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Chronic Health Conditions and Substance Use Among Canadian Youth: A Nationally Representative Study

Problèmes de santé chroniques et usage de substances chez les jeunes Canadiens : étude représentative à l'échelle nationale

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Abstract

Background: This study compared prevalence of youth substance use by gender and type of chronic health condition (CHC); estimated gender-stratified odds of substance use across CHCs; and, contrasted effect sizes across CHCs and genders.

Methods: Data come from 13,580 youth 12 to 17 years in the 2019 Canadian Health Survey on Children and Youth (48.7% girls). CHC was categorized as none (38.4%), physical only (39.8%), mental only (2.7%), neurodevelopmental only (6.7%), and multiple CHCs (MCHC; 12.4%). Multiple CHCs was defined as having ≥1 physical condition and ≥1 mental or neurodevelopmental condition. Youth self-reported alcohol, tobacco, e-cigarette, and cannabis use and gender identity (boy/girl; sparse data prevented inclusion of gender-diverse).

Results: Overall, 29.4% of youth used ≥1 substance. Girls were more likely to be occasional or regular consumers of alcohol (26.4% vs. 24.3%; $P < 0.01$), but boys were more likely to be frequent e-cigarette (7.2% vs. 5.2%; $P < 0.01$) and cannabis users (3.0% vs. 1.8%; $P < 0.01$). Prevalence was lowest for youth with no CHC or physical only and highest for youth with mental only or MCHC. Among girls, all CHCs were associated with increased odds of substance use (vs. no CHC; OR = 1.3 to 14.6; $P < 0.05$); whereas for boys, odds of substance use were increased among mental only, neurodevelopmental only, and MCHC (OR = 1.3 to 6.0; $P < 0.05$). Effect sizes for MCHC were typically significantly larger compared to physical only, but not when compared to mental or neurodevelopmental only. Effect sizes were also significantly larger for mental only compared to physical only. Associations between CHCs and substance use were typically larger for girls compared to boys.

Conclusions: Youth with CHCs, especially mental only, neurodevelopmental only, or MCHC are more likely to report substance use. Gender differences exist; magnitudes of association are larger for girls compared to boys.

RÉSUMÉ

Contexte : Cette étude a comparé la prévalence de l'usage de substances chez les jeunes selon le sexe et le type de problème de santé chronique (PSC); la probabilité estimée d'usage de substances selon le sexe pour différents PSC; et l'ampleur de l'effet comparée selon les PSC et le sexe.

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Méthodes : Les données proviennent de 13 580 jeunes âgés de 12 à 17 ans ayant participé à l'Enquête canadienne sur la santé des enfants et des jeunes de 2019 (48,7 % de filles). Le problème de santé chronique a été classé dans les catégories « aucun problème » (38,4 %), « problème physique uniquement » (39,8 %), « problème mental uniquement » (2,7 %), « problème neurodéveloppemental uniquement » (6,7 %) et « problèmes de santé chroniques multiples » (PSCM; 12,4 %). La catégorie « problèmes de santé chroniques multiples » a été définie comme le fait d'avoir au moins un problème physique et au moins un problème mental ou neurodéveloppemental. Les jeunes ont autodéclaré leur usage d'alcool, de tabac, de cigarette électronique, de cannabis et leur identité de genre (garçon/fille; en raison de la rareté des données, la diversité de genre n'a pas pu être incluse).

Résultats : Globalement, 29,4 % des jeunes ont consommé au moins une substance. Les filles étaient plus susceptibles d'être des consommatrices occasionnelles ou régulières d'alcool (26,4 % par rapport à 24,3 %; $p < 0,01$), mais les garçons étaient plus susceptibles d'être des consommateurs fréquents de cigarette électronique (7,2 % par rapport à 5,2 %; $p < 0,01$) et de cannabis (3,0 % par rapport à 1,8 %; $p < 0,01$). La prévalence était la plus faible chez les jeunes qui n'avaient pas de PSC ou qui avaient un problème physique uniquement, et la plus élevée chez les jeunes ayant un problème mental uniquement ou des PSCM. Parmi les filles, tous les PSC ont été associés à une augmentation de la probabilité de faire usage de substances (par rapport à la catégorie « aucun problème »; RC = 1,3 à 14,6; $p < 0,05$); chez les garçons, en revanche, la probabilité de faire usage de substances était plus élevée chez ceux ayant un problème mental uniquement, neurodéveloppemental uniquement et des PSCM (RC = 1,3 à 6,0; $p < 0,05$). En général, l'ampleur de l'effet pour la catégorie « PSCM » était significativement plus élevée que celle de la catégorie « problème physique uniquement », mais pas en comparaison avec la catégorie « problème mental uniquement » ou « problème neurodéveloppemental uniquement ». De même, l'ampleur de l'effet était significativement plus élevée pour la catégorie « problème mental uniquement » que pour la catégorie « problème physique uniquement ». Le lien entre les PSC et l'usage de substances était généralement plus fort chez les filles que chez les garçons.

Conclusions : Les jeunes atteints de PSC, en particulier d'un problème mental uniquement, d'un problème neurodéveloppemental uniquement ou de PSCM, sont plus susceptibles de déclarer faire usage de substances. Il existe des différences entre les sexes; l'ampleur du lien est plus grande chez les filles que chez les garçons.

Keywords
adolescent, chronic disease, gender, morbidity, multimorbidity, substance use

Introduction

Substance use commonly emerges during early adolescence, with alcohol, e-cigarettes/tobacco, and cannabis being the most frequently used substances among young Canadians—22%, 15%, and 12% of youth 12 to 18 years reported using these substances in the past month, respectively.[1] While data from the Ontario Student Drug Use and Health Survey (OSDUHS) show significant downward trends between 1999 and 2025 for past-year substance use among youth 12 to 18 years (e.g., alcohol: 66% to 32%, tobacco: 28% to 4%, cannabis: 28% to 12%), prevalence remains concerning, including that of polysubstance use—53% of youth aged 12 to 18 years who were current substance users, reported using ≥2 substances.[2–4] Recent national and international surveillance shows that experimentation with e-cigarettes/vaping products is widespread and that indicators of nicotine dependence among youth aged 16 to 19 years who use e-cigarettes have increased markedly since 2017, exceeding those observed among those who smoke.[5,6] For instance, in 2022, the mean number of days in the past month in which e-cigarette users vaped was significantly higher compared to the number of days tobacco users smoked (17.5 vs. 11.4) and e-cigarette users were more likely to perceive themselves as "very addicted" compared to tobacco users (28% vs. 16%).[6] In Canada, surveillance data shows dynamic transitions toward increasing polysubstance use during adolescence, with evidence showing that secondary school students were nearly twice as likely to engage in polysubstance use (alcohol, tobacco, e-cigarettes, cannabis) in 2018 compared to 2013.[7,8] Youth substance use is a pressing public health concern.

