

Substance Abuse in Canada: **Youth in Focus**



September 2007

This document was published by the Canadian Centre on Substance Abuse (CCSA) and was made possible in part through a financial contribution from Health Canada. The views expressed herein do not necessarily reflect the views of Health Canada.

Suggested citation: Canadian Centre on Substance Abuse. (2007). *Substance Abuse in Canada: Youth in Focus*. Ottawa, ON: Canadian Centre on Substance Abuse.

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Ce document est également disponible en français sous le titre :
Toxicomanie au Canada : Pleins feux sur les jeunes

ISBN 1-897321-58-9

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INTRODUCTION

Substance Abuse in Canada: Current Challenges and Choices was first published in 2005 as a way of drawing attention to a series of key contemporary issues in substance abuse in Canada, and their implications for policy development. The first edition looked at a wide range of topics from new directions in preventing alcohol problems to alternative sanctions for cannabis use and possession, and from drugs and driving to diversion and abuse of prescription medications. Every chapter concluded with a discussion of implications and potential future directions for Canadian substance abuse policy.

In planning for a second edition of *Substance Abuse in Canada*, the Canadian Centre on Substance Abuse once again consulted with a variety of substance abuse and addiction experts to identify the issues of greatest concern in 2007. What emerged was a list of topic suggestions that seemed to have a single unifying theme: youth—whether it was concern about the age of initiation for first-time alcohol and drug use (now around 14 or younger), the unusually high levels of cannabis use among young Canadians compared with their peers in other countries, or the rise in hazardous drinking by those under 25.

An examination of patterns of substance use and related harms within the Canadian population sends a clear message: youth deserve

a special focus. This was the rationale for including children and youth in one of three priority areas in the National Framework for Action to Reduce the Harms Associated with Alcohol and Other Drugs and Substances in Canada. Young people are the most likely to use substances, engage in risky forms of use, and experience harms as a result. As well, early experience with substance use and hazardous patterns of drug-using behaviour during adolescence are serious risk factors for developing long-standing problems, including dependence, that continue into adulthood.

Risk factors for problematic substance use also overlap with risk factors for other negative outcomes such as criminal and violent behaviour. Prevention programs that target substance abuse also have the potential to forestall the development of these other behaviours. Successful treatment of substance use problems at an early age substantially lowers the risk of long-term harms, including chronic diseases. Intervening with youth offers the best chance to not only have a positive influence on their future development as individuals, but also to reduce the impact of substance abuse on society as a whole.

In this edition of *Substance Abuse in Canada*, we look at the issue of youth substance use and abuse from several perspectives:

Substance use and harm in the general youth population

Adolescence and young adulthood is a period of biological, intellectual, and psychosocial development. Many lifelong skills and behaviour patterns are established during this time. The use of alcohol and illicit drugs typically begins during adolescence. For most, this use is experimental or occasional, but a substantial minority will experience harm to their current or subsequent health, or threaten the well-being of others. This chapter examines the prevalence of substance use and abuse among Canada's mainstream youth population (defined here as ages 12-24), as well as consequential harms.

Substance use among non-mainstream youth

While most adolescents do not have substance abuse problems, certain groups of youth are more likely than their peers to report heavy use, multi-drug use, social and economic problems due to use, and substance abuse or dependence disorders. Emerging research exploring the reasons for this higher risk suggests that some teens may be self-medicating to cope with toxic environments, untreated trauma, and underlying psychological conditions. Current population approaches for preventing adolescent drug use may not address the key issues for groups at highest risk, but may only reach the majority who are not likely to experience substantial harms from drug use.

Our responses to youth substance abuse

In North America, and more specifically in Canada, it is now recognized that substance abuse is a major health care problem that entails substantial economic costs. Statistics generally show that the periods when the prevalence of alcohol and other drug use and abuse is highest are late adolescence and young adulthood. This chapter looks at Canada's response to youth substance abuse from a "four pillars" perspective comprising prevention, treatment, enforcement and harm reduction. It also examines the different roles that schools and communities play in addressing youth substance abuse and suggests how those roles could be better integrated.

Drug abuse, addiction and youth: a neuroscience perspective

This chapter provides insights into the biological basis of drug abuse and addiction. Although drug abuse and addiction are often perceived as behaviours controlled by individual choice and free will, it is also true that drugs produce physical and chemical changes in the brain that make it progressively harder to act on a desire to quit. Adolescence is a time of brain development and the inadvertent short-term and long-term biological consequences of drug exposure during adolescence can create harm and a long-term vulnerability to future drug effects. These long-term changes may be at the root of drug abuse problems well into the adult years.

Gaps in our approach to youth substance use and abuse

Levels and quality of mental health and addiction services vary across Canada, but regardless of region or jurisdiction, there is a general lack of funding for age-appropriate services for young people and their families. Mental health and addictions have long been orphans in our health and human service systems, and substance abuse prevention and intervention services for young people receive a minuscule portion of the larger health and human service budget. This creates fragmentation of services and access difficulties, and prevents the development of a continuum of services and a range of programming.

Conclusion: A call to action

In this concluding chapter, we draw on many of the themes explored in earlier chapters and use these as a starting point for a discussion of future directions for the substance abuse field. We explore the importance of appropriately matching services to the needs of young people and discuss gaps and shortcomings in services for youth and how we might correct them. We then address the need for improved training and closer collaboration among substance abuse and allied professionals, and highlight the value of ongoing research into risk and protective factors associated with youth substance abuse and the need for improved evaluation of substance abuse programs.



Substance use and harm in the general youth population

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John, 17, went to a party on Friday night with some friends. His friends brought beer, but he did not since he was the designated driver for the evening and did not want to drink. At the party, some people were smoking cannabis. Joints were passed around and John joined in. A short time later he and his friends left the party. Thinking he was all right to drive because he had had nothing to drink, John got behind the wheel. His car hit another car soon afterwards. John and his friends sustained only minor injuries, while the passenger in the other car suffered a severe head injury. John was considered to be at fault for the accident and was charged with impaired driving.

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Prevalence of substance use in the general youth population

Substance use by young people is a constantly evolving phenomenon as various drugs go in and out of favour over time. Recent Canadian surveys show that tobacco, alcohol and cannabis are the substances most frequently used by youth. In fact, international comparisons of alcohol and cannabis use by young people indicate that Canada ranks among the leading countries for rates of prevalence and frequency.^{1,2}

Alcohol is by far the most common substance used by youth. A recent national school survey of students in grades 7–9 found that about two-thirds had already consumed alcohol.³ Another national survey of Canadian youth aged 15–24 showed that 83% were current (or past-year) drinkers; the most common pattern of alcohol use reported by drinkers was “light-infrequent”* (39%).⁴ Similarly, provincial surveys of junior high and high school students show that half to two-thirds are current users of alcohol, and most use it infrequently.⁵⁻¹¹

* Defined as drinking less often than once a week, and usually drinking fewer than five drinks on days when alcohol is consumed. In this typology, other patterns include light-frequent, heavy-infrequent, and heavy-frequent, where “heavy” refers to consuming five or more drinks on days when alcohol is used and “frequent” refers to drinking on a weekly basis.



NATIONALLY, OVER A THIRD OF STUDENTS IN GRADES 7–9 HAVE BINGED ON ALCOHOL. OVER 40% OF 15–19 YEAR OLDS HAVE BINGED AT LEAST ONCE IN THE PAST YEAR, AND MORE THAN A QUARTER OF DRINKERS AGED 12–19 HAVE BINGED 12 OR MORE TIMES IN THE PAST YEAR.

Binge drinking (typically defined as consuming five or more drinks on a single occasion) is common in adolescence and young adulthood. Nationally, over a third of students in grades 7–9 have binged on alcohol.³ Over 40% of 15–19 year olds have binged at least once in the past year,¹² and more than a quarter of drinkers aged 12–19 have binged 12 or more times in the past year.¹³ Another recent national survey of youth aged 15–24 showed that almost half (46%) of past-year drinkers drank heavily at least once a month, and 14% did so at least once a week.⁴ This survey also showed that more than a third of young drinkers drank at a hazardous level.¹⁴ Similarly, many provincial school surveys indicate that about a quarter of junior high and high school students binge at least once a month^{5,8,11} and that about 15% of students drink at a hazardous level.^{6,7}

Cannabis is the second most common substance—and the first among illicit drugs—used by Canadian youth. Lifetime cannabis use is reported by 17% of students in grades 7–9.³ About 29% of 15–17 year olds and almost half of 18–19 year olds report past-year cannabis use.¹⁴ Provincial surveys show that a quarter to more than a third of junior high and high school students use cannabis.⁵⁻¹¹ These surveys also show that about 3%–5% of students use cannabis daily,^{6,8-10} and daily use has increased over the long-term.⁶ In international comparisons, Canadian boys report the highest rates of frequent (more than 40 times in their lifetime) cannabis use.¹⁵

Although smoking rates have been falling among youth and adults in North America, they are still a concern. A recent national school survey of young students (grades 5–9) found 19% had tried smoking cigarettes at some point, and about 2% of these students smoked daily.³ Another national smoking survey found that 18% of teens aged 15–19, and 26% of youth aged 20–24 were current smokers (daily or occasional).¹⁶ The average number of cigarettes smoked by young daily smokers was about 10 or 11 a day.^{3,16} Provincial school surveys show that estimates of past-year smoking (more than a few puffs) among junior and senior high school students range from 14% to 27%^{6-9,11} and, for the most part, fall below the estimates for past-year cannabis use.

Hallucinogenic drugs such as psilocybin (“magic mushrooms”) and mescaline are the next most popular illicit drugs after cannabis, with about 10% of junior high and high school students reporting use.^{5-9,11} Past-year use of other illicit drugs such as ecstasy or cocaine is less than 10% among adolescents.^{5,9,11,14} Although the abuse of certain drugs such as methamphetamine and OxyContin is raising concerns in some parts of Canada, available statistics show that past-year use among mainstream youth is relatively low, each at about 1%.⁶

Poly drug use—defined as the use of different substances on the same or different occasions—is common and young people typically use alcohol, tobacco and cannabis in some combination or along with other illicit drugs.^{6,11} Thus, it is fairly rare to find anyone who uses only one substance exclusively.

Risk factors for use and abuse

Substance use behaviour is complex and a wide range of risk factors has been identified and classified with reference to the individual, the family, the peer group, school and environment. Experts agree that the *cumulative number* of risk factors, rather than any one specific risk factor, increases the likelihood of substance use or abuse. Below is a brief summary of key risk factors.

