million Canadians who reported past-30-day cigarette smoking, the most commonly used substance was weekly or daily consumption of alcohol (48.3%); the use of inhaled cannabis (31.8%) was also significantly higher than the use of vaping products (16.5%) among this subgroup. Among the 3.4 million Canadians who reported past-30-day use of inhaled cannabis, weekly or daily consumption of alcohol (56.2%) was most common. Among the 11.7 million Canadians who reported consuming alcohol weekly or daily in the past 30 days, 16.4% reported using inhaled cannabis, 13.2% reported smoking cigarettes and 5.8% reported using vaping products.

Number of substances used by Canadians aged 15 years and older

In 2020, 12.2% of Canadians (3.8 million) reported polysubstance use in the past 30 days. More specifically, 8.9% (2.8 million) used two substances, 2.8% (860,000) used three substances and 0.6% (176,000) used four substances (see Table 2). A majority of Canadians (52.6%, or 16.4 million) reported using none of the examined substances, and 35.2% (11.0 million) reported use of one substance, in the past 30 days.

The number of substances used (one, two, three and four) was significantly higher among men than women and varied by age group. The use of one substance increased significantly with

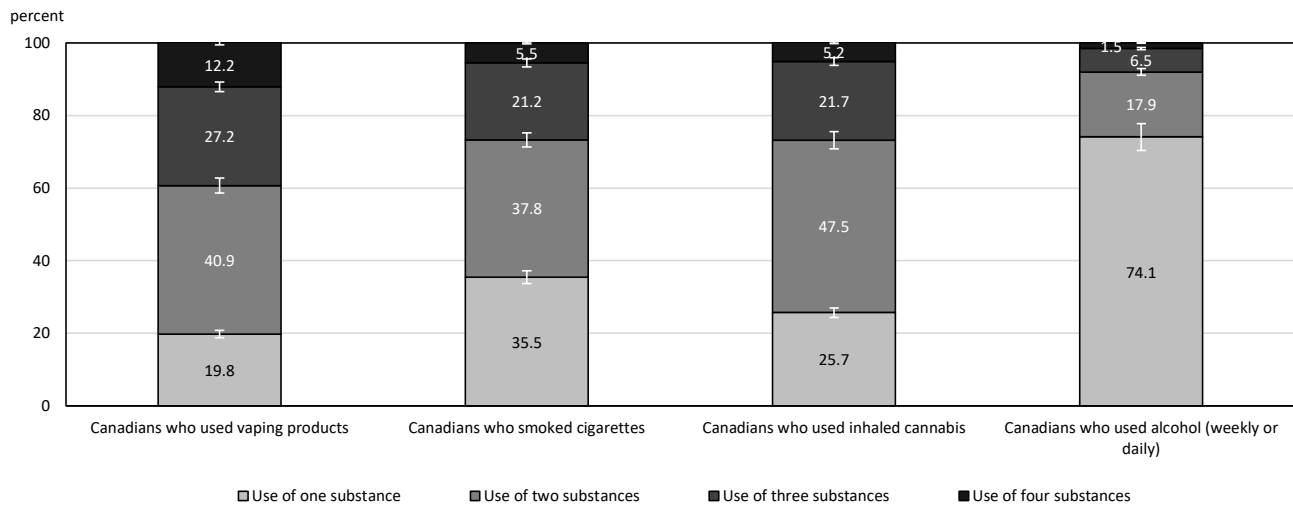
Table 2
Number of substances used by Canadians aged 15 years and older, 2020