Intersecting with the high prevalence of youth substance use is the high burden of chronic health conditions (CHCs; conditions which have been diagnosed by a health professional and are expected to last or have lasted at least 6 months) in this population. Recent Canadian estimates show that 49% of youth <18 years of age have a physical health condition and 18% have a mental health (not including substance use disorders) or neurodevelopmental condition.[9] Estimates among older youth (those aged 15-17 years) suggest an even higher prevalence—55% for physical, 12% for mental, and 17% for neurodevelopmental conditions.[10] Evidence shows that youth health is associated with substance use outcomes, and the nature of these associations is often nuanced by the

presence of co-occurring conditions.[11,12] Canadian epidemiological data showed that odds of alcohol use disorder and drug (excluding cannabis) use disorder were higher among young people 15 to 30 years with respiratory or endocrine conditions, though moderating effects were found such that the odds of substance use were higher in the presence of comorbid depressive disorder.[13] Another epidemiological study found that multiple CHCs (MCHC; specifically the co-occurrence of a physical and mental condition) were associated with a 46% and 38% higher odds of daily smoking and lifetime cannabis use, respectively, compared to youth 14 to 26 years with physical conditions only in Denmark.[14] The overlapping prevalence of substance use and CHCs suggests that a large proportion of youth are at increased risk for poor health, educational, and social outcomes and increased complexity of care.[15,16]

Despite accumulating evidence linking youth CHCs and substance use, gaps in knowledge remain. First, epidemiological studies investigating associations between CHCs and substance use have included both youth (<18 years) and young adults (18-30 years),[13] which may obscure the nature of associations across developmental periods. Second, previous studies in Canada used data collected prior to cannabis legalization and associations may not reflect the reality of increased access. Third, with few exceptions,[13,14] studies have focused on single classes of CHCs (i.e., physical, mental, neurodevelopmental), which prevented cross-condition comparisons, and did not consider the potential effects of co-occurring conditions, particularly those across classes (e.g., physical and mental). This latter point is salient given evidence that young people with MCHC and substance use disorder use a disproportionate amount of mental health services.[17] Fourth, given known gender differences across CHCs (males more likely to report having physical, neurodevelopmental, or multiple health conditions; females more likely to report mental health conditions or suicidality),[10,18] as well as in the prevalence and patterns of substance use (males more likely to report illicit substance use, cigarette smoking, and polysubstance use; females more likely to report synthetic cannabis use, alcohol use),[3,19–22] understanding how CHCs may be associated with youth substance use by gender remains understudied.

Thus, this study used representative Canadian data to estimate and compare prevalence of youth substance use by gender and type of CHC; estimate gender-stratified odds of substance use across different CHCs relative to youth with no CHCs; and contrast effect sizes across CHCs and genders.

Method

Source

The data source for this study is the 2019 Canadian Health Survey on Children and Youth (CHSCY), a cross-sectional, nationally representative survey conducted by Statistics Canada.[23] Data were collected using a multistage, random sampling design which leveraged the 2018 Canada Child Tax Benefit file as the sampling frame for children and youth aged 1 to 17 years living in private dwellings and excluded those residing on First Nations reserves, other Indigenous settlements, and residential institutions ($N = 91{,}796$). For each household, the person most knowledgeable (PMK) about their child completed a telephone or in-person interview with Statistics Canada personnel and provided information on the physical, mental, and neurodevelopmental health of enrolled children and youth ($n = 47{,}871$, 52.1%). Participation across the provinces ranged from 48.1% in Newfoundland and Labrador to 66.5% in Quebec.[23] The remaining provinces clustered between 50.2% and 55.4%. Participation from the territories was lower, at 30.9%. One child was selected per household. Substance use was assessed by youth self-report for those aged 12 to 17 years and the analytic sample was restricted to this subset of youth ($n = 14{,}168$). Statistics Canada obtained all required approvals to conduct the CHSCY and secured informed consent from participants. As publicly available de-identified data accessed under this framework,[24] this study did not require institutional research ethics review. PMK and youth surveys were completed independently and the Privacy Act guaranteed the confidentiality of participant data.

Measures

Chronic conditions and classification. PMKs reported whether their child had a CHC by responding to the question, "Has the child been diagnosed with any of the following long-term conditions?" PMKs were instructed that long-term conditions were those "that are expected or have already lasted six months or more and have been diagnosed by a health professional." The list of physical conditions was chronic headaches (occurring ≥1/week over the past 6 months) and lifetime diagnoses of allergies, asthma, diabetes, and epilepsy. PMKs also reported the height and weight of their child; Statistics Canada computed body mass index (BMI) and classified youth as underweight or having overweight/obesity. Although BMI has recognized limitations as a health indicator in children,[25] results were unchanged when BMI quartiles were used in the analyses. The list of mental conditions was lifetime diagnoses of anxiety, mood, and eating disorders. The list of neurodevelopmental conditions was lifetime diagnoses of learning disorders, attention-deficit/hyperactivity (ADHD), autism spectrum, and fetal alcohol spectrum disorders.

A second question about youth chronic conditions asked PMKs whether their child was diagnosed with "any other long-term physical, mental, developmental, or intellectual conditions." Responses to this question could not be disaggregated by condition (i.e., physical, mental or neurodevelopmental); thus, youth whose PMKs responded positively, but did not report any specific condition(s) were excluded ($n = 566$, 4.0%).

Youth were classified into mutually exclusive groups based on their CHC status: none, physical condition only, mental condition only, neurodevelopmental condition only, and MCHC. MCHCs were defined as having ≥1 physical condition and ≥1 mental or neurodevelopmental condition. Other forms of MCHC could not be disaggregated due to Statistics Canada privacy requirements surrounding sparse data.

Substance use. Categorizing youth on their use of alcohol, tobacco, e-cigarettes, and cannabis was based on classifications developed by Statistics Canada for use in national surveys.

Youth were asked if they had ever consumed alcohol and to report their consumption of alcohol over the past 12 months. The response options for 12-month alcohol use were: "Never," "Once a month or less," "2 to 3 times a month," or "At least once a week." Based on these responses, youth were classified according to their alcohol use as "Never had a drink of alcohol," "Did not drink in past 12 months," "Occasional drinker," or "Regular drinker" (Supplemental Material A).

Compiling responses from 4 questions on cigarette smoking (1—ever smoked cigarette; 2—lifetime smoked ≥100 cigarettes; 3—frequency of smoking in past 30 days; and 4—smoked cigarettes everyday for ≥1 month), youth smoking status was classified as "Never," "Experimental smoker," or "Current or former smoker" (Supplemental Material A).