Certain *individual characteristics* have consistently been associated with a greater risk of use and abuse. Age is perhaps the strongest determinant. Generally, substance use increases with age during adolescence, peaks in the mid to late 20s, and then subsides with typical life changes such as taking on full-time employment and getting married.¹⁷ Inhalants are the exception with use diminishing through adolescence. Gender is also a strong predictor with males typically more likely to use substances and to use heavily. However, the gender gap may be narrowing according to some recent surveys that show girls are as likely as boys to drink alcohol, binge drink, get drunk, smoke, and use an illicit drug.^{5,6,8,9,12,18} Other individual-level risk factors include attitudes and beliefs about the risks of use, impulsivity and sensation

seeking, and childhood psychological disorders (for example, conduct disorder).¹⁹

Certain *interpersonal factors* in the family, among peers and at school are associated with substance use. Families affect children's substance use in a variety of ways. Poor parenting practices such as inadequate monitoring, a low degree of bonding between parent and child, abuse, family conflict, family modelling of substance-using behaviours, and lax parental attitudes toward substance use have all been associated with children's use.¹⁹

Peer substance use has consistently been found to be among the strongest predictors of substance use by youth.¹⁹ Associating with deviant peers and perceiving approval of drug-using behaviours among peers are also important risk factors. Contrary to popular belief, the peer effect is not entirely due to “pressure” from peers to use, but often indicates a choice by some young people to hang out with friends who use substances and hold similar attitudes.^{20, 21}

School-related factors such as academic failure beginning in late elementary school are related to substance use, as is lack of commitment to school and low bonding with other students and teachers.¹⁹ Other variables, such as the “drinking culture” within the student body or disapproval of substance use can also affect student substance use.^{22, 23}

Apart from personal and interpersonal risk factors, the wider *cultural and social environment* significantly influences substance use and misuse. A substantial body of research on alcohol and tobacco shows that increased availability of a substance—including ample supply and low price—increases the likelihood of its use, especially among young people.^{7, 24} Media portrayals and social norms favourable to substance use also play influential roles.^{25, 26}

While risk and severity of outcome increase as risk factors multiply, it is important to note that risk factors for *use* are different from those for *abuse*. The initiation of substance use owes more to social and environmental factors such as peer use and drug availability, whereas early use, heavy use and abuse are generally associated with biological factors such as genetics and difficult temperament, and psychological determinants such as childhood abuse, trauma and psychological disorder.²⁷

At a glance

- **Alcohol is by far the most common substance used by youth and binge drinking is common. Cannabis is the second most common substance—and the first among illicit drugs—used by Canadian youth. Cannabis use is now more common than cigarette smoking among students.**
- **The likelihood of substance use or abuse increases with the *cumulative number* of risk factors, rather than with any one specific risk factor. While risk and severity of outcome increase as risk factors multiply, risk factors for use are different from those for abuse.**
- **Harms from substance use range from physical health and safety to social and economic consequences. The severity and types of harms depend on patterns of use, including mode of administration, intoxication, regular use and dependence.**
- **Early substance use has consistently been linked to negative consequences, including regular heavy use, dependence, and physical and social problems during young adulthood. Strategies that delay the age of initiation of substance use should be pursued.**
- **Governments, non-governmental organizations, academics and educators should develop youth-oriented strategies to broaden understanding around the harmful health and social consequences of cannabis use.**
- **A culture of moderation should be promoted around alcohol use through the establishment of National Alcohol Drinking Guidelines, and greater attention to underage drinking and the stages of youth development.**



CONTRARY TO POPULAR BELIEF, THE PEER EFFECT IS NOT ENTIRELY DUE TO “PRESSURE” FROM PEERS TO USE, BUT OFTEN INDICATES A CHOICE BY SOME YOUNG PEOPLE TO HANG OUT WITH FRIENDS WHO USE SUBSTANCES AND HOLD SIMILAR ATTITUDES.

Harms associated with patterns of use

Research shows that alcohol, tobacco and illicit drug use is responsible for a significant proportion of death, disease and disability in developed countries.^{28, 29} In Canada, the latest statistics show that tobacco, alcohol and illegal drug use contribute to 21% of all deaths, 25% of potential years of life lost, and 19% of days spent in hospital for Canadians aged 15 or older.³⁰ Tobacco use accounts for the largest proportion of each outcome, but when only younger age groups are considered, alcohol accounts for a larger burden of acute harms such as injuries and accidents.³¹

At the individual level, researchers have devised a classification system for substance use patterns that pose a risk of adverse health, safety, social and economic consequences.³² The first category is harms due to the *mode of administration* of the substance. Smoking substances eventually leads to respiratory problems. Oral ingestion is characterized by slow absorption into the blood stream or central nervous system, making it more difficult to measure and adjust doses. Injecting substances allows large quantities to be absorbed almost instantly and can cause overdoses; injecting also promotes the spread of blood-borne viruses such as HIV and hepatitis C. Injection drug use within the mainstream adolescent population is rare, ranging from under 1% to 2% among students.^{6, 33}

The second risky pattern is *intoxication*, which is often associated with acute harms. Immediate physical harms include poisoning and overdose, and intentional and unintentional injuries such as traffic accidents and falls. Indeed, driving while under the influence of alcohol or other drugs remains a problem in Canada. In 2001, 25% of drivers aged 19 and younger who died behind the wheel and were tested were over the legal alcohol limit.¹³ Recent provincial school surveys found self-reports of drinking and driving among students with a driver's licence ranging between 9% and 19%, and 16% and 26% for cannabis use and driving.^{5, 6, 9, 11, 13, 34}

Those intoxicated by alcohol or drugs place themselves at risk for unprotected sex,³⁵ and intoxication is often cited as a risk factor

for sexual victimization among adolescent females.³⁶ About 10% of students in junior high and high school are likely to have unplanned sex while under the influence of alcohol, and a similar proportion are likely to do so while under the influence of drugs.^{8, 11}

Causing damage to property and causing injury to oneself are some of the most common harms associated with alcohol and drug use among students.^{5, 8, 9, 11} Repeated intoxication can also lead to problems in school, such as truancy or academic failure, and family problems. Student surveys show that less than 10% of all students reported school problems due to their drinking or drug use.^{8, 10} A 2004 national survey found over a fifth of drinkers aged 15–24 years reported experiencing at least one harm (physical, social, legal) from their own drinking during the past year, while about 30% of 15–19-year-old illicit drug users reported at least one harm due to their use.¹⁴

Alcohol intoxication is associated with aggression and violence, especially among young males.^{37–39} Provincial surveys show that about 5% of junior high and high school students report having been in trouble with the police because of their alcohol or drug use.^{5, 6, 8, 9}

Regular and prolonged use of substances is associated with many long-term health consequences. Of course, prolonged smoking is associated with a host of diseases such as cancers, respiratory diseases, and vascular diseases. In the case of regular heavy alcohol use, problems include cancers, liver disease, hypertension, brain damage, and dependence disorder. Chronic heavy exposure of the adolescent brain to alcohol can interfere with brain development and cause memory loss and other cognitive deficits.^{40, 41} Adolescents who are regular heavy drinkers are likely to experience symptoms of poor general health (overweight, high blood pressure) as early as their mid-20s,⁴² and are at high risk for alcohol dependence.⁴³ Frequent heavy alcohol use in adolescence has been associated with violent crime in early adulthood.⁴⁴

Regular, prolonged cannabis use is associated with a host of adverse physical health effects, including cognitive impairment

and respiratory illnesses.^{45, 46} There is some debate as to whether regular cannabis use is linked with cancers.^{47, 48} Regular cannabis use among students has been associated with school failure and drop-out.⁴⁹⁻⁵¹ There is growing evidence that chronic heavy use in adolescence can exacerbate symptoms of schizophrenia and psychosis in those already vulnerable to such conditions.^{32, 49} This relationship is not considered causal.⁵² There is some research showing a link between frequent cannabis use and subsequent use of other illicit drugs,⁴⁹ and some researchers suggest that this may be causal,⁵³ although the evidence is not conclusive.

The fourth pattern is *dependence*. While dependence is considered a harm that can ensue from regular use, it is also a pattern of use associated with significant distress. A recent study found that about 6% of Canadian youth aged 15–19 may be dependent on alcohol, and about 3% may be dependent on an illicit drug.⁵⁴ Provincial surveys found that about 6–8% of students who use cannabis showed signs of dependence.^{6, 7} Alcohol dependence among adolescents can cause cognitive deficits, anxiety or depression.⁵⁵ Physical and mental health problems can be exacerbated during withdrawal if drug supplies run low. Social consequences of dependence may include problems with family, work and finances, and criminal activity to obtain the substance.

Conclusions and implications for Canada

This chapter underscores the need to pursue strategies that can prevent hazardous consumption patterns and resulting harms, especially in connection with alcohol and cannabis use among young people. One way to address this is by identifying and addressing risk factors associated with substance abuse. Special attention should be given to the initiation of substance use early in adolescence—usually defined as before age 13 or 14—because this can have life-long consequences. Longitudinal research consistently shows that early use of a given substance increases the likelihood of regular heavy use, related harms and dependence.⁵⁶⁻⁵⁹

Consistent with longitudinal research, analysis of data from a 2004 Canadian survey demonstrated that an early age of alcohol or cannabis initiation was associated with regular and heavy use among youth, as well as a higher prevalence of reported harms (social, physical and legal).⁴ Further, some evidence shows that early use of one substance increases the risk of using another substance.⁶⁰⁻⁶² Early use is also linked to negative consequences for social role functioning and hampers the ability to make expected

transitions from adolescence into adulthood—for example, attaining higher education and finding success in marriage.⁶³ Other harms experienced in early adulthood that have been linked with early initiation include legal problems, violence, injuries, and mental health problems.^{64, 65}

Canadian studies show that the average age of first tobacco use is about 12, first alcohol use and first intoxication is about 13, while the first use of cannabis and other drugs usually occurs at about 14.^{6, 18, 66} Some American studies show a decline in age of initiation over time,⁶⁷ although Ontario data suggest that over the long-term, average age of first tobacco, alcohol and cannabis use has remained steady or increased in recent years.⁶ This poses challenges for prevention programmers, given the widespread perceptions that use is normal in North American culture, and views that “recreational” use is a rite of passage. In addition, risk factors tend to cluster together and those who engage in early use are also likely to experience a number of additional risk factors. Although youth in the general population do not appear to be exposed to a high number of risk factors, there are sub-groups of youth who are at increased risk for developing problems with substance abuse. These special populations are the focus of the next chapter.

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Substance use among non-mainstream youth

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Sara, 15, lives in a small rural community in the North. Over the past year she has begun to realize that she is not attracted to boys and is attracted to girls. She hears all the negative comments her friends make about “lezzies” and “fags”, and she knows one boy a few grades ahead of her who was teased constantly, and even beat up, just because everyone thought he was gay. She doesn’t dare confide in anyone. She even dates one of the guys in her school so that people won’t suspect, but she feels increasingly isolated and depressed. She used to drink now and then at bush parties with friends, but lately she’s been drinking more often, and getting drunk every time. Some days she thinks about killing herself, and when it gets too bad, she smokes cannabis so that she won’t care so much.

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Youth are not all at equal risk

The majority of adolescents in Canada do not have alcohol or other drug use problems. Indeed, fewer than one in five teens in school have ever tried any drugs other than alcohol and cannabis; around the same proportion use alcohol or cannabis regularly; and far fewer have used street drugs such as heroin, cocaine or crystal methamphetamine.¹⁻⁶ Older teens are more likely to drink and experiment with drugs than younger teens, but those who start at younger ages are more likely to develop personal and social problems, including clinically-defined substance abuse or dependence disorders.

A number of studies in North America have identified specific groups of youth who are at much higher risk than their peers for heavy use, multi-drug use and substance abuse. When we explore the common experiences and characteristics of the youth in these various groups, we begin to discover why they may be at risk, and this in turn can suggest more effective methods for prevention and treatment, including better skills for decision making and self-management. Who are these groups of youth at higher risk, and what do they have in common?