Characteristic	Prevalence of use in the past 30 days														
	Use of zero substances			Use of one substance			Use of two substances			Use of three substances			Use of four substances		
	Weighted %	95% Confidence interval		Weighted %	95% Confidence interval		Weighted %	95% Confidence interval		Weighted %	95% Confidence interval		Weighted %	95% Confidence interval	
		from	to		from	to		from	to		from	to		from	to
Overall	52.6	51.3	54.0	35.2	33.9	36.5	8.9	8.1	9.6	2.8	2.3	3.2	0.6	0.3	0.9
Gender															
Men	47.4	45.4	49.4	37.5	35.5	39.5	10.7	9.5	11.9	3.5	2.9	4.3	0.9	0.5	1.6
Women	57.7	55.8	59.6	33.0	31.2	34.7	7.0	6.0	8.0	2.0	1.5	2.6	0.3	0.1	0.5
Age group [years]															
Youth (15 to 19)	77.6	75.0	80.2	11.4	9.4	13.4	6.3	4.9	7.7	3.5	2.2	4.7	1.2	0.5	1.9
Young adults (20 to 24)	53.0	49.8	56.2	26.1	23.2	28.9	14.3	12.1	16.6	5.5	4.1	6.9	1.1	0.5	1.8
Adults (25 and older)	50.7	49.2	52.3	37.8	36.3	39.2	8.6	7.7	9.5	2.5	1.9	3.0	0.5	0.1	0.8

Notes: Analyses conducted using weighted data. Respondents with missing data are not included in weighted estimates.

Source: Canadian Tobacco and Nicotine Survey, 2020.

Figure 2
Number of substances used among Canadians aged 15 years and older who reported use of the examined substances, 2020



Notes: Analyses conducted using weighted data. Respondents with missing data are not included in weighted estimates. Whiskers represent 95% confidence intervals.

Source: Canadian Tobacco and Nicotine Survey, 2020.

age: 11.4% among youth, 26.1% among young adults and 37.8% among adults. The use of two substances was highest among young adults (14.3%), followed by adults (8.6%) and youth (6.3%). The use of three substances was highest among young adults (5.5%), followed by youth (3.5%) and adults (2.5%). The use of four substances did not differ by age group.

The number of substances used among Canadians who reported use of the examined substances is shown in Figure 2. When substance use is examined across groups, the use of one substance was highest among Canadians who reported using alcohol weekly or daily (74.1%), followed by those who reported smoking cigarettes (35.5%), using inhaled cannabis (25.7%) and vaping (19.8%). The use of two substances and the use of three substances, respectively, were significantly higher among those who vaped (40.9% and 27.2%), those who smoked cigarettes (37.8% and 21.2%) and those who used inhaled

cannabis (47.5% and 21.7%). The use of four substances was highest among those who vaped (12.2%) and lowest among those who consumed alcohol weekly or daily (1.5%).

With respect to substance use within groups, use of two substances was most common among Canadians who reported vaping (40.9%) and among those who used inhaled cannabis (47.5%). Among Canadians who reported cigarette smoking, use of one (35.5%) or two (37.8%) substances was most common. Use of one substance was most common among Canadians who reported consuming alcohol weekly or daily (74.1%). Canadians who reported past-30-day use of vaping products reported the highest proportion of polysubstance use (80.2%), significantly greater than that reported by those who smoked cigarettes (64.5%), those who used inhaled cannabis (74.3%) and those who consumed alcohol weekly or daily (25.9%).