Youth were asked if in the past 30 days they used an e-cigarette. Those who reported use of an e-cigarette were asked about the frequency of use in the past 30 days, with response options of "Less than once per week," "1 to 2 times per week," "3 to 5 times per week," or "Daily or almost daily." Due to sparse data, youth were reclassified according to their 30-day e-cigarette use as "Never," "≤2 times per week" or "≥3 times per week."

Youth reported whether they had ever used cannabis as, "No," "Yes, just once," or "Yes, more than once." They were also asked about the frequency of their 12-month and 3-month cannabis use. The response options for both frequency questions were "Never," "Once or twice," "1 to 3 times per month," "Weekly," or "Daily or almost daily." Sparse data required that response options be collapsed for analyses; thus, youth were reclassified as, "None," "Once or twice," "1 to 3 times per month," or "Weekly or more," regarding their frequency of 12-month and 3-month cannabis use.

To quantify polysubstance use, binary indicators for each substance were summed to classify youth according to the number of substances they reported using (0-4), an approach consistent with prior definitions.[3,8] While cigarettes and e-cigarettes are both related to nicotine use, there are markedly different epidemiological trends in youth cigarette smoking versus vaping,[26,27] perhaps due to different biopsychosocial factors/processes, which suggest that young people perceive these as different substances with different risks and were thus considered independent substances in computing polysubstance use.[28]

Gender. Analyses focused on youth gender because no study has investigated the extent to which associations between youth morbidity and substance use may differ across genders; gender identity more comprehensively captures the social experiences of youth compared to sex[29]; and evidence suggests that gender effects for substance use are larger than sex effects.[30–32] Youth self-identified their gender in response to the question, "What is your gender?" The CHSCY noted that, "Gender refers to current gender which may be different from sex assigned at birth and may be different from what is indicated on legal documents." The responses for this question were "male gender" (herein boy), "female gender" (herein girl), and "gender diverse." Statistics Canada privacy rules required that youth identifying as gender diverse ($n = 22$, 0.2%) be excluded.

Statistical Analysis

The final analytic sample comprised $n = 13{,}580$ youth. Categorical variables were compared across type of CHC and by gender using Rao-Scott χ^2 tests; youth age was compared across CHCs using analysis of variance. Logistic regression models estimated associations between type of CHC and any alcohol use (ever vs. never), any e-cigarette use (30-day vs. never), and any cannabis use (ever vs. never), stratified by gender. Multinomial regression was used for all other substance use outcomes. Odds ratios (ORs) and 95% confidence intervals (CIs) were computed. Models adjusted for factors identified *a priori* as a sufficient set of confounders available in the CHSCY—youth age, youth and parent ethnicity and immigration, parent education, and community size.[1,3,13,18] To compare effect sizes across CHCs and between genders, the method of variance estimate recovery (MOVER) was used.[33] MOVER uses the CIs of the ORs from the gender-stratified models to construct the CI surrounding the difference in ORs between boys and girls. MOVER CIs that do not include the null (i.e., 0), indicate a moderating effect of gender in associations between CHCs and substance use. Survey weights accounting for unequal selection probabilities and nonresponse were applied to obtain nationally representative estimates, and Statistics Canada bootstrap weights were used to compute variance estimates. Analyses were conducted in SAS 9.4. Reporting followed the STROBE guidelines.[34]

Results

Sample Characteristics

The average age of youth was 14.4 (2.3) years, 48.7% identified as girls, 35.5% reported being part of a racial and ethnic minoritized group, and 16.8% were immigrants. One-in-ten youth came from households with an income below the low-income measure. Approximately one-third of PMKs reported being part of a racial and ethnic minoritized group (32.2%) or

Table 1. Sample Characteristics by Type of Chronic Health Condition.

Characteristics	Total (n = 13,580)	None (n = 5,208)	Physical (n = 5,410)	Mental (n = 367)	Neurodev (n = 911)	MCHC (n = 1,684)	P
Youth							
Girl	48.7 (46.8, 50.6)	52.0 (50.2, 53.8)	48.1 (46.1, 50.1)	62.8 (60.9, 64.7)	35.1 (33.5, 36.7)	45.0 (43.4, 46.7)	<0.01
Age, years	14.4 (2.3)	14.3 (1.4)	14.4 (1.5)	14.8 (0.6)	14.4 (0.9)	14.8 (1.2)	<0.01
Racial and ethnic minoritized group	35.5 (34.4, 36.5)	38.6 (36.8, 40.3)	40.3 (38.3, 42.3)	21.5 (20.5, 22.6)	17.0 (16.1, 17.8)	21.8 (20.7, 22.9)	<0.01
Immigrant or permanent resident	16.8 (15.9, 17.6)	20.9 (19.5, 22.1)	18.6 (17.1, 20.0)	5.1 (4.7, 5.5)	6.3 (5.8, 6.8)	6.0 (5.6, 6.5)	<0.01
PMK							
Female	88.9 (88.1, 89.6)	87.9 (86.7, 89.2)	88.8 (86.1, 91.5)	92.0 (89.2, 94.8)	90.4 (87.6, 93.2)	90.0 (87.3, 92.8)	0.10
Racial and ethnic minoritized group	32.2 (31.1, 33.2)	35.8 (34.1, 37.5)	36.7 (34.7, 38.4)	15.3 (14.5, 16.1)	15.6 (14.8, 16.4)	17.2 (16.3, 18.1)	<0.01
Immigrant or permanent resident	34.1 (33.0, 35.2)	40.3 (38.5, 42.2)	38.6 (36.5, 40.7)	13.9 (13.1, 14.6)	13.1 (12.4, 13.8)	14.7 (14.0, 15.5)	<0.01
Partnered	79.8 (78.9, 80.8)	82.9 (81.5, 84.4)	80.6 (79.0, 82.2)	72.3 (70.0, 74.5)	73.6 (71.4, 75.7)	72.4 (70.1, 74.6)	<0.01
Bachelor's degree or above	38.7 (37.6, 39.8)	41.2 (39.4, 43.0)	39.6 (37.6, 41.5)	36.5 (34.6, 38.2)	32.3 (30.6, 33.8)	31.0 (29.4, 32.5)	<0.01
Below LICO	10.2 (9.5, 10.9)	9.7 (8.5, 10.8)	10.2 (8.5, 11.8)	10.2 (8.5, 11.9)	11.1 (9.5, 12.8)	12.0 (10.3, 13.6)	0.34
Community							
Number of residents							
< 1,000	18.0 (17.2, 18.9)	17.8 (16.5, 19.1)	16.9 (15.6, 18.2)	17.5 (16.2, 18.9)	20.9 (19.3, 22.5)	21.3 (19.7, 22.9)	<0.01
1,000–29,999	12.5 (11.8, 13.2)	12.2 (11.0, 13.4)	11.5 (10.4, 12.6)	13.1 (11.9, 14.4)	13.5 (12.2, 14.8)	15.3 (13.9, 16.8)	
30,000–99,999	8.2 (7.6, 8.8)	7.8 (6.8, 8.7)	8.4 (7.3, 9.4)	8.4 (7.4, 9.4)	6.5 (5.7, 7.2)	10.2 (8.9, 11.4)	
≥ 100,000	61.3 (60.2, 62.3)	62.2 (60.3, 64.3)	63.2 (61.3, 64.2)	60.9 (59.8, 62.0)	59.2 (58.2, 60.3)	53.3 (52.4, 54.2)	