SUBSTANCE ABUSE IN THESE RISK GROUPS MAY BE ATTEMPTS TO MANAGE INTENSE STRESSORS AND TOXIC ENVIRONMENTS, THE PHYSIOLOGICAL EFFECTS OF CHRONIC STRESS, AND PSYCHOLOGICAL OUTCOMES OF UNTREATED TRAUMA, BOTH PRIOR AND RECURRING.

Runaway and street-involved youth. Surveys of runaway, street-involved, and homeless teens have consistently found much higher rates of substance use and adverse consequences in these groups compared with youth in school.⁷⁻⁹ They often have high rates of exposure to violence on the street, as well as histories of sexual and physical abuse, depression, and other mental health problems. They may have access to drugs as part of survival methods on the street (gang involvement, drug dealing, sex work) or they may be introduced to illicit substances by other street youth.

Youth in custody. Youth in the juvenile justice system are another group at high risk for problem substance use.¹⁰ Many young people in custody have been involved in the child welfare system and have been runaways or have lived on the streets at some point during their adolescence. Like their peers who are street-involved, they are much more likely to experience physical and sexual abuse than teens in the general population, and they report higher rates of disorders such as Attention-deficit hyperactivity disorder (ADHD) or Fetal Alcohol Spectrum Disorder (FASD). Among youth in custody in British Columbia, more than one in five report they have been diagnosed with substance abuse or dependence disorders by a health professional.¹⁰

Adolescents with co-occurring disorders. An emerging body of research has found that youth with ADHD and other impulse-control disorders are more vulnerable to developing substance abuse problems.¹¹ Studies have identified differences in brain structures and brainwave patterns among youth who eventually develop problem substance use—patterns that are also linked to ADHD and conduct disorder, among others.¹² While an element of this vulnerability is genetically inherited,¹³ youth with ADHD, conduct disorder, and other similar disorders are also more likely to be found among runaway and street youth¹⁴ and, of course, among youth in custody.¹⁰ Their impulsivity and difficulty in anticipating outcomes may also put them at higher risk for sexual and physical abuse.^{15,16} As well, they may use substances to better focus their attention and manage their moods; for example, some studies have found adolescents with ADHD symptoms are far

more likely to smoke cigarettes.¹⁷ Other studies have shown that youth with ADHD who are treated during childhood and adolescence with stimulants such as methylphenidate (Ritalin) are half as likely to develop substance abuse disorders;¹⁸ this suggests a certain amount of their drug use may be attempts to manage ADHD symptoms.

Sexually-abused and exploited youth. Substance misuse has long been identified as a common response to sexual abuse during childhood or adolescence.^{19,20} There is some evidence that actual changes in the brain from the trauma of the abuse may increase the odds of drug addiction.²¹ Teens who experience post-traumatic stress, depression, or suicidal thinking after sexual violence may try to manage their moods through the use of drugs.¹¹ If the sexual abuse occurs in the family, the teen may run away, ending up on the street and further victimized.²² Young runaways who have been coerced or lured into sex work, and street youth who trade sex for food or shelter, are often introduced to drugs as part of their exploitation.²³ They may continue to use in order to cope with the shame and stigma of their work, and to blunt the experiences of the toxic environments they try to survive.^{24,25}

Gay, lesbian, bisexual and questioning teens. A growing number of population studies have also reported that sexual-minority youth are more likely than their peers to smoke,²⁶ drink and use cannabis,²⁷⁻²⁹ and to report problems with substance use and abuse.^{30,31} Sexual-minority teens are at much higher risk of experiencing violence, whether that is family rejection and conflict due to their orientation,^{32,33} actual physical and sexual abuse in or beyond the family,³⁴ or harassment and victimization at school or in the community.³⁵ This greater risk of violence might contribute to higher rates of substance use; in one province-wide study among high school students in the Pacific Northwest, bisexual and gay or lesbian youth reported higher rates of injection drug use than heterosexual teens, but a history of sexual abuse or assault explained far more of this risk than sexual orientation alone did.³⁶ Similarly, a higher percentage of runaway and homeless teens identify as gay, lesbian or bisexual compared with youth in school,^{7,8} and

sexual-minority street youth appear to have greater risks of violence and substance use than heterosexual homeless teens.³⁷

First Nation, Inuit and Métis youth. The historical and ongoing effects of colonization, poverty, and forced acculturation strategies such as residential schools have created challenges for the health and survival of First Nation, Inuit and Métis communities across several generations. Some of these effects help explain higher risks of substance use and misuse for Native people in general,³⁸ as well as for First Nation, Inuit and Métis youth.^{38,39,40} First Nation young people report troubling rates of trauma,⁴¹ including sexual and physical abuse, racial discrimination, and harassment in school. They are over-represented among homeless and street-involved teens;⁷⁻⁹ youth in the child welfare system, including youth in custody;¹⁰ and among sexually exploited adolescents.³⁹ Native young people in North America who are gay, lesbian, bisexual or Two-Spirit are also more likely to experience abuse³⁴ and run away⁴² than heterosexual Native youth. Although First Nation and Inuit communities often have cultural histories of positive non-heterosexual roles,^{34,43} colonizing practices and missionary efforts have shifted traditional attitudes about sexual-minority people in many communities, and there is evidence that sexual-minority Native people have experienced more historical trauma, current abuse and trauma, and higher rates of substance use and problem use as a result.⁴³

Emerging evidence around trauma, stigma, stress and coping

The overlapping experiences of these groups of youth—all at higher risk for harmful substance use—are compelling: they have higher rates of trauma and loss, exposure to sexual and physical abuse and other types of violence, potent experiences of stigma and racism, as well as risk for psychological disorders that may increase their chances of victimization and make coping with subsequent trauma more challenging. Whether the evidence is at the neurobiological^{11,19,21} or population level,^{17,22,28,36} substance abuse or dependence disorders among young people in these risk groups may be attempts to manage, however ineffectually, intense stressors and toxic environments, the physiological effects of chronic stress, and psychological outcomes of untreated trauma, both prior and recurring.¹¹

Fortunately, not all youth exposed to these higher risks end up with chronic substance abuse or dependence disorders. There is growing evidence that protective factors and assets in the lives of even the most vulnerable may buffer their risk, and support

At a glance

- **The majority of youth in Canada do not have alcohol or drug problems. Fewer than one in five teens have ever tried drugs other than alcohol and cannabis, and a similar proportion use alcohol or cannabis regularly.**
- **Special populations of youth are at an increased risk for heavy use of substances, poly-substance use, and substance abuse. Special populations include runaway and street-involved youth; youth in custody; adolescents with co-occurring disorders; sexually-abused and exploited youth; gay, lesbian, bisexual and questioning teens; and First Nation, Inuit and Métis youth.**
- **The increased risk experienced by these populations is due to factors such as elevated rates of trauma and loss, sexual and physical abuse and other types of violence, and stigma and racism.**
- **Interventions to address substance abuse should work towards preventing the underlying factors that drive this behaviour such as sexual and physical violence, and stigma and discrimination.**
- **Beyond prevention, we need culturally-relevant interventions that help teens heal from trauma, learn healthy ways of coping with chronic stress and distress, and stay connected to protective resources in their lives.**



WE NEED FURTHER RESEARCH TO CHART THE COMPLEX PATHWAYS AND POTENTIAL CAUSES MORE CLEARLY, BUT THERE IS ENOUGH EVIDENCE ALREADY TO SUGGEST NEW DIRECTIONS IN PREVENTION AND TREATMENT.

resilience and healing.^{1,8,10,40,41,44} Connectedness to school, positive relationships with caring adults within or outside of the family, and supportive peers seem to reduce the likelihood of the distress and difficulties in coping that lead to problem substance use. Other population-level influences, such as self-governance and cultural continuity among First Nation communities, also appear to contribute to lower distress and improved resilience for youth.⁴⁵ However, this work is in its earliest stages, and the pathways between vulnerability and resilience are complex.

Conclusions and implications for Canada

Prevailing population-based approaches to preventing drug abuse tend to be grounded in a particular view of how youth become involved in substance use and abuse, a view that is based on social norms and influences. From this perspective, tolerant community attitudes about substance use, combined with exposure to use by family or peers, can lead to experimentation (often with tobacco and alcohol—“gateway” substances to more dangerous illicit drugs), followed by increasing use, experimenting with other drugs, problems from regular use, and ultimately, abuse and dependence. In this approach to drug abuse prevention, everyone is at relatively equal risk for eventual chronic abuse and dependence disorders *once they start using*. As a result, prevention has focused on changing the acceptability of any level of substance use (social norms), promoting avoidance and abstinence, and increasing resistance skills to ever trying drugs. Programs such as the popular DARE program, and public health social marketing campaigns, are often based on this view.

Yet is this the most accurate or effective population approach? While the number of teens who try alcohol or other drugs increases steadily throughout adolescence, very few of them actually develop substance abuse or dependence disorders. Indeed, it is only a minority of adolescents who report monthly or more frequent use, even of alcohol, and a small percentage who report using regularly.^{1-6,44} Some measures of problem use, such as binge drinking, increase with age during adolescence, but the rate of people with high-risk alcohol use declines among adults after 18 to 24 years of age.⁴⁶

Addiction to other drugs is even rarer: based on the 2004 Canadian Addiction Survey,⁴⁶ if we exclude problems with alcohol use, only around 1% of Canadians aged 15 and older have symptoms of serious substance abuse, far fewer than those who report ever using an illicit drug other than alcohol or cannabis in their lifetime. For the majority of adolescents, experimentation and “gateway” substance use do not appear to lead to chronic abuse or dependence disorders, or even intermittent harms due to use. Our prevention efforts may be largely misfocused on youth who never will develop substance abuse problems, while we fail to address the issues of those at greatest risk.

Why has this approach remained so popular and the evidence from the groups at higher risk remained relatively unknown? In part, it is because research on chronic substance abuse and dependence among vulnerable populations such as street youth has been difficult to conduct at a population level. Similarly, population-based surveys of youth have seldom included questions about sexual orientation, stigma, trauma, sexual and physical abuse, or co-occurring disorders such as ADHD.^{22,47}

In order to reduce problem substance use, we need to recognize the potent influences of trauma, violence, stigma, and neurophysiological vulnerability on the risk for chronic substance abuse. We need further research to chart the complex pathways and potential causes more clearly, but there is enough evidence already to suggest new directions in prevention and treatment. We should focus our prevention efforts on addressing these underlying issues, rather than just the coping behaviours they elicit. Population-level prevention efforts may be more effective if they focus not on drug use itself, but instead on preventing sexual and physical violence, reducing stigma and discrimination, early identification and treatment of psychological disorders, promoting cultural continuity and self-determination for Indigenous communities, and helping all young people to find safe and nurturing environments. Beyond prevention, we need culturally-relevant interventions that help teens heal from trauma, learn healthy ways of coping with chronic stress and distress, and stay connected to protective resources in their lives.

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Our responses to youth substance abuse

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Pierre is a parent with a 12-year-old daughter in a small rural school within a large regional board that also includes several urban schools. Rumours have been circulating that drug use is rampant in some of the urban schools. The school board has drafted a proposed “prevention policy” for dealing with the problem. As a member of the school committee, Pierre has been asked to comment on the policy, which will apply to all schools within the board, including his daughter’s.