Substance use combinations

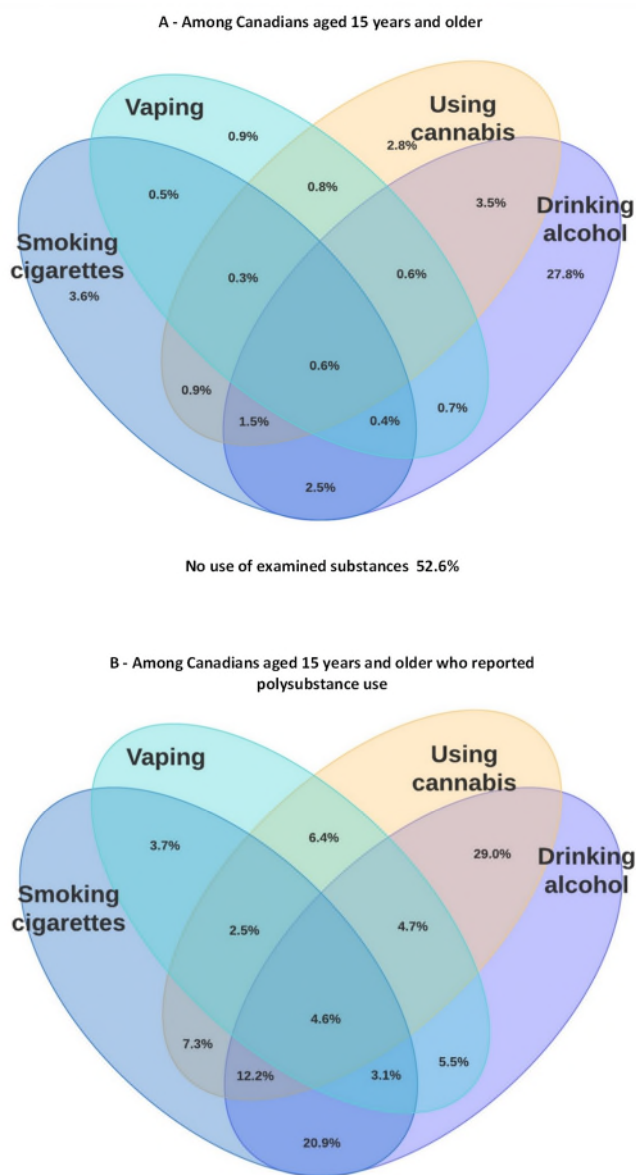
All combinations of examined substances used by Canadians are presented in Figure 3. Among Canadians aged 15 years and older, the most common form of substance use was exclusive consumption of alcohol, with weekly or daily frequency (27.8%, or 8.7 million). Among the 3.8 million Canadians who reported polysubstance use, the most common combination of substances included inhaled cannabis and weekly or daily consumption of alcohol (29.0%, or 1.1 million).

Discussion

The use of substances, including vaping products, cigarettes, inhaled cannabis, and alcohol, is substantial among the Canadian population: approximately half of Canadians aged 15 years and older reported past-30-day use of at least one of these substances in 2020.

The prevalence of substance use among Canadians varied by age group: vaping products were most commonly used by youth and young adults, inhaled cannabis by young adults, and

Figure 3
Prevalence of specific substance use combinations, 2020



Notes: Analyses conducted using weighted data. Respondents with missing data are not included in weighted estimates.
Source: Canadian Tobacco and Nicotine Survey, 2020.

cigarettes by adults. Factors that vary across stages of life or age cohorts, such as accessibility of products, exposure to promotions and product perceptions (e.g., appeal, harm, social acceptability), may be influencing use of specific substances, particularly following the recent legalization of cannabis and nicotine vaping products in Canada.¹¹⁻¹⁴ In contrast, frequent consumption of alcohol was the most prevalent substance overall, and its use increased with age. The findings suggest that policies and programs addressing substance use may consider targeting substance-specific messages for particular age groups (such as for youth, young adults and adults), in addition to addressing alcohol consumption across the lifespan.

Study findings showing rates of substance use among Canadians who reported use of cigarettes, vapes, inhaled cannabis, or alcohol are consistent with research showing the clustering of modifiable health behaviours, including substance use.^{8,15,16} Among Canadians who reported use of cigarettes, vapes or inhaled cannabis, alcohol was the most commonly co-used substance.

In 2020, 3.8 million Canadians engaged in polysubstance use, reporting past-30-day use of at least two of the examined substances. Polysubstance use was higher among men than women and was concentrated among youth and young adults; this may reflect greater propensity for experimentation.¹ Future research may examine the frequency of substance use among these subpopulations more precisely (e.g., daily or weekly frequency) to capture use patterns that may be more regular and, thus, more likely to impact health. Polysubstance use varied among Canadians who reported use of the examined substances, with the highest rate observed among Canadians who used vaping products. This may reflect underlying characteristics of this subpopulation, given that vaping is concentrated among groups known to engage in other substance use, such as young Canadians, among whom experimentation is common,¹ as well as adults, who cite smoking cessation as the most common reason for vaping.¹¹