LICO = low-income cutoff; MCHC = multiple chronic health conditions; PMK = person most knowledgeable.
Some of the data in this table have been published previously (https://doi.org/10.1038/s41598-026-38955-0). Data are reported as proportions and 95% confidence intervals, except for youth age, which is reported as mean and standard deviation.

immigrant (34.1%), and 38.7% had attained at least a bachelor's degree. CHCs were distributed as none (38.4%), physical only (39.8%), mental only (2.7%), neurodevelopmental only (6.7%), and MCHC (12.4%). A higher proportion of boys, compared to girls, were classified as neurodevelopmental only or MCHC; a higher proportion of girls were in the mental only group. Additional sample characteristics and differences across CHCs are shown in Table 1.

Prevalence of Substance

Overall, 29.4% of youth reported ever having used ≥1 substance. As shown in Table 2, 7.1% of youth reported regular alcohol use over the past 12 months, 2.5% reported being current or former smokers, and 6.3% reported using e-cigarettes ≥3 times/week over the past 30 days. Approximately 1-in-8 youth (12.7%) reported having tried cannabis and 2.4% reported using cannabis at least weekly in the past 3 months. A total of 15.2% were coded as polysubstance users. Gender differences were found such that girls were more likely to report being occasional or regular alcohol users (26.4% vs. 24.3%), but boys were more likely to report frequent e-cigarette (7.2% vs. 5.2%) and cannabis use (3.0% vs. 1.8%). No gender differences were found for lifetime tobacco or cannabis use, 12-month cannabis use, or polysubstance use.

Differences in the distribution of each substance use outcome were found across CHCs (Table 3). Prevalence was lowest and similar for youth with no CHCs or physical only, and prevalence was highest and similar for youth with mental only or MCHC. For instance, 37.8% of youth with mental only and 34.5% of youth with MCHC reported being occasional or regular alcohol users over the past 12 months; prevalence was also high for this outcome among youth with neurodevelopmental only (32.3%). Smoking (8.4%, 7.7%), e-cigarette use (9.5%, 11.7%), and cannabis use (21.1%, 17.3%) were also prevalent among youth with mental only or MCHC, respectively. Reported polysubstance use was

Table 2. Prevalence of Substance Use by Gender.

Substance	Total	Boys ($n = 6,967$)	Girls ($n = 6,613$)	*P*
Alcohol (12-month)				
Never	69.9 (68.9, 71.0)	71.0 (68.9, 73.1)	68.8 (66.6, 71.0)	<0.01
None	4.8 (4.3, 5.3)	4.8 (4.0, 5.5)	4.8 (4.1, 5.5)	
Occasional	18.2 (17.3, 19.1)	16.7 (15.4, 17.9)	19.8 (18.3, 21.2)	
Regular	7.1 (6.5, 7.8)	7.6 (6.7, 8.6)	6.6 (5.7, 7.5)	
Tobacco (ever)				
Never	94.8 (94.3, 95.3)	94.9 (92.7, 97.2)	94.7 (92.4, 97.0)	0.89
Experimental smoker	2.7 (2.3, 3.1)	2.6 (2.1, 3.1)	2.8 (2.2, 3.4)	
Current or former smoker	2.5 (2.1, 2.9)	2.5 (2.0, 3.0)	2.5 (2.0, 3.1)	
E-cigarettes (30-day)				
Never	86.9 (86.2, 87.7)	85.8 (83.6, 88.0)	88.1 (85.8, 90.4)	<0.01
≤2 times/week	6.8 (6.2, 7.4)	7.0 (6.1, 7.8)	6.7 (5.8, 7.6)	
≥3 times/week	6.3 (5.7, 6.8)	7.2 (6.4, 8.0)	5.2 (4.5, 5.9)	
Cannabis (ever)				
Never	87.3 (86.5, 88.1)	87.1 (84.9, 89.3)	87.5 (85.2, 89.8)	0.61
Once	3.9 (3.4, 4.3)	4.1 (3.5, 4.8)	3.6 (3.0, 4.2)	
≥1 time	8.8 (8.2, 9.5)	8.8 (7.8, 9.7)	8.9 (7.9, 9.9)	
Cannabis (12-month)				
None	89.1 (88.4, 89.9)	89.0 (86.8, 91.2)	89.3 (86.9, 91.6)	0.09
Once or twice	6.2 (5.6, 6.8)	6.0 (5.2, 6.8)	6.4 (5.5, 7.2)	
1 to 3 times/month	2.3 (1.9, 2.6)	2.2 (1.7, 2.6)	2.4 (1.9, 3.0)	
Weekly or more	2.4 (2.0, 2.8)	2.9 (2.3, 3.4)	2.0 (1.5, 2.4)	
Cannabis (3-month)				
None	91.8 (91.1, 92.4)	91.7 (89.4, 93.9)	91.9 (89.6, 94.3)	<0.01
Once or twice	4.2 (3.7, 4.7)	3.9 (3.2, 4.5)	4.6 (3.8, 5.3)	
1 to 3 times/month	1.6 (1.3, 2.0)	1.5 (1.1, 1.9)	1.8 (1.3, 2.3)	
Weekly or more	2.4 (2.0, 2.7)	3.0 (2.4, 3.6)	1.8 (1.3, 2.2)	
Poly-substance (ever)				
None	70.6 (69.5, 71.7)	71.0 (68.9, 73.1)	70.1 (68.0, 72.3)	0.57
One substance	14.2 (13.3, 15.0)	13.5 (12.3, 14.7)	14.9 (13.6, 16.1)	
Two substances	6.9 (6.3, 7.5)	7.0 (6.2, 7.8)	6.8 (6.0, 7.7)	
Three substances	5.5 (5.0, 6.1)	5.7 (4.9, 6.4)	5.4 (4.6, 6.2)	
Four substances	2.8 (2.4, 3.2)	2.9 (2.3, 3.4)	2.8 (2.2, 3.3)	

All data are reported as proportion and 95% confidence interval (CI). Substances included in polysubstance use are alcohol, tobacco, e-cigarettes, and cannabis.

more common among youth with mental only (27.6%) or MCHC (24.7%) compared to other CHCs.