The policy outlines sanctions to be imposed on students who are found on school property with either firearms or drugs. Pierre finds it odd that possession of a joint of marijuana would be treated as severely as carrying a handgun. He also wonders if the penalty in either case—suspension from school either temporarily or permanently—is the right approach to take with a student for whom school may be their only stabilizing influence. Further on, he reads that the board wants to bring uniformed police officers into the classrooms to talk about drugs. He wonders how that will affect his daughter.

Pierre raises some of his concerns at a school committee meeting, but other parents seem to like the get-tough approach and a school board representative says the new measures are all based on solid research findings. Pierre decides to keep his opinions to himself.

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Prevention programs

Prevention programs aim to prevent, delay, or reduce substance use in youth. The intensity of prevention efforts should ideally match the level of risk within an identified population.

Universal prevention targets a broad population of children and youth with low-intensity health promotion efforts that can include awareness campaigns, school drug education programs, and a blend of community initiatives. Schools are an obvious setting for universal prevention, and, indeed, the bulk of prevention programming is based in the schools.

Selective prevention is aimed at a sub-population of youth and their families with a particular risk potential associated with poor academic performance, poverty, or a history of family dysfunction or substance abuse. These programs attempt to reduce the influence of risks by building on personal strengths and promoting coping strategies and other life skills.

Indicated prevention is intended for a relatively small group, including out-of-the-mainstream youth, who may already be using substances regularly, but do not meet the criteria for dependence. This more intensive approach provides various supportive services,



IN CANADA, THE NUMBER OF PERSONS UNDER 18 CHARGED WITH DRUG POSSESSION HAS TRIPLED OVER THE PAST DECADE. IN MANY CASES, THESE YOUNG PEOPLE ARE NOT MERELY UNLUCKY EXPERIMENTERS, BUT MAJOR USERS WHO HAVE PROBLEMS MANAGING THEIR SUBSTANCE USE.

such as referral to counselling, that are aimed at minimizing the harms associated with a problematic lifestyle.

Meta-analyses, which pool the results of several studies to identify the global impact of a program, commonly indicate that prevention programs have a positive impact on promoting abstinence and discouraging the early use of psychoactive substances.^{1,2} However, some programs are more effective than others.^{3,4} Unfortunately, the most widely implemented programs are not necessarily the most effective. Prevention programs most often implemented in North America are based on the Drug Abuse Resistance Education (DARE) model. This program was designed to be delivered by specially-trained and experienced police officers. It aims not only to provide credible information on drugs, but also to help identify and learn to resist various pressures to use. The United States has invested almost a billion dollars in this program, and the DARE official website indicates that 36 million students in the world have been introduced to it. It is also commonly delivered in Canada by police forces. Programs such as DARE, whose main goal is to provide drug information, are successful at enhancing participants' knowledge.^{1,5} But the idea that information alone can stimulate anti-drug attitudes and prevent drug use is unfounded. Meta-analyses indicate that DARE had no statistically significant long-term effect on preventing youth illicit drug use.³

Preventing substance abuse in youth is not just about ensuring that youth do not develop problems or experience harms from using substances and focusing on negative behaviours; it is also about promoting healthy development and providing youth with the tools to make informed and healthy choices. For example, the healthy lifestyles and choices adopted by young people who do not engage in substance use should be continually supported. This is an asset-building perspective that aims to increase the range of protective factors in a young person's life in order to enhance resiliency. Resiliency is the ability of a young person to cope with a situation that cannot be easily changed (for example, living with a parent who abuses alcohol) and protective factors are elements in a young person's environment that make them less likely to abuse

substances. Examples of protective factors include academic success, reading skills, connection with a supportive adult, feeling part of the school environment, and participating in extra-curricular activity.⁸⁻¹⁰

Rather than focusing solely on drug-related knowledge, prevention programs need to use techniques that directly address participants' attitudes in order to help them acquire skills they can use to resist drug abuse.² The most effective prevention programs usually rely on the active participation of peers to provide a positive influence.¹ They teach participants to reframe their perceptions and to adopt refusal strategies, while remaining interactive and focused on rational and behavioural learning.^{1,6,7} Role-plays, feedback, problem-solving strategies and positive reinforcement of desired behaviours all appear to be important tools for effective prevention:² they not only enable subjects to acquire drug-related knowledge, but they also improve decision-making capacity and enhance both self-esteem and resistance to peer pressure.¹

Substance abuse treatment programs

It is more difficult to compare the effectiveness of substance abuse treatment programs because there are few studies on the topic. However, in general, treatment is better than no therapeutic intervention at all.^{14,15}

The scientific literature reveals certain variables linked to treatment success: a low initial level of substance-abuse problems, good integration in school, the support of one's peers and family in favour of treatment objectives, and staying on to complete the program.^{14,15} Impact studies—generally positive with regard to these programs—nonetheless do not clearly identify which treatment approaches are better than others.¹⁵ The factors that show the most promise include providing services that meet young people's needs (schooling, vocational guidance, recreational activities), integrating motivational and family therapy modules within programs, and offering post-treatment services.^{15,16,17}

The inability of research to isolate tools according to their therapeutic effectiveness becomes even more obvious when we look at special

populations of drug-addicted young people, including Aboriginal and street-involved youth. However, a promising approach for treating young Aboriginals involves enhancing programs with traditional practices that address their spiritual needs; for street youth, providing a safe space is an effective measure.¹⁷

One of the challenges in treating youth is a discrepancy between the goals of the organizations who refer youth and the agencies who treat them. A number of young people with substance abuse problems are now being referred to treatment centres by a variety of institutions, including schools and the legal system. This can pose major coordination problems. To start with, the various systems in place do not necessarily share the same views on drug problems. For example, for some school authorities, substance use is a problem in and of itself because it is illegal. Yet few substance abuse rehabilitation programs agree to treat experimental users.

Enforcement

Enforcement and regulatory approaches aim to restrict the availability of substances and to increase their price beyond the reach of young people.^{18, 19} These measures include criminalization of substance use, taxation, minimum legal-age requirements, and graduated licensing. These methods are only partially successful and do not constitute a sufficient response to youth substance use.

Beyond these measures, most young people are also subject to school policies that sometimes use enforcement to maintain a healthy and safe school environment. It is relatively common for school principals to collaborate with police forces in an attempt to curb drug use and trafficking within educational institutions. This collaboration takes many forms, but typically it means allowing police to carry out a raid to arrest some small-scale cannabis dealers or users, handing students caught by staff over to the police, or encouraging students to inform on each other. These tough responses aim first of all at sending a no-tolerance message to students and reassuring parents about the principal's attitude toward drug use. While collaboration with police generally succeeds in achieving these goals, very few dealers or users are actually arrested in this way.

Some Canadian provinces have implemented mandatory youth detoxification legislation for youth with serious substance abuse issues. Since these legal measures have not yet been evaluated, it is difficult to assess their impact. However, even in the absence of a legislative framework requiring drug-addicted adolescents to take

part in treatment, more and more young people are being referred to specialized addiction centres by the justice system as an alternative to custody. The Youth Criminal Justice Act sets out a range of extra-judicial measures that apply to adolescents accused of offences.

In Canada, the number of persons under 18 charged with drug possession has tripled over the past decade (1,047 in 1993 and 3,294 in 2003, according to the Canadian Centre for Justice Statistics).²⁰ In many cases, these young people are not merely unlucky experimenters, but major users who have problems managing their substance use.²¹ So, several young users are entering treatment more or less involuntarily.^{22, 23} Follow-up data show that many young people do not complete the rehabilitation process. However, success or failure at completing the program does not seem to be related to judicial pressure to attend treatment.²² Among the more promising practices aimed at preventing early drop-out is the use of principles from motivational interviewing,^{24, 25} as well as the development of a therapist-client bond.²²

Harm reduction programs (HRP)

Over the past 25 years, the harm reduction approach has influenced Canadian drug abuse strategies. Harm reduction accepts that some drug use is inevitable and even a social norm. Supporters of harm reduction provide users with services aimed at reducing harms related to their use. Harm reduction is usually associated with strategies that include the provision of clean needles and injection sites, prescription of methadone or other drugs, and reliable information and education programs.^{26, 27} However, it also includes a variety of strategies across the spectrum of use, including prevention and treatment. In fact, prevention and treatment services that aim to reduce harm have long existed.²⁷

One of the current debates regarding harm reduction is whether this philosophy is appropriate for universal programs in schools. A universal program under a harm reduction philosophy would be neutral on the topic of abstinence and would focus instead on addressing the harms experienced from use.²⁸ For example, harm reduction programs would address high-risk patterns of alcohol use such as binge drinking rather than abstinence. Should we encourage abstinence or adopt a do-less-harm philosophy in Canadian schools? It is difficult to find a clear answer to this important question. Some research concludes that harm reduction objectives are acceptable only in universal prevention programs for older students who are more likely to use substances than



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younger students. However, the authors do not object to indicated harm reduction programs.²⁹ For example, harm reduction strategies that specifically target young intravenous drug users—including education campaigns on safe injection techniques and needle exchange programs—are effective health measures.^{30, 31}

Mobilizing communities to provide coordinated services

School is often the focal point for initiatives to address youth substance use, as the classroom provides access to the majority of youth. It is an excellent platform for universal programs. The school environment provides a unique place and time to reach young people. Not only are most young people schooled in recognized institutions, but in primary school at least, they usually do not hold strong beliefs or have specific expectations in terms of drugs. However, research clearly traces the development of drug abuse to exposure to a variety of risk factors across a number of domains, including individual, interpersonal and cultural. Not all of these factors can be offset by school programs alone. The youth at greatest risk sometimes leave school prematurely. Many of the highest-risk users cannot be reached in school environments; other environments may be better suited to providing more specialized programs.

Specialized services and community agencies have a greater capacity for more individualized programming, such as matching intensity and length of service to the needs of the youth. Coordination of these services, however, can be a challenge, as organizations may have competing philosophies and different goals. More and more treatment centres favour harm reduction approaches, while several referral agencies prefer abstinence as a goal. Also, during treatment, the confidentiality that is necessary for the development of a therapeutic relationship can undermine the work of referral agencies who depend on access to treatment information. Such gaps in communication and coordination mean that services for youth are not always used efficiently.

Increased efforts should be made to integrate services. A good example of this is an award-winning integrated service network

operating in some regions of Quebec called Mécanisme d'accès jeunesse en toxicomanie, or MAJT, (loosely translated as “youth addictions access mechanism”).³² The goal of MAJT is to provide effective screening, early intervention and rehabilitation for youth with substance use problems. Partners include schools, health and social services centres (CSSS), youth centres, legal settings and addiction-treatment centres. Through training and the use of common instruments for detecting and evaluating alcohol and drug abuse, agencies learn to better communicate with each other. They have also agreed on a way of dovetailing services that organizes the needs of youth into three categories: green light, yellow light and red light. Youth in the green light category do not require intervention. Young people in the yellow light category are referred to a CSSS or a school social worker for brief intervention. Finally, the red lights are referred to addiction treatment centres, where a substance abuse severity index designed for adolescents (IGT ADO)³³ helps interveners to refer these teens to the most appropriate treatment centres. MAJT is now being copied in several other regions in Quebec.³⁴

Once communities have mobilized in order to coordinate services, the challenge lies in correctly selecting appropriate programs to address youth substance abuse. Some organizations specialize in working with communities to identify the needs of youth and to select and implement evidence-based programs that have been scientifically evaluated. Communities that have mobilized and worked with these types of organizations have reported success.¹¹⁻¹³ This approach often begins with an assessment of the risk and protective factors experienced by young people in the community; this provides the basis for a plan of action detailing initiatives and programs the community can implement to attend to the young people's needs. When a community has selected the programs it wishes to implement, the organizations will provide support and training to implement the programs. There is still some work to do in evaluating what program components work best for certain youth and in certain communities, but overall these types of approaches have demonstrated effectiveness in addressing youth substance use.¹¹⁻¹³

Communities do not need to rely on external organizations to mobilize and coordinate their responses to youth substance use. For example, New Brunswick's health regions have formed multi-disciplinary committees to gather relevant substance use information and to set priorities for action. These committees include representatives from enforcement, community and mental health agencies, school districts, and the province's college of physicians. The Campbellton health region stages a wellness rally at the start of every school year to inform Grade 8 students about the services and resources available to them. The wellness rallies include presentations and displays by community agencies as well as activities such as skating and hip hop dancing. Similar initiatives are in place all across New Brunswick.