Study findings may have policy implications. High rates of polysubstance use among Canadian youth and young adults suggest targeting prevention efforts for these groups. Programs and policies aimed at prevention may benefit from addressing use of multiple substances (i.e., including content regarding vaping products, cannabis, alcohol and cigarettes), rather than

just a single substance. To the extent that use of substances clusters⁸ and risk factors for substance use may be common across substances,¹⁸ addressing use of multiple substances may enhance the power and cost effectiveness of prevention efforts. Such efforts could focus on substance use or expand to consider other risk factors for physical and mental health. This may result in better alignment between prevention efforts and the health profile of Canadian students, a majority of whom exhibit two or more modifiable risk factors for chronic disease,¹⁵ and many of whom report symptoms of anxiety and depression.¹⁹

A key strength of this analysis is the use of measures that employ a consistent timeframe (past 30 days), allowing for comparability. However, given measures were not necessarily aligned with advice regarding lower-risk use of substances,^{20,21,22} caution is warranted when interpreting the results. The results are reflective of only a subset of substances, since the analysis did not examine illicit drugs. In addition, examination of cannabis use was limited to smoked and/or vaped forms, excluding edibles; thus, total cannabis use may be underestimated. Responses were self-reported, and this may make them subject to bias. Results are cross-sectional, meaning temporality of substance use could not be assessed. Lastly, data are lacking regarding the context of polysubstance use (e.g., whether substances were used at the same time or at different times, whether respondents were experimenting or regularly using substances in the past 30 days).

Conclusion

Despite its health risks, national surveillance of polysubstance use in Canada has been limited. The study findings address this gap, providing a current snapshot showing that the use of vaping products, cigarettes, inhaled cannabis, and alcohol—individually and in combination—is substantial among Canadians aged 15 years and older. Frequent consumption of alcohol was most prevalent overall and, in contrast to the other examined substances, was common among Canadians of all ages. Polysubstance use was higher among men, young Canadians and those who vaped. Findings may inform a polysubstance use approach for prevention policies and programs.