Associations Between CHCs and Substance Use

Adjusted estimates of association from gender-stratified models are shown in Tables 4 and 5. Among boys, physical only was not associated with reported any substance use, relative to boys with no CHCs. Boys with neurodevelopmental only or MCHC were at 50% and 30% higher odds of reporting ever having consumed alcohol and 50% and 80% higher odds of reporting being an occasional or regular alcohol user, respectively. Those with mental only, neurodevelopmental only, or MCHC were more likely to report being current or former smokers (ORs ≥2.2), having used e-cigarettes in the past 30 days (ORs ≥1.8), and having used e-cigarettes ≥3 times/week (OR ≥1.8). Boys with mental only (ORs ≥4.2) or MCHC (ORs ≥2.6) had higher odds of reporting cannabis use at least weekly. Using four substances was more likely to be reported by boys with mental only (OR = 4.9 [2.0, 12.0]), neurodevelopmental only (OR = 2.9 [1.6, 5.2]), or MCHC (OR = 6.0 [3.6, 10.1]).

Among girls, all types of CHCs were associated with higher odds of reporting having ever consumed alcohol and being classified as an occasional alcohol user (ORs ≥1.3 for both). Girls with mental only, neurodevelopmental only, or MCHC were more likely to report regularly consuming alcohol in the past 12 months (ORs ≥2.6). Those with mental only or MCHC were more likely to report being current or former smokers (ORs ≥5.6) and having used e-cigarettes in the past 30 days (ORs ≥2.1). Only girls with neurodevelopmental only were not at higher odds for reporting having used e-cigarettes ≥3 times/week. While girls with mental only, neurodevelopmental only, or MCHC were more likely to report having ever used cannabis (ORs ≥1.9), only those with mental only or MCHC were at higher odds of reporting frequent cannabis use (i.e., at least weekly; ORs ≥10.0). Girls with mental only (OR = 6.6 [2.9, 15.2]) or MCHC (OR = 7.9 [4.2, 14.8]) were also more likely to report using four substances.

Table 3. Prevalence of Substance use by Type of Chronic Health Condition.

Substance	None	Physical	Mental	Neurodev	MCHC	*P*
Alcohol (12-month)						
Never	73.7 (72.4, 75.0)	71.6 (69.1, 74.1)	55.6 (53.7, 57.6)	63.2 (61.0, 65.4)	59.2 (57.1, 61.2)	<0.01
None	4.3 (3.5, 5.0)	4.6 (3.8, 5.4)	6.5 (5.4, 7.7)	4.5 (3.7, 5.3)	6.4 (5.3, 7.5)	
Occasional	16.2 (14.9, 17.6)	17.4 (15.9, 18.9)	28.7 (26.3, 31.2)	22.6 (20.7, 24.5)	22.8 (20.8, 24.7)	
Regular	5.8 (4.9, 6.7)	6.4 (5.5, 7.3)	9.1 (8.2, 10.1)	9.7 (8.8, 10.6)	11.7 (10.7, 12.7)	
Tobacco (ever)						
Never	96.5 (94.0, 97.1)	96.1 (93.4, 98.9)	86.5 (84.1, 89.0)	93.3 (90.6, 95.9)	86.5 (84.0, 89.0)	<0.01
Experimental smoker	2.0 (1.5, 2.6)	2.2 (1.6, 2.7)	5.1 (3.8, 6.4)	3.4 (2.6, 4.3)	5.8 (4.3, 7.3)	
Current or former smoker	1.5 (1.0, 2.0)	1.7 (1.2, 2.2)	8.4 (7.5, 9.4)	3.3 (2.6, 4.0)	7.7 (6.7, 8.7)	
E-cigarettes (30-day)						
Never	89.4 (88.3, 90.5)	87.9 (85.9, 90.0)	77.8 (76.1, 79.5)	82.0 (80.2, 83.9)	79.7 (78.0, 81.4)	<0.01
≤2 times/week	6.0 (5.1, 6.9)	6.3 (5.4, 7.2)	12.7 (10.8, 14.6)	10.3 (8.8, 11.9)	8.6 (7.4, 9.9)	
≥3 times/week	4.6 (4.0, 5.2)	5.8 (5.0, 6.6)	9.5 (8.2, 10.8)	7.6 (6.6, 8.7)	11.7 (10.1, 13.3)	
Cannabis (ever)						
Never	90.3 (87.9, 92.6)	88.6 (85.9, 91.3)	76.0 (73.7, 78.3)	85.0 (82.4, 87.6)	77.1 (74.7, 79.4)	<0.01
Once	3.0 (2.5, 3.6)	3.9 (3.2, 4.6)	2.9 (2.4, 3.4)	4.3 (3.6, 5.0)	5.6 (4.8, 6.4)	
≥1 time	6.7 (5.7, 7.6)	7.5 (6.6, 8.4)	21.1 (18.3, 23.6)	10.6 (9.2, 11.9)	17.3 (15.0, 19.3)	
Cannabis (12-month)						
None	91.8 (90.7, 92.8)	90.1 (87.6, 92.6)	77.1 (75.4, 78.9)	88.0 (85.6, 90.3)	80.1 (78.3, 81.4)	<0.01
Once or twice	5.3 (4.4, 6.2)	6.0 (5.1, 6.9)	6.9 (5.9, 8.0)	5.5 (4.7, 6.4)	9.7 (8.2, 11.2)	
1 to 3 times/month	1.5 (1.1, 2.0)	1.9 (1.4, 2.4)	7.6 (5.6, 9.6)	3.6 (2.6, 4.5)	4.0 (2.9, 5.0)	
Weekly or more	1.4 (1.0, 1.8)	2.0 (1.5, 2.5)	8.4 (6.1, 10.7)	2.8 (2.1, 3.6)	6.2 (4.6, 7.9)	
Cannabis (3-month)						
None	94.2 (93.3, 95.1)	92.4 (90.3, 94.5)	81.5 (79.8, 83.3)	90.4 (88.4, 92.4)	84.4 (82.6, 86.2)	<0.01
Once or twice	3.2 (2.5, 3.9)	4.2 (3.5, 5.0)	5.5 (4.5, 6.4)	4.3 (3.6, 5.1)	6.8 (5.6, 8.0)	
1 to 3 times/month	1.1 (0.8, 1.5)	1.5 (0.9, 1.9)	4.0 (2.5, 5.2)	1.9 (1.2, 2.5)	3.2 (2.0, 4.2)	
Weekly or more	1.5 (1.1, 1.9)	1.9 (1.4, 2.4)	9.1 (6.6, 11.5)	3.3 (2.4, 4.2)	5.6 (4.1, 7.1)	
Poly-substance						
None	74.8 (73.2, 76.4)	72.3 (71.2, 74.4)	54.2 (52.5, 55.9)	60.3 (58.7, 61.9)	59.4 (57.9, 60.9)	<0.01
One substance	12.6 (11.3, 13.8)	13.9 (12.6, 15.2)	18.2 (16.4, 19.9)	20.4 (18.4, 22.3)	16.0 (14.4, 17.5)	
Two substances	6.4 (5.5, 7.3)	6.2 (5.3, 7.1)	12.0 (10.2, 13.7)	10.2 (8.7, 11.6)	8.5 (7.2, 9.7)	
Three substances	4.7 (3.9, 5.5)	5.3 (4.4, 6.1)	9.1 (7.6, 10.6)	6.1 (5.1, 7.1)	8.1 (6.8, 9.4)	
Four substances	1.5 (1.1, 1,9)	2.3 (1.8, 2.8)	6.5 (5.1, 8.0)	3.0 (2.3, 3.7)	8.1 (6.2, 9.9)	