Conclusions and implications for Canada

The most successful prevention efforts focus on risk and protective factors and are implemented using an interactive approach. Participants in prevention programs should not be perceived as a passive audience, but rather as principal actors. Prevention programs that include these effective components should be implemented on a wide scale in place of the DARE model. As for treatment, sticking with the treatment program until it is completed seems most often linked to therapeutic success with young people.

Some fundamental questions remain: should we favour abstinence first and foremost in our prevention and rehabilitation efforts, or would it be more appropriate to focus on harm reduction as we do with adults? The few studies available seem to indicate that the answer depends on the participants' ages and on their previous experience with alcohol and drugs. An additional area for future research is the incremental impact of prevention or treatment programs on young (aged 11 to 14) and older (15 and over) adolescents. Mental, physical and other development varies depending on age, but research on the impact of programs is not linking the effectiveness of tools to the age of adolescents.¹²

Research indicates that prevention and treatment programs can have significant impacts on youth substance use, yet in order for these programs to benefit the lives of youth, all-out efforts must be made to facilitate access to these programs. This requires community mobilization and integration of services; this can be challenging, but there are success stories throughout Canada that indicate it is possible.

At a glance

- **Responses to youth drug abuse in Canada rest on four pillars: prevention, treatment, enforcement and harm reduction. Reconciling these different approaches poses a major challenge for the implementation of a truly effective strategy for dealing with drug abuse.**
- **The principal aim of the most commonly used prevention programs in North America is to provide young people with drug information. Yet interactive programs that allow participants to identify the pressures they feel to use drugs and teach them the skills they need to resist are more effective.**
- **Despite the difficulty of comparing the effectiveness of various types of treatment, it can be generally stated that treatment is better than no therapeutic intervention at all. However, it is important to provide for young people's needs through schooling, vocational guidance and recreational activities, as well as through motivational and family therapy and post-treatment services.**
- **More and more young people are being referred to specialized addiction centres by the justice system. That means young users enter treatment more or less unwillingly and then drop out. Among the more promising practices aimed at preventing early drop-out is the use of motivational interviewing and the development of a therapist-client bond.**
- **Some communities have been successful in forming coalitions to assess local risk factors and in developing strategies to address these risks.**

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Drug abuse, addiction and youth: a neuroscience perspective

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Jim, a 32-year-old computer programmer, thought about it and found it bizarre. He hadn't tried cocaine in years. Yet, here he was, experiencing intense craving just as he had so many other times over the past months and years. It was as if something kept reminding him of the feeling. It was like a memory that wouldn't go away, a craving memory. He considered resisting it, but this time—he couldn't say why—he just gave in. Now its effects felt even more powerful than the last time he tried the drug. Jim couldn't help but feel that his experiences with cocaine long ago must have somehow changed his brain. How else could he explain the way he felt, even though it had been years since he had last used drugs? If he was to rid himself of his cravings, undoing these changes was his challenge

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Introduction

This chapter provides insights into the biological basis of drug abuse and addiction. Although drug abuse and addiction are often perceived as behaviours controlled by individual choice and free will—and indeed self-analysis and personal insight can facilitate recovery—it is also true that drugs produce physical and chemical changes in the brain that make it progressively harder to act on a desire to quit. It is thought that our brain systems originally evolved to ensure, among other things, that we seek and ingest food and repeat behaviours that bring us other rewards. Addictive drugs tap into these brain systems to provide, in essence, false motivational signals. Moreover, with extended substance abuse, there is a progressive eroding of brain mechanisms related to resisting drugs. The first objective of this chapter is to highlight the behavioural implications of these changes to the brain. The second objective is to look at recent evidence that addictive drugs may affect adolescents and adults differently.

Adolescence is a time of brain development during which the brain is continuing to grow into its adult form and complete its complex inter-connections with different brain regions. This maturing brain is also more responsive to some drug effects and less responsive to others.^{2,4,5,6,7,13} Aggravating these features is the fact that adolescence is also a period of increased risk-taking



IF THE BRAIN TAKES MANY MONTHS OR EVEN YEARS TO REPAIR OR REVERSE DRUG-INDUCED CHANGES, THEN THE BEHAVIOURAL ASPECTS OF THE DISORDER (DRUG SEEKING) WOULD BE EXPECTED TO PERSIST AND BE EVIDENT FOR A SIMILAR LENGTH OF TIME.

behaviour. Just as the brain's reward system likely first developed to enhance behaviours such as finding food to eat, this increased attraction toward novel and stimulating events undoubtedly has adaptive value under some circumstances—increasing our tendency to try new things and make discoveries about the world. However, these same novelty- and sensation-seeking tendencies can also lead adolescents toward poor judgment and reckless behaviours. This highlights the need to identify youth as a key target for drug policies and related programs. The inadvertent short-term and long-term biological consequences of drug exposure can create harm and a long-term vulnerability to future drug effects. These long-term changes may be at the root of drug abuse problems well into the adult years.

Neuroscience research: implications for understanding drug abuse and addiction

There have been many significant findings about the nature of drug abuse and how it affects the brain. Virtually all the scientific techniques that have been brought to bear on this issue make it clear that drugs produce their effects by acting on specific “receptors” in the brain to produce their rewarding effects.¹ Initial periods of drug taking appear to have long-lasting effects that increase vulnerability for future drug taking and other psychiatric disorders such as depression. These behavioural and psychological changes seem to reflect changes within the brain's pathways for regulating responses to rewards and risks. These changes in the brain go beyond the receptor level and involve complex alterations to the machinery inside the brain cells.¹⁰ Environmental factors such as early traumatic experiences can aggravate the development of these changes.^{3, 6, 7, 8, 9} Together, this fundamental knowledge forms the cornerstone of the neuroscience of drug addiction.

While many of our current notions concerning the effects of drugs on the brain are rooted in animal research, more recent human brain imaging research has revealed that repeated drug taking causes clear changes in the biochemical makeup of the human brain.^{1, 10} The results of this work are largely consistent with theories that

emerged from earlier animal research.¹ Neuroscience research is beginning to uncover the precise nature of the neurobiological consequences of early drug experiences. This area of research holds great promise for future drug policies, as it will help us to develop a more holistic approach to the prevention of drug abuse and treatment of drug addiction by embedding a strong biological perspective into future policy frameworks.

The finding that brain changes can persist for some months or even years after drug taking has ceased completely is particularly relevant to youth. The nature of the changes can help explain why drug addiction is a chronic relapsing disorder. If the brain takes many months or even years to repair or reverse drug-induced changes, then the behavioural aspects of the disorder (drug seeking) would be expected to persist and be evident for a similar length of time.

Neurobiology of drug abuse and reward

People's reasons for using addictive drugs may seem obvious. Addictive drugs feel good, and we tend to repeat behaviours that feel good. This is also the basis for reinforcement theory, which helps to explain why people (and all sorts of other animals tested to date) will readily self-administer addictive drugs and revisit places that are associated with a drug's rewarding effects. Reinforcement theory provides a “drug reward” perspective to help us understand why people take drugs. The basis for drug reward lies in the neurochemical properties of addictive drugs. Psychoactive drugs, whether they are medications or drugs of abuse, produce their behavioural effects by influencing the activity of particular brain chemicals that are released from brain cells. These chemicals are known as neurotransmitters.

Different types of rewarding drugs, while distinguishable on various pharmacological grounds, share the common property of increasing the activity of a particular neurotransmitter called “dopamine” in a key part of the brain known as the “mesolimbic” system. Increasing this neurochemical activity increases the rewarding effects of drugs while decreasing it produces the opposite result.^{1, 10, 11, 12, 14, 15}

Under natural conditions, the mesolimbic dopamine system is activated by fundamental behavioural patterns linked to survival, such as those associated with food and sex, and this system is likely to be one of the most important survival mechanisms in the brain. When psychoactive drugs activate this pathway, it is as if the drugs “trick” the brain into perceiving drug taking as a survival-essential activity, and therefore one that must be repeated. In this way, the brain is thought to “learn”, by activation of these regions, that the drug taking is so “essential” that we are motivated to do it again and again. In short, drugs of abuse seem to gain control of our behaviour because the brain mechanisms affected by them are those that mediate our most powerful urges and desires.

Ongoing drug-taking behaviour can be understood in relation to the continual availability and regularly experienced pleasurable effects of the drug. In this case, the drug in question, through its reinforcing neurochemical effects (that is, increased dopamine activity), is a critical driver for ongoing drug taking. Indeed, active drug users will tend to regulate their drug intake over time, and their drug-taking patterns can generally be understood in terms of the short-term presence and absence of the drug in their bodies, and the resulting changes in dopamine activity in their brains. However, the long-term effects of drugs of abuse are a different story.

Long-term effects of addictive drugs—sensitization, cellular adaptation and adolescent neurodevelopment

The continued tendency and compulsion to self-administer drugs of abuse and the persistent drug cravings long after quitting (and in the face of psychological, biological and social harms) is a scientific and clinical enigma. This continued propensity is also at the very core of what makes drug abuse and dependence a major health and social problem. While the rewarding effects of drugs on the mesolimbic system can explain drug taking in the short term, the ongoing desire to take drugs well into the future, even when the drugs are no longer having any direct effect, is indicative of a different biological process. Recent research in the areas of *sensitization* and *cellular adaptation* can help explain this scientific and treatment challenge.

Drug-induced sensitization refers to the process whereby initial experiences with a drug result in an exaggerated response to the rewarding effects of that drug (or other related drugs of abuse) at some future point. At the cellular level, sensitization can be seen

At a glance

- **Drugs of abuse produce short- and long-term effects on brain function.**
- **The longer-term effects of drugs of abuse on brain function are responsible for the addictive properties of drugs of abuse and help us understand the persistent desire for a drug, even after long drug-free periods.**
- **For reasons related to changes in the maturing brain and in behaviour during adolescence, this period of development warrants special attention in relation to drug use and abuse.**
- **A proper understanding of drug use and the harms associated with drug abuse requires a full appreciation of the effects of drugs on brain function.**
- **The effects of drug abuse on brain function are influenced by environmental factors and social interactions (drug–environment associations).**
- **Knowledge of the effects of drugs of abuse on the brain helps us to better understand the social, societal and psychological features of drug abuse and addiction.**
- **The neuroscience perspective is an essential element of any drug policy framework, and the knowledge derived from neuroscience should be key to informing and directing drug policy and best practices.**



FROM A NEUROSCIENCE PERSPECTIVE, IT IS NOT REALLY POSSIBLE TO UNDERSTAND THE BIOLOGICAL BASIS OF DRUG ADDICTION WITHOUT AN APPRECIATION OF THE ENVIRONMENTAL CONTEXT OR SITUATIONAL PERSPECTIVE.

as a process of adaptation to the repeated effects of a drug(s).¹ Sensitization is a process that is particularly relevant to youth for two reasons: 1. There is evidence that not all brain regions develop at the same rate and that during adolescence particular areas of the brain may mature at a faster rate than others, 2. The increased incidence of drug experimentation during adolescence raises the likelihood of sensitization processes being inadvertently activated.