References

- Leyton M & Stewart S (Eds). Substance abuse in Canada: Childhood and adolescent pathways to substance use disorders. Ottawa, ON: *Canadian Centre for Substance Abuse*; 2014.
- American Psychiatric Association. *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC; 2013.
- Conway KP, Vullo GC, Nichter B, Wang J, Compton WM, Iannotti RJ, et al. Prevalence and patterns of polysubstance use in a nationally representative sample of 10th graders in the United States. *Journal of Adolescent Health* 2013;52(6):716-723.
- Moss HB, Chen CM, Yi H. Early adolescent patterns of alcohol, cigarettes, and marijuana polysubstance use and young adult substance use outcomes in a nationally representative sample. *Drug and Alcohol Dependence* 2014;136:51-62.
- Government of Canada. *Canadian Alcohol and Drugs Survey* [Internet]. Ottawa (ON): Government of Canada; [cited 2022 November 4]. Available from: <https://www.canada.ca/en/health-canada/services/canadian-alcohol-drugs-survey.html>
- Government of Canada. *Canadian Tobacco and Nicotine Survey* [Internet]. Ottawa (ON): Government of Canada; [cited 2022 November 4]. Available from: <https://www.canada.ca/en/health-canada/services/canadian-tobacco-nicotine-survey.html>
- Government of Canada. *Canadian Student Tobacco, Alcohol and Drugs Survey* [Internet]. Ottawa (ON): Government of Canada; [cited 2022 November 4]. Available from: <https://www.canada.ca/en/health-canada/services/canadian-student-tobacco-alcohol-drugs-survey.html>
- Leatherdale ST, Ahmed R. Alcohol, marijuana, and tobacco use among Canadian youth: Do we need more multi-substance prevention programming? *Journal of Primary Prevention* 2010;31:99-108.
- Leatherdale ST, Burkhalter R. The substance use profile of Canadian youth: Exploring the prevalence of alcohol, drug and tobacco use by gender and age. *Addictive Behaviors* 2012;37:318-322.
- Zuckermann AME, Williams G, Battista K, de Groh M, Jiang Y, Leatherdale ST. Trends of poly-substance use among Canadian youth. *Addictive Behaviors Reports* 2019;10:100189.
- Government of Canada. *Canadian Tobacco and Nicotine Survey (CTNS): Summary of results for 2020* [Internet]. Ottawa (ON): Government of Canada; [cited 2022 May 10]. Available from: <https://www.canada.ca/en/health-canada/services/canadian-tobacco-nicotine-survey/2020-summary.html>
- Government of Canada. *Cannabis Act* [Internet]. Ottawa (ON): Government of Canada; 2018 [cited 2022 May 5]. Available from: <https://laws-lois.justice.gc.ca/eng/acts/C-24.5/>
- Government of Canada. *Tobacco and Vaping Products Act* [Internet]. Ottawa (ON): Government of Canada; 2018 [cited 2022 May 5]. Available from: <https://laws-lois.justice.gc.ca/eng/acts/T-11.5/>
- Government of Canada. *Canadian Cannabis Survey 2021: Summary*. [Internet]. Ottawa (ON): Government of Canada; 2021 [cited 2022 May 30]. Available from: <https://www.canada.ca/en/health-canada/services/drugs-medication/cannabis/research-data/canadian-cannabis-survey-2021-summary.html>
- Leatherdale ST, Rynard V. A cross-sectional examination of modifiable risk factors for chronic disease among a nationally representative sample of youth: Are Canadian students graduating high school with a failing grade for health? *BMC Public Health* 2013;13:569.
- Noble N, Paul C, Turon H, Oldmeadow C. Which modifiable health risk behaviours are related? A systematic review of the clustering of Smoking, Nutrition, Alcohol and Physical Activity ('SNAP') health risk factors. *Preventive Medicine* 2015;81:16-41.
- Zuckermann AME, Williams GC, Battista K, Jiang Y, de Groh M, Leatherdale ST. Prevalence and correlates of youth poly-substance use in the COMPASS study. *Addictive Behaviors* 2020;170:106400.
- Terzian MA, Andrews KN, Anderson Moore K. *Preventing multiple risky behaviors among adolescents: Seven strategies*. 2011. http://www.childtrends.org/wp-content/uploads/2011/09/Child_Trends-2011_10_01_RB_RiskyBehaviors.pdf
- Williams GC, Patte KA, Ferro MA, Leatherdale ST. Substance use classes and symptoms of anxiety and depression among Canadian secondary school students. *Health Promotion and Chronic Disease Prevention in Canada* 2021;41(5):153-164.
- Centre for Addiction and Mental Health (CAMH) Nicotine Dependence Service. Lower-Risk Nicotine Use Guidelines. [Internet]. Toronto (ON): *Centre for Addiction and Mental Health*; [cited 2022 May 30]. Available from: <https://www.nicotinedependenceclinic.com/en/Pages/Lower-Risk-Nicotine-Use-Guidelin%E2%80%8Bes.aspx>
- Centre for Addiction and Mental Health (CAMH). Canada's Lower-Risk Cannabis Use Guidelines. [Internet]. Toronto (ON): *Centre for Addiction and Mental Health*; [cited 2022 May 30]. Available from: <https://www.camh.ca/-/media/files/pdfs---reports-and-books---research/canadas-lower-risk-guidelines-evidence-brief-2019.pdf>
- Canadian Centre on Substance Use and Addiction (CCSA). Canada's Low-Risk Alcohol Drinking Guidelines. [Internet]. Ottawa (ON): *Canadian Centre on Substance Use and Addiction*; [cited 2022 May 30]. Available from: <https://www.ccsa.ca/canadas-low-risk-alcohol-drinking-guidelines-brochure>