MCHC = multiple chronic health conditions.
Data are reported as proportions and 95% confidence intervals.

Pairwise Contrasts by CHC and Gender

As shown in Tables 4 and 5, effect sizes for MCHC were typically significantly larger compared to physical only, but not when compared to mental or neurodevelopmental only. Effect sizes were also significantly larger for mental only compared to physical only. Effect sizes were typically larger for girls compared to boys; 25% of which were statistically significant based on the MOVER between gender-stratified models. These significant differences are illustrated in Supplemental Material B.

Discussion

Summary

Findings from this nationally representative study showed that nearly one-third of Canadian youth aged 12 to 17 years used alcohol, tobacco, e-cigarettes, or cannabis in their lifetime, with approximately one-in-seven reporting polysubstance use. Gender differences in prevalence, although statistically significant, were relatively small in magnitude, suggesting a closing of the gender gap in substance use.[35] Indeed, data from OSDUHS shows that while males are more likely to report any past-year substance use (excluding cannabis) compared to females, the difference in sex-specific prevalence has narrowed from 5.5% in 1983 to 1.6% in 2025.[4] Overall, substance use was lowest among youth with no CHCs or those with physical only; use was highest among youth with mental only or MCHC. Modelling showed that reporting a CHC was associated with increased odds of substance use, particularly for those with mental only, neurodevelopmental only, or MCHC.[13,36,37] Among boys, physical only was not associated with substance use, but among girls, physical only was associated with increased odds of some alcohol, e-cigarette, and cannabis use outcomes. The general absence of associations between physical only and substance use may be the result of youth being proactive in avoiding triggers

Table 4. Associations Between Type of Chronic Health Condition and Substance Use Among Boys.

Substance Use Outcome	Physical	Mental	Neurodev	MCHC	Contrasts
Any alcohol use (ever, ref: never)	0.9 (0.8, 1.1)*	1.3 (0.8, 2.2)*	**1.5 (1.1, 2.0)**	**1.3 (1.1, 1.7)***	ND, MCHC > PI
Alcohol (12-month, ref: never)					
None	1.1 (0.7, 1.5)	1.7 (0.7, 4.1)	1.3 (0.7, 2.3)	**1.7 (1.1, 2.7)**	
Occasional	0.9 (0.7, 1.1)*	1.3 (0.8, 2.4)*	**1.5 (1.0, 2.0)**	1.2 (0.9, 1.6)*	ND > PI
Regular	1.0 (0.7, 1.3)	1.4 (0.7, 3.1)	1.6 (0.9, 2.6)	**1.8 (1.2, 2.7)**	MCHC > PI
Tobacco (ever, ref: never)					
Experimental smoker	0.9 (0.6, 1.6)	0.8 (0.2, 3.0)	1.2 (0.6, 2.2)	**2.6 (1.5, 4.8)**	MCHC > PI
Current or former smoker	0.9 (0.5, 1.5)	**4.2 (1.7, 10.1)**	**2.2 (1.1, 4.2)**	**5.1 (3.0, 8.7)**	MCHC, MD, ND > PI
Any e-cigarette use (30-day, ref: never)	1.1 (0.9, 1.4)	**3.1 (1.8, 5.1)**	**1.9 (1.4, 2.7)**	**1.8 (1.4, 2.4)**	MCHC, MD, ND > PI
E-cigarettes (30-day, ref: never)					
≤2 times/week	1.1 (0.8, 1.5)	**3.8 (2.0, 3.3)**	**2.0 (1.2, 3.3)**	1.3 (0.9, 2.0)	MD, ND > PI; MD > MCHC
≥3 times/week	1.1 (0.8, 1.5)	**2.3 (1.2, 4.6)**	**1.8 (1.2, 2.7)**	**2.2 (1.6, 3.1)**	MCHC > PI
Any cannabis use (ever, ref: never)	1.1 (0.9, 1.4)	**2.0 (1.2, 3.3)**	**1.5 (1.2, 2.3)**	**2.2 (1.6, 2.9)***	MCHC > PI
Cannabis (12-month, ref: none)					
Once or twice	1.1 (0.8, 1.5)	1.4 (0.7, 3.0)	1.0 (0.5, 1.7)	**1.6 (1.1, 2.4)**	
1 to 3 times/month	1.0 (0.6, 1.7)	2.1 (0.6, 7.0)	1.8 (0.8, 4.0)	**2.4 (1.2, 4.5)**	MCHC > PI
Weekly or more	1.3 (0.8, 2.1)	**4.4 (2.0, 10.0)**	1.8 (1.0, 3.4)	**2.7 (1.6, 4.7)**	MD > PI
Cannabis (3-month, ref: none)					
Once or twice	1.1 (0.8, 1.7)	1.2 (0.4, 3.5)	1.3 (0.6, 2.5)	**2.0 (1.2, 3.3)**	
1 to 3 times/month	0.8 (0.4, 1.5)	2.4 (0.7, 8.4)	1.0 (0.4, 2.3)	1.8 (0.8, 4.3)	
Weekly or more	1.2 (0.7, 2.0)	**4.2 (2.0, 9.9)**	1.9 (1.0, 3.5)	**2.6 (1.5, 4.5)**	MCHC, MD > PI
Poly-substance (ever, ref: none)					
1 substance	1.0 (0.8, 1.2)*	1.0 (0.5, 2.0)*	**1.7 (1.2, 2.5)**	1.3 (0.9, 1.8)	ND > PI
2 substances	0.9 (0.7, 1.2)	2.1 (1.0, 4.7)	**1.8 (1.1, 3.0)**	1.3 (0.9, 1.9)	ND > PI
3 substances	0.9 (0.7, 1.3)	1.5 (0.7, 3.3)	1.3 (0.7, 2.3)	1.3 (0.9, 2.0)*	
4 substances	1.5 (0.9, 2.4)	**4.9 (2.0, 12.0)**	**2.9 (1.6, 5.2)**	**6.0 (3.6, 10.1)**	MCHC, MD > PI