With regard to the first of these two points, recent findings indicate that brain development during adolescence appears to favour brain regions that are known to be associated with motivation, impulsivity and addiction. The preferential development of these brain regions offers a biological framework to help understand the novelty-seeking behaviour and impulsivity often associated with adolescence.^{2, 4, 6, 7} While these selective developmental processes presumably represent a neural platform for the development of adult motivation, behaviour and learning, these same developmental features of adolescence may also produce elevated risks for drug abuse. This feature of adolescent neurodevelopment is consistent with epidemiological studies indicating that experimentation with drugs of abuse and onset of drug addiction tend to occur in adolescence and early adulthood.

From a neurochemical standpoint, the dopamine-enhancing effect of drugs of abuse and the related drug reward can help explain ongoing drug taking, but this does not satisfactorily explain the persistence of a powerful and unreasonable desire for the drug that can last long after the drug has cleared the body. Indeed, this long-term effect is in many ways the hallmark of addiction.

Current research indicates that the long-term nature of addiction results primarily from cellular adaptations in neural pathways projecting through different parts of the brain.¹⁰ These cellular adaptations create their persistent and long-term effects in part through the formation of associations with environmental cues and situations linked to the drug's rewarding effects.¹⁰ Environmental associations become embedded in a person's perception of his or

her environment by virtue of “associative learning.” This learning is grounded in the brain's ability to form associations between the psychobiological effects of the drug and the environmental features surrounding the drug taking. It is worth noting that drug-paired cues also elicit dopamine release, and this is thought to play an important role in the ability of environmental cues to trigger relapse. The rewarding effects (neurochemically and psychologically) of these drugs are very powerful (much more so than natural rewards) and environmental associations that are formed can be very broad and therefore difficult to avoid (these can include parties, social gatherings, specific places, friends and social routines—each of which represents a drug-taking association that must be extinguished). Because there are so many environmental and situational triggers that are often unavoidable, these associations are difficult to extinguish and may take the form of a craving or desire that seems to appear out of nowhere.

Mental illness and substance dependence

Although not the focus of this chapter, it is worth noting the high degree of co-morbidity (co-occurrence in the same individual) of mental illness and addiction. This high degree of co-morbidity has been taken to suggest that substance dependence and certain mental illnesses are linked through shared neurological or behavioural abnormalities.¹ Interestingly, dopamine abnormalities have been implicated in a variety of mental illnesses. The dopamine parallel between addiction and mental illness is consistent with the notion of a shared biological basis. While many scientists and clinicians agree with the notion of a shared biological basis for these concurrent disorders, the causal factors remain unclear.

Co-morbidity of mental illness and substance dependence is of particular interest from the point of view of adolescent development and early experience with drugs of abuse. Late adolescence and early adulthood is a period associated with the onset of a number of mental disorders, and early traumatic experiences can be associated with the expression of mental illness later in life. Taken together with the earlier discussion of the neural effects of drugs of abuse,

these developmental features of mental illness should be considered another important area for increased knowledge and attention in the context of youth substance abuse and addiction.

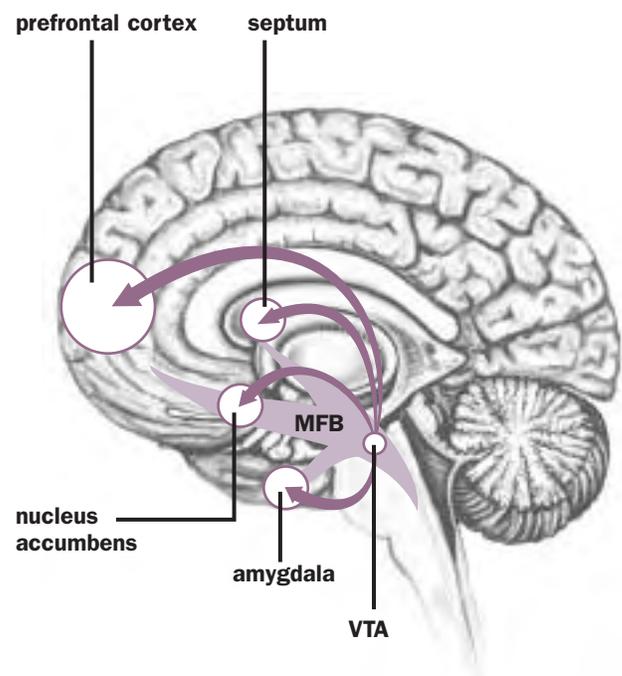
Based on the evidence for increased neurodevelopmental activity of brain areas linked to motivation during adolescence, the scientific literature points to adolescence as a sensitive period with regard to drug reward, co-morbidity, motivation and drug taking. Because the cellular adaptations associated with addiction processes occur in the same regions of the brain as those undergoing preferential maturation during adolescence, adolescence should be viewed as a period of particular vulnerability to the effects of rewarding drugs and to the development of future drug-related problems.

Conclusions and implications for Canada

Neuroscience views behaviour as a function of the nervous system, particularly the brain, and recognizes the existence of systematic laws of behaviour. Moreover, it recognizes that alterations to the brain can be used to explain abnormalities in behaviour. It follows that addiction, in its full expression, can be considered a bio-behavioural disorder. More specifically, addiction is a disorder of motivation and motivational systems in the brain. Like other health problems, biological alterations are key to fully understanding the disorder. This chapter has highlighted specific brain alterations that help explain drug taking and its links to drug abuse and addiction. This chapter has also used neuroscience to highlight the sensitive nature of adolescence as a period of particular vulnerability to drug abuse.

At the same time, from a neuroscience perspective, it is not really possible to understand the biological basis of drug addiction without an appreciation of the environmental context or situational perspective. Indeed, the biological effects of rewarding drugs can only be truly understood through the environmental and situational context. For this reason, a more effective approach to intervention for drug abuse in the future will depend on a better understanding of the potential relationship between pharmacological treatments that work on the brain and nervous system, and psychological treatments such as cognitive behavioural therapy that address situational and cognitive factors.

This chapter set out to explore the neuroscience of addiction, or the relationship between addiction and the brain. It is clear that a comprehensive picture of drug abuse and addiction must include



This illustrates the mesolimbic-dopamine reward pathway. The **ventral tegmental area (VTA)**, located in the mid-brain, receives information from other regions of the brain when a reward stimulus is detected. The VTA uses dopamine to send messages to the **nucleus accumbens**, the **amygdala**, the **septum** and the **prefrontal cortex**. These reward- and fear-related areas play a key role in processing and regulating emotions, memories and drives. They are linked through the **medial forebrain bundle (MFB)**, whose activation leads to the repetition of gratifying actions, which strengthens these pathways in the brain.

Under natural conditions, the mesolimbic-dopamine system is activated by fundamental behavioural patterns linked to survival, such as those associated with food and sex. The system is therefore one of the most important survival mechanisms in the brain. When psychoactive drugs activate this pathway, it is as if the drugs “trick” the brain into perceiving drug taking as a survival-essential activity. In this way, the brain “learns”, by activation of these regions, that the drug taking is so “essential” that we are motivated to do it again and again. In short, drugs of abuse seem to gain control of our behaviour because the brain mechanisms affected by them are those that mediate our most powerful urges and desires.

this specialized understanding, but it is equally evident that this neuroscience perspective must be incorporated into the broader context of social and public health policy. The societal and cultural contributions to addiction—as well as its social consequences—cannot be underestimated, and indeed, contemporary neuroscience highlights its need to maintain a close connection with areas such as social psychology. These connections are exemplified in the emerging field of “social neuroscience” where the intricate interplay of social, environmental and neural processes is recognized and

studied. Such a field, while still in its early stages, holds great promise for the development of a truly holistic understanding of substance abuse in youth.

By grasping the enormity of the neurobiological effects of drug abuse and addiction, and appreciating the interactions between neurobiology and environment that are key to the initiation and perpetuation of addiction, we are starting to build a broad platform for a comprehensive public health approach to addiction.

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Gaps in our approaches to youth substance use and abuse

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Mary had seen her 16-year-old daughter, Joanne, struggle with mood swings since hitting puberty. By the time Joanne was in Grade 11, the mood swings had become more pronounced. She had started to stay out later at night and over the past month had disappeared for days at a time. She would come home looking exhausted yet wired, irritable, and refusing to say where she had been. Mary knew that Joanne was drinking and suspected that she was also using drugs. However, since her daughter had been freezing Mary out, she didn't know anything about Joanne's friends or what they might be doing.

A neighbour suggested that she call the local family resource centre and try to get Joanne in to see a counsellor. The resource centre provided some informative brochures, but no concrete ideas about what to do. Joanne refused to go to a counselling appointment her mother had made for her, and after the fight that ensued, she left home. Mary hasn't heard from her in a week. She is beside herself with worry about her young daughter. Each day and night that Joanne stays away increases her fear that her daughter is being harmed and is losing herself to a destructive way of life. Mary feels impotent and desperate to do something before her daughter is seriously harmed, or even lost to her forever.

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Interventions: an overview of the gaps

The level and quality of substance abuse services in Canada can vary widely from jurisdiction to jurisdiction, but one thing is common to most regions: a general lack of funding for age-appropriate services for young people and their families. Compared with general health services, mental health and addictions have long been orphans in our health and human service systems. Mental health and addiction services for youth and their families are poor cousins to their adult counterparts. Substance abuse prevention and intervention services for young people receive a miniscule percentage of the larger health and human service budget. This creates fragmentation of services and access difficulties, and disrupts the continuum of services needed for a full range of programming.

This lack of funding is compounded by our geographical size and the distribution of our population.¹ As with almost every aspect of our health and human service budgets, funding tends to be concentrated in our cities, along with the more highly trained staff. As a result, people living in large urban centres tend to be better served than those in our small urban, rural and remote communities.² Urban residents may complain that they are underserved, but the situation is far worse for young people in other parts of the country.



HIGHER-PROFILE ISSUES SUCH AS CRYSTAL METHAMPHETAMINE USE CAN GET MORE ATTENTION THAN ALCOHOL OR CANNABIS DESPITE THE RELATIVELY SMALL NUMBERS OF YOUTH WHO MAY BE EXPERIENCING DIFFICULTIES.

Services are also handicapped by how we conceptualize our programs. Too many services for youth are still just modifications of long-standing adult programs.¹ There remains a strong—and misguided—sense that interventions that serve adults should also be effective for adolescents. Adolescents have their own needs that must be addressed in specific ways.³ We do not always pay close enough attention to variations in the developmental levels of the youth who access our programs.