PI = physical illness; MCHC = multiple chronic health conditions; MD = mental disorder; ND = neurodevelopmental disorder.
No morbidity was the reference group. Data reported are odds ratios and 95% confidence intervals. Models adjusted for youth age, youth and parent ethnicity and immigration, parent education, and community size. Estimates in bold are statistically significant. Contrasts were computed using the MOVER.
*Effect size is significantly smaller than that for girls.

that exacerbate their conditions (e.g., respiratory discomfort with smoking/vaping/cannabis among those with asthma and seizure precipitation and reduced effectiveness of anti-seizure medications with alcohol use among those with epilepsy).[38,39] Associations between type of CHC and substance use were larger among girls, a finding consistent with other epidemiological work examining psychopathology and substance use among youth 12 to 14 years of age.[40]

Multiple mechanisms may underlie these associations. Youth may be motivated to use substances to cope with the multifaceted sequelae of having a CHC. For instance, robust evidence shows consistent associations between physical and mental conditions with pain in youth ≤19 years.[41] Among youth and emerging adults (15-30 years) in the general population, alcohol and drug use disorders have been found to moderate associations between physical conditions and life-disrupting pain;[42] a finding suggesting the use of these substances to self-medicate to relieve chronic pain and reduce limitations in daily activities.[43–45] Other coping-motivated use may surround attempts to regulate stress in the context of psychosocial challenges of having a CHC, particularly as they relate to parent-child relationships. Evidence from clinical and epidemiological samples shows that parents of children with CHCs can exhibit more overprotective behaviors compared to parents of healthy children, and parent–child conflict often arises in reference to self-care practices which can be intensified during the transition from pediatric to adult health services.[46,47] Compromised parent–child relationships in childhood are associated with increased youth substance use in adolescence and young adulthood.[48]

Developmentally, adolescence is a period in which experimentation with substance use is normal.[49] This process is likely strengthened among youth with CHCs where traits of disinhibition across physical, mental, or neurodevelopmental conditions (e.g., epilepsy, oppositional defiant disorder, ADHD, respectively), as well as relatively stronger motivations for autonomy from their parents (vs. healthy peers) may further predispose these youth to use substances.[50] Complementing these processes is the development, refinement, and reinforcement of peer bonds, which while necessary for all youth, has been argued to be of even greater necessity for youth with CHCs.[51] Substance use may be a method by which youth with CHCs strengthen bonds when

Table 5. Associations Between Type of Chronic Health Condition and Substance Use among Girls ($n = 6{,}613$).

Substance Use Outcome	Physical	Mental	Neurodev	MCHC	Contrasts
Any alcohol use (ever, ref: never)	**1.3 (1.1, 1.6)***	**2.9 (2.0, 4.1)***	**2.1 (1.4, 3.0)**	**2.6 (2.1, 3.3)***	MCHC, MD > PI
Alcohol (12-month, ref: never)					
None	1.2 (0.8, 1.7)	**2.3 (1.2, 4.5)**	1.2 (0.6, 2.2)	**2.1 (1.3, 3.3)**	MCHC > PI
Occasional	**1.3 (1.1, 1.6)***	**3.2 (2.1, 4.8)***	**1.9 (1.2, 3.0)**	**2.6 (2.0, 3.4)***	MCHC, MD > PI
Regular	1.4 (1.0, 2.0)	**2.8 (1.5, 5.1)**	**2.6 (1.3, 5.1)**	**3.3 (2.1, 5.2)**	MCHC > PI
Tobacco (ever, ref: never)					
Experimental smoker	1.3 (0.7, 2.2)	**4.3 (1.8, 10.7)**	**2.9 (1.1, 8.0)**	**3.9 (2.1, 7.0)**	MCHC, MD > PI
Current or former smoker	1.4 (0.8, 2.7)	**6.7 (3.1, 14.2)**	1.5 (0.5, 4.4)	**5.6 (2.9, 10.6)**	MCHC, MD > ND, PI
Any e-cigarette use (30-day, ref: never)	1.2 (1.0, 1.6)	**2.1 (1.3, 3.2)**	1.4 (0.8, 2.5)	**2.7 (2.0, 3.6)**	MCHC, MD > PI
E-cigarettes (30-day, ref: never)					
≤2 times/week	1.0 (0.7, 1.4)	1.8 (1.0, 3.1)	1.5 (0.8, 3.0)	**2.0 (1.3, 3.1)**	MCHC > PI
≥3 times/week	**1.6 (1.1, 2.2)**	**2.7 (1.4, 4.9)**	1.3 (0.5, 3.2)	**4.0 (2.7, 6.0)**	
Any cannabis use (ever, ref: never)	1.3 (1.0, 1.7)	**3.9 (2.6, 5.9)**	**1.9 (1.1, 3.3)**	**3.7 (2.7, 4.1)***	MCHC, MD > ND, PI
Cannabis (12-month, ref: none)					
Once or twice	1.3 (0.9, 1.8)	1.7 (0.9, 3.2)	1.3 (0.6, 3.1)	**2.9 (1.9, 4.3)**	MCHC > PI
1 to 3 times/month	1.7 (0.9, 3.0)	**9.4 (4.5, 19.8)**	**3.8 (1.5, 9.8)**	**4.0 (2.0, 8.0)**	MD > PI
Weekly or more	1.7 (0.8, 3.6)	**13.2 (5.6, 31.2)**	2.1 (0.6, 8.1)	**10.8 (5.1, 22.9)**	MCHC, MD > ND, PI
Cannabis (3-month, ref: none)					
Once or twice	1.6 (1.0, 2.3)	**2.5 (1.3, 5.1)**	1.7 (0.7, 4.2)	**3.1 (1.9, 5.0)**	MCHC > PI
1 to 3 times/month	**2.2 (1.1, 4.4)**	**6.6 (2.9, 15.0)**	**4.3 (1.3, 13.9)**	**6.4 (3.0, 13.4)**	MCHC, MD > PI
Weekly or more	1.3 (0.6, 2.9)	**14.6 (6.1, 35.3)**	2.6 (0.7, 9.0)	**10.0 (4.6, 22.1)**	MCHC, MD > PI; MD > ND
Poly-substance (ever, ref: none)					
1 substance	**1.4 (1.1, 1.7)***	**2.8 (1.7, 4.5)***	**2.5 (1.6, 3.9)**	**2.0 (1.5, 2.8)**	MCHC, MD, ND > PI
2 substances	1.1 (0.8, 1.4)	**2.9 (1.6, 5.3)**	**2.2 (1.1, 4.4)**	**2.2 (1.5, 3.2)**	MCHC, MD > PI
3 substances	1.5 (1.0, 2.2)	**4.3 (2.4, 7.6)**	2.2 (0.9, 5.1)	**3.9 (2.5, 6.0)***	MCHC, MD > PI
4 substances	1.7 (0.9, 3.0)	**6.6 (2.9, 15.2)**	1.6 (0.5, 5.3)	**7.9 (4.2, 14.8)**	MCHC, MD > PI; MCHC > ND