Another problem is that we still tend to provide programming to young people as if they were all the same.⁴ This overlooks the wonderful diversity of our country and ignores the way family culture, gender, ethnicity, age and life experience can influence how services are accessed, perceived or processed. There is clearly a need for services that are not just age-appropriate, but also sensitive to other characteristics of young people.¹ Whether for philosophical or funding reasons, we are still caught in the trap of trying to develop “one-size-fits-all” programming, even though we know it does not work. Admittedly there are efforts in the country to develop diversity in programs, but these are far from universal.

This one-size-fits-all orientation means that many young people do not receive the type of intervention and support they need. This holds especially true for young people who are on the margins of our society. We know from our experiences with young people that programs for marginalized youth need to be different from those for more mainstream youth.¹ Young people with disabilities or those from other than mainstream cultures, street youth, sexual-minority youth, and others report a need for services geared specifically to them.^{5, 6, 7, 8} In addition, we need to emphasize and act on the importance of programming involving families, young people with mental illnesses, and youth in the criminal justice and child protection systems.^{1, 7, 9, 10, 11} It is still far too common for services to be only offered within the various systems rather than across them.

There is also, at times, a significant lack of coordination among various service providers and across systems.¹ Our services still

tend to be stand-alone programs that compete with each other for territorial, jurisdictional or philosophical reasons. This results in a significant gap in how services are conceptualized and delivered. Rather than having a coordinated response to substance abuse and a well-developed and accessible continuum of services, we have competing interests and often a failure to acknowledge other ways of providing services. The result is a hodgepodge of programs providing similar services in a wasteful and frequently ineffectual manner.⁴

This problem results in part from a gap between research and practice.¹² As we become more sophisticated at evaluating prevention and treatment outcomes, we are starting to see which interventions work. For example, we have made great strides in such areas as screening and assessment, client matching and clinical frameworks. However, despite this growing knowledge, there are still programs that continue to use ineffective approaches.¹³ Besides wasting much-needed funds, these programs give us a false sense of action and may actually be doing more harm than no intervention at all.¹³ We need a true commitment to evidence-based practice with corresponding measures of success built into all our programs. This means agreeing on what constitutes success in prevention and intervention, but unfortunately such agreement either does not exist or is so general as to be meaningless. To make evidence-based practice a reality, funding agencies must provide the resources needed to learn and implement new knowledge, and to develop appropriate outcome measures.¹⁴ Unfortunately this is not common.

Another major gap relates to staff training and supports.^{15, 1} Programs are often not delivered as intended because staff are poorly trained and have no access to ongoing professional development. There are only a few specialized post-secondary programs specifically dealing with substance abuse in Canada. This results in a shortage of knowledgeable workers providing services to young people and their families. This is true for front-line staff as well as for psychotherapists and psychiatrists who work with children and adolescents, especially in the area of substance abuse. This work requires a level of expertise that is not always provided in our post-

secondary institutions and is not reflected in our prevention and intervention programs. Other neglected and under-funded areas include clinical supervision, cross-training and interprofessional learning opportunities for staff.

There is also a corresponding lack of consistent substance abuse training for various allied professionals such as police officers, teachers, social workers, nurses and physicians who come into contact with young people.^{4,16} This lack of training hampers the early detection of difficulties, and delays appropriate referrals to service providers. There are some excellent educational opportunities for direct service staff and other professionals, but there is generally not enough core knowledge provided in professional entry-level post-secondary programs, or adequate specialized training at a more advanced stage.

The other side of this requirement for advanced training is the need to demystify our responses to substance abuse. As professionals, our responses must be informed and specialized, but we must also ensure that we do not isolate youth from their communities by singling them out for special attention. Substance abuse is a human problem that requires a human and community response. We need to go beyond our traditional ways of dealing with youth who struggle with substance abuse. For example, if we could train allied professionals such as teachers to be able to recognize and screen young people with substance issues, we could improve the referral process. This might also reduce the reliance on zero-tolerance policies in schools, which serve primarily to isolate young people who most need inclusion and support. This could also result in more effective prevention strategies within our educational and community settings.

Research: what works and what doesn't?

We have added significantly to our understanding of youth substance abuse in recent years, but there is still much we do not know.¹⁷ We still do not have a clear picture of the types of drugs being used and the extent of that use at the local, provincial and national levels.¹⁵ We also need long-term studies that can help us identify risk factors for youth substance abuse.¹⁵ As well, we need to look beyond commonly studied groups. Most of our current research is based on easy-to-access groups of young people in school or in treatment. Effective prevention and intervention strategies require a better understanding of less studied groups, including young

At a glance

- **Intervention services for youth continue to be under-funded and fragmented, and are too often based on adult treatment models that may not work for youth.**
- **Professional services tend to respond to youth substance abuse in isolation from families and communities whose diversity is not fully recognized. Training for substance abuse professionals is limited.**
- **We need to better understand why some youth develop substance abuse problems while others do not, and what aspects of successful treatment models are making a difference for young people.**
- **We need to know how genetics, parental behaviour and mental illness influence substance abuse, and we need to explore the connection between neurobiology, the social environment and addictive behaviours.**
- **Levels of funding and types of available treatment programs vary across provincial and territorial jurisdictions, and policy decisions are often tied to political and ideological circumstances rather than to evidence.**
- **There needs to be a serious effort to identify and implement evidence-based practices, starting with improved knowledge dissemination mechanisms. Vast resources are wasted every year on ineffective or harmful interventions.**



**PROGRAMS ARE OFTEN NOT DELIVERED AS INTENDED
BECAUSE STAFF ARE POORLY TRAINED AND HAVE NO
ACCESS TO ONGOING PROFESSIONAL DEVELOPMENT.**

people in the work force, on the streets, or at the margins of our society.⁶ These also include young people from various cultures in our society. We also need to better understand how young people feel about substance use, prevention and intervention. One way of doing this is through narrative research in which young people are asked to tell their stories.^{17, 18} While this method is not evidence-based, it can contribute to our understanding of the needs of young people.

Perhaps the greatest contribution research can make is helping us to determine which interventions work and why they work.¹⁷ This includes learning about which interventions work best with specific groups of young people. Much of our current research on effectiveness looks at programs or interventions as a complete entity rather than drilling down to examine their component parts to understand specifically what is working. The inclusion of evaluation mechanisms within all prevention and intervention programs would contribute greatly to our understanding of program effectiveness. Research needs to be an active component of clinical practice within all program areas.

Closely related to this is the need to learn more about what does not work and the potential negative impact that ineffective interventions may have on their target populations. For example, there is a growing body of literature on the potential for harmful consequences for some young people enrolled in group counselling and therapy.^{10, 13, 18} We need to further understand these kinds of dynamics so that we can more effectively match the right person with the right service at the right time. On the reverse side, we also need to better understand the potential secondary benefits of some of our interventions. Can our work make a broader contribution to the lives of young people beyond simply assisting them to deal with substance abuse issues?

In addition, we have to better understand the underlying causes of substance abuse and why some people develop problems while others do not.⁹ We have learned something about risk and protective factors related to substance abuse, and we know that high-risk factors

do not necessarily lead to substance abuse. We need to develop a more complete understanding of why two people with similar risk and protective factors can have completely different patterns of substance use. This involves a better understanding of the interplay between substance abuse and other conditions, including fetal alcohol syndrome (FAS) and fetal alcohol spectrum disorder (FASD), mental illness, attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD), and conduct disorders. Indeed, there is a pressing need to better understand the neurobiological aspects of substance use. This includes the interconnectedness between neurobiology, the social environment and subsequent adolescent behaviours. We also need a fuller understanding of the role of victimization and oppression in substance abuse and behavioural or mental health issues.

We also need to explore the link between earlier behaviours and later substance use.¹² For example, we would benefit from increased knowledge about the connection between early academic problems and later substance abuse.⁴ This could contribute significantly to the development of early intervention programs that are more effective than current drug and alcohol education strategies with their heavy demands on time and resources.

A related area that is woefully neglected is cost-benefit analysis.¹⁷ Even when there is evidence that a particular intervention is effective, little work has been done to determine whether it can reach the same size of population as successfully and efficiently as any other form of programming. While there clearly is a need for cooperation and partnering between services providers and other players, we have to also acknowledge that such collaborations are expensive. Understanding the true costs of these endeavours may help us avoid the trap of forming partnerships for their own sake that drain resources for children and youth services.

We also need to better understand how to involve parents, families and communities in prevention and intervention initiatives. Although attitudes have changed in recent years, many services still operate according to a top-down expert model rather than

using a collaborative approach. We need effective collaborations that involve parents and communities as active contributors in the development of prevention and intervention services. To do this we need to improve our understanding of collaboration and cooperation. We also need to expand our definition of substance abuse research to include all aspects of individual, family and community dynamics that have an impact on the development or mitigation of substance abuse among young people.

We also need more research into the role of genetics in individual susceptibility to problem behaviours, the dynamics of relapse, the role of parental behaviour in the development of youth addiction problems, and the relationship of certain mental illnesses to substance abuse problems. We also need to study the development of substance abuse problems within the broader social context through an exploration of related social determinants of health. Indeed, the understanding of these issues is critical to preventing and treating addictions and substance misuse in young people.

Policy: the search for consensus

Most policy and legislation related to young people and substance abuse, other than that which falls under the Criminal Code of Canada, comes under provincial and territorial jurisdiction. The strength in this is that it allows for a more localized and often more immediate response to substance abuse problems than would be possible if everything had to be developed on a national level. However, it also means that there are significant differences in how the various provinces and territories deal with substance abuse issues. It also means that policy development is driven as much by financial considerations as by specific community needs. The jurisdictions with the greatest financial resources often have the widest range of options available to them.

Policy development in this country and related issues connected to funding and intervention are also often driven by the ideological and political climate of the day.⁴ While this may generate much-needed action, it also means that funding for programs and research can be influenced as much by media attention as by evidence-based decision making. This can contribute to the piecemeal development of services that is so often seen in our communities. It also means there can often be a significant disconnect between the severity of a problem and the reaction to it. Higher-profile issues such as crystal methamphetamine use can get more attention despite the relatively small numbers of youth who may be experiencing difficulties, while

lower-profile issues such as alcohol may receive less consideration despite a higher number of users.

There is also a frequent and significant disconnect between the wishes of the general public, especially the parents of young substance abusers, and our legislators and policy makers. For example, one of the biggest frustrations faced by parents is the voluntary nature of most of our services. Young people have to *want* help before it can be given and meanwhile parents must watch them sink deeper into addiction. Many parents have been calling for involuntary intervention options for years, but most jurisdictions have not responded. The new Protection of Children Abusing Drugs Act in Alberta is one of the few exceptions. This law, which allows for short-term locked detention of young people, is receiving strong support among parents and the general public. It is too soon to know if this type of programming will be effective, but it is critical that we work towards addressing this disconnect between the professional and lay communities.

Our response to youth substance abuse has been largely professionalized and our policy and legislative measures are often formulated with limited community input. As a result, our communities feel little ownership of the substance abuse problems that confront us daily—not just the problems related to the human toll on young people and their families, but also the stresses on our communities and our resources. There have been some efforts in recent years to address this issue, but usually with regard to a specific issue. What is needed is a broad-based national, provincial and territorial consultation where members of the community are actively involved in developing a consensus on how to respond to issues of concern throughout all parts of the country.¹⁵

Finally, we must also develop policies that support new avenues for the dissemination of knowledge.¹⁵ There remains a gap between what is known and what is being done, in part because of difficulties in getting new knowledge out to practitioners. Knowledge without application, while interesting, is of little benefit to young people.

Conclusions and implications for Canada

There have been great strides made in the area of youth substance abuse. We have intervention, research and policy initiatives in Canada that are among the best in the world. However, there are still significant gaps in our work because of a lack of funding,

the geographic vastness of our country, and the diversity of our population. We need to develop programs based on the evidence of what works and what does not. We need to increase community and consumer involvement in the development and implementation of policy, legislation and services. We have to continue to break down the intervention, research and policy development silos that

drain our resources and prevent the development of effective strategies. We need to address existing policy and knowledge gaps by supporting new research initiatives and a broad-based public consultation. Only through such efforts can we hope to effectively deal with the devastating effects of substance abuse on our young people, their families and communities.

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CONCLUSION: A call to action

In publishing *Substance Abuse in Canada: Youth in Focus*, CCSA's aim was to provide an overview of youth substance use and abuse, and to report on what the evidence tells us about how best to address the immediate and long-term threats that alcohol and other drugs pose for this vulnerable segment of the population. Addressing youth substance abuse through a variety of approaches, including promoting healthy development, clearly needs to be a priority for Canadians and the actions we take should begin in childhood and follow through beyond adolescence. This comprehensive approach to early and sustained intervention should build on proven successes while incorporating emerging knowledge into our prevention and treatment programs.

In this call to action, we draw on many of the themes explored in earlier chapters and use these as a starting point for a discussion of future directions for the substance abuse field. We start by exploring the importance of appropriately matching services to the needs of young people as they move from childhood through adolescence. This leads to a discussion of some of the gaps and shortcomings in services for youth and how we might use current and emerging knowledge to correct these deficits. We then address the need for improved training and closer collaboration among substance abuse and allied professionals. Finally, we highlight the value of ongoing research into risk and protective factors associated

with youth substance abuse and the need for improved evaluation of substance abuse programs.

Matching services to age and stage

Appropriate programs and services should be available to all young people as they move from childhood through adolescence and beyond. What these programs and services should look like will vary greatly depending on the age and needs of youth.

Targeting Children. It makes sense to start providing young children with the tools and support they will need to make healthy lifestyle choices. By the time many high-risk young people reach mid-adolescence, they no longer attend school regularly and are hard to connect with appropriate services. As well, research clearly indicates that many risk factors for adolescent substance abuse have their roots in childhood, including academic problems, abuse, childhood psychological disorders such as Attention-deficit hyperactivity disorder (ADHD), and a low degree of bonding with parents. Appropriately identifying and addressing these problems in childhood can significantly reduce the risk of future problems. Evidence pointing to the value of preventing early initiation of substance use is yet another reason for targeting children at younger ages.

Identifying and addressing risk in children is an area where there is much room for improvement. ADHD provides a good illustration of this. There is a popular belief that ADHD is over-diagnosed and pharmacological treatments such as methylphenidate (Ritalin®) are over-prescribed to children and adolescents; however, this is not consistent with recent research. A study in Atlantic Canada indicates that there are many young people who meet the criteria for ADHD, but who do not receive pharmacological treatments. Moreover, many youth who meet the criteria for ADHD report taking Ritalin® without a doctor's prescription. This suggests a need for improved screening and treatment of problems in childhood.

Targeting Adolescents. School-based prevention programs for adolescents should focus on substances that are used most frequently and cause the most harm within this population. The number-one substance on both counts is alcohol, followed closely by cannabis. Given this information, what are the appropriate goals and messages we should build into prevention programs aimed at this group? Some say abstinence is the only reasonable objective while others argue for low-risk use. In our chapter on neuroscience, we learned that the sensitization process makes any substance use in youth a potential trigger for increased risk at a later stage of development. This knowledge clearly supports the goal of abstinence in prevention programs. On the other hand, an

abstinence message may not be appropriate for young people who have already begun to use these substances. In such cases, research supports the effectiveness of programs that target risky patterns of use in older substance-using students.

School provides access to a majority of young people at some point in their lives and this makes the classroom a natural platform for universal programs. However, high-risk users are less likely to attend school and even when they do, other environments may be better suited to providing more specialized programs. Community agencies, for example, can offer more individualized programming that matches the intensity and length of service to the needs of young clients. Some youth subgroups who are at a disproportionate risk for problematic substance use, including gay, lesbian, bisexual and questioning teens; First Nations youth; abused youth; and youth with co-occurring disorders, will also be better served outside of the school environment. It is important to be sensitive to these differences and the impact that they may have on risk and protective factors and service delivery.

Implementing effective services

Addressing youth substance abuse presents many challenges. There are few standards and little evidence underpinning some prevention and treatment services. Program evaluations are rare, staff training is often inadequate, and there is a lack of knowledge and guidance when it comes to choosing prevention and treatment programs. These limitations contribute to discrepancies in the quality of services delivered to youth, and delivery of ineffective services wastes resources and fails to achieve our prevention and treatment goals.

One step in the right direction would be to develop accreditation standards for prevention and treatment programs and to tie funding directly to the implementation and evaluation of these accredited services. A sound program accreditation model would encompass several components, including consultation with experts to establish specific program criteria based on contemporary knowledge and effective methods.

We still have much to learn about the interplay of biological, psychological and social processes involved in substance abuse, but we know enough about which factors to target and which methods of intervention are effective to begin to move forward. Accreditation does not mean waiting for all the answers before we act. Rather, it is a process of knowledge development whereby programs are continually evaluated and the resulting information is used to make refinements and improvements that boost program impact. Achieving the best results requires evaluating which program components work best for specific youth subgroups.

Program providers need to be accountable for ensuring the services they deliver are appropriate for the community they are serving and its diversity. This includes culturally-appropriate services and services that address the risk and protective factors of youth in the community. An increasingly common method of ensuring that programs meet the needs of youth is to directly assess the prevalence and patterns of substance use in the community. In some communities this information may be available from surveys already in place, including provincial student drug use surveys. Information about specific risk and protective factors can also be collected to help program providers choose from an array of tailored programs and services.

Two organizations that have worked with communities in Canada to address youth substance use are the Search Institute and Communities that Care. Although both use community surveys to assess risk and protective factors, there does not appear to be a strategy in place to address implementation of these surveys in a culturally-appropriate manner. However, this may be mitigated by community involvement in implementing the programs. Further evaluation of these programs has the potential to suggest ways to adapt them in a culturally-appropriate manner.

Preparing professionals

A successful response to youth substance abuse depends on trained professionals who are able to screen, identify and treat problems related to young people's use of alcohol and other drugs. Some professionals who work with youth are better placed to do this than others and there is a need for improved coordination of the services they provide. For example, a public health nurse working in a school may be in a good position to identify a young person with substance abuse issues, but once the problem has been revealed through an initial screening may then need to refer the individual to other professionals who specialize in substance abuse treatment. This type of coordination requires available services delivered by a specialized substance abuse workforce and awareness of substance abuse issues and screening techniques among allied professionals such as family doctors, teachers, psychologists and youth workers.

Coordination is also a critical requirement for the effective delivery of treatment. For example, it is possible to integrate pharmacological treatment for cravings and substance effects in the brain with a cognitive-behavioural approach that addresses maladaptive thoughts and behaviours associated with substance abuse. Regrettably this multidisciplinary approach to treating substance abuse is rare, although more common in mental health settings where interdisciplinary teams work together within a hospital environment. However, many of the services available for treating addictions occur in community settings that do not have the same ready

access to a team of professionals. In such cases, a multidisciplinary approach means coordinating across services and requires that professionals be equipped with a clear communications structure and an understanding of who is in charge of the treatment plan. These are requirements that can and must be met through cross-disciplinary training for professionals working in and around the substance abuse field.

Sustaining and supporting workforce development was identified as a key priority in the National Framework for Action to Reduce the Harms Associated with Alcohol and Other Drugs and Substances in Canada. To this end, CCSA developed the Canadian Network of Substance Abuse and Allied Professionals website (www.cnsaap.ca) specifically for Canada's substance abuse workforce. The new Network promotes evidence-based practice and ongoing learning with an emphasis on emerging trends, quality assurance and cross-disciplinary collaboration. The Network also serves as a virtual gathering place where professionals can learn about upcoming events, education and career opportunities, and new developments from across Canada and around the world.

There remains an important need for youth-focused initiatives within the area of workforce development. Specifically, we must promote awareness and training in early detection, brief intervention and referral among a range of professionals who work with children and adolescents and who, in their position as a first point of contact, are equipped to identify youth at risk. We know that many young people who come into contact with various health and social services such as child welfare are at high risk for substance abuse and there is a need for those providing these services to be aware of this fact and to be able to screen their young clients for potential substance abuse problems. Even when substance abuse issues are not present, service providers should take note of the various risk and protective factors present in the lives of the young people they work with so that they can anticipate emerging needs or potential problems.

Continuing to develop knowledge

We need to identify gaps in our knowledge and look into areas of further research on youth and substance abuse; however, designing and implementing this kind of research is a difficult challenge. For example, to address the important relationships between early trauma and adversity and substance abuse, we need to ask young people about sensitive topics, including sexual behaviour, substance use and prior victimization. This is hard to do on a large scale (in province-wide student surveys, for example). There are concerns that young people will experience duress in responding to these questions or that asking students about risky behaviours such as sexual activity or substance use will normalize

attitudes towards these behaviours and encourage their spread. These concerns need to be addressed in order to satisfy ethics committees and to solicit participation in surveys by school boards and schools.

There has been some success in conducting surveys that ask about these types of behaviour. Concerns about the distress students may feel when asked for sensitive information can be addressed by referring students to crisis or counselling services. The danger of normalizing risky behaviours can be dealt with by ensuring the survey is constructed in a way that does not assume students are engaging in these behaviours. It is also important to examine the experience of jurisdictions that regularly implement these surveys. In fact, the results of these surveys can be used to show students how few of their peers actually engage in these risky behaviours. They can also be used to educate policy makers about behaviours that need to be addressed in a community. We should not underestimate the difficulty of gathering this kind of information, but neither should we downplay the tremendous benefit of being able to use this kind of data to increase our understanding of the risks associated with substance abuse and to be able to anticipate and act on emerging problematic trends.

It is widely agreed that a key knowledge component in driving successful intervention strategies is proper evaluation of substance

abuse programs across the prevention, treatment and harm reduction domains. Much of what we need to know about which program components work best for youth according to their culture, ethnicity and age can be addressed through comprehensive evaluations. In addition, cost-benefit studies can highlight the economic benefit of these types of programs and can be used to justify the resources allocated to them. Yet, these evaluations are supported much more in theory than in practice. The reality is that many youth intervention programs operate with limited resources and the cost of comprehensive evaluations could draw scarce resources away from program delivery. One way of addressing this could be through partnerships with researchers at academic institutions with the capacity and interest to do this type of research.

Conclusion

Although a sustained commitment to addressing youth substance abuse will require increased attention and resources, this continued effort will pay off by reducing the considerable short- and long-term harms and costs associated with substance use, abuse and dependence. In addition, targeting the underlying risk and protective factors associated with substance abuse has the potential to reduce other negative behaviour, including criminal and violent behaviour, and to promote positive outcomes for youth that include getting a post-secondary education and finding a remunerative and fulfilling place in the job market.

Suggested reading

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