PI = physical illness; MCHC = multiple chronic health conditions; MD = mental disorder; ND = neurodevelopmental disorder.
No morbidity was the reference group. Data reported are odds ratios and 95% confidence intervals. Models adjusted for youth age, youth and parent ethnicity and immigration, parent education, and community size. Estimates in bold are statistically significant. Contrasts were computed using the MOVER.
* Effect size is significantly larger than that for boys.

other opportunities for socialization with peers may be reduced (e.g., school absences, community sports). With this lens, substance use may be used to increase perceived normalcy with healthy peers.

The potential for MCHC to exert an additive or multiplicative effect on associations between individual CHCs (i.e., physical, mental, neurodevelopmental) and substance use was dependent on the reference. For boys and girls, associations between MCHC and substance use were significantly larger compared to those of physical only and substance use, but not when compared to those of mental or neurodevelopmental only. Findings are consistent with previous epidemiological reports from Canada and Denmark showing that the presence of a mental condition moderated associations between physical conditions and substance use disorders among youth and emerging adults and that youth with MCHC were more likely to have ever smoked or used cannabis compared to youth with physical conditions only.[13,14] This small body of evidence suggests that the presence of mental conditions may be the major thrust in associations between MCHC and substance use. Mechanisms surrounding this hypothesis may be gender-specific—previous work has shown that girls may use substances to cope with symptoms of internalizing symptoms, whereas boys' use may stem from sensation seeking, peer pressure, and risky behavior inherent to problem behavior/externalizing symptoms.[20,52] Given the gender differences found particularly for mental conditions and MCHC, it is possible that the need to cope with internalizing symptoms among girls may be stronger than the effects of peer pressure or sensation seeking among boys. These hypotheses are speculative and warrant additional research.

The intersection of CHCs and substance use in youth populations requires integrated service models that move beyond fragmented physical, mental, developmental, and addiction sectors within the health system. Siloed services impede timely and appropriate care—a system gap addressed by patient navigators, which may be useful in connecting youth and their families to the health and social services they need

to manage the complexity of morbidity and problematic substance use.[53,54] Opportunities to prevent substance use among youth with CHCs are not limited to the health system and engagement of the education system is critical. Youth with CHCs experience lower academic achievement and school connectedness compared to their healthy peers.[55,56] These outcomes are also more common among youth who use substances and may be important targets for preventive intervention.[57,58] School-based interventions that simultaneously target physical and mental health, academic support, and substance use prevention are effective, offer near-universal implementation, and reduce stigma in help-seeking.[59] Effective screening of substance use is key to identifying at-risk youth and initiating preventive care strategies. Evidence from the youth aged 12 to 17 years in the National Survey on Drug Use and Health showed that substance use screening thresholds for identifying tobacco dependence (smoking ≥1 day in past 30 days) and alcohol and cannabis use disorder (≥3 days [12-15 years] and ≥12 days [16-17 years] in past year) aligned with categories of relatively low frequency of substance use in this study.[60] Performance of these thresholds was robust (sensitivity: 0.92-1.00 and specificity: 0.80-0.97).

Limitations

There are limitations to this study. The CHSCY is cross-sectional, which prevents inferences of causality. While nationally representative, the sample excludes youth living on Indigenous reserves or in institutions (< 3% of population); thus, findings may not apply to these groups. The overall response rate to the CHSCY was low, but consistent with other national studies conducted by Statistics Canada, and there was variability in participation across the provinces and territories. Sampling weights were used to account for nonresponse. Data were collected in 2019, immediately prior to the COVID-19 pandemic, and there may be some changes in the reported findings if the same data were collected today, potentially as a consequence of the pandemic. Nonetheless, these findings can serve as the baseline to contextualize post-pandemic prevalence and gender-specific associations between CHCs and substance use. As per Statistics Canada requirements, gender diverse youth could not be retained in the analysis, and sparse data prevented stratification by cis-boys/girls or trans-boys/girls. Disaggregating youth into different types of MCHC (e.g., physical–mental, physical–neurodevelopmental) was not possible. Relatedly, the aggregation of disorders may bias estimates of associations between neurodevelopmental disorder and substance use; the directionality of associations (risk or protective) between individual disorders (e.g., ADHD, autism spectrum disorder) and youth substance use differs.[61,62] Evidence suggests low agreement between electronic health records and self-reported health,[63] which increases the probability of misclassification of youth. Likewise, social desirability bias may result in youth underreporting substance use. Boys and girls differ in care-seeking;[64] thus, it is possible that gender differences in associations between CHCs and substance use may be related to such behaviors. Finally, no adjustments were made to account for the multiple comparisons in this study; thus, some spurious findings may be present.

Conclusion

This nationally representative study demonstrated that youth with CHCs—particularly mental, neurodevelopmental, and MCHC—was positively associated with substance use across alcohol, tobacco, e-cigarettes, and cannabis. Although gender differences in prevalence were modest, associations between CHCs and substance use were consistently larger among girls, highlighting important gendered pathways that warrant further attention. These findings underscore the need for integrated prevention and intervention strategies that address the complex interplay between CHCs and substance use during adolescence. Strengthening coordination across physical, mental, developmental, and addiction services, alongside enhanced school-based supports, may reduce risk and improve outcomes for affected youth. Longitudinal research is needed to clarify developmental trajectories, investigate causal mechanisms, and evaluate tailored interventions. Addressing health-related disparities in substance use is essential to improving the well-being of young people in Canada.

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Ethical Approval and Informed Consent

The PMK provided informed consent. Because Statistics Canada approved the study protocol before the investigators were granted data access, ethical approval for the study was waived by the University of Waterloo Research Ethics Board.

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Data Availability

Data access is available through application to the Research Data Centres Program at Statistics Canada.

Supplemental Material

Supplemental material for this article is available online.

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