



ALCOHOL AND HEALTH

THE EFFECTS OF EARLY ALCOHOL USE

CAUSES AND CONSEQUENCES OF EXCESSIVE DRINKING IN ADOLESCENCE



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INTRODUCTION

It is against the law to sell alcohol to minors in Quebec, as it is almost *everywhere* in the world. Numerous retail campaigns and posters at points of sale serve as reminders of this fact.

In recent years, additional effort has gone into further publicizing the legal obligations related to the age limit and the importance of enforcing it, without necessarily explaining why the law exists.

Yet there are some very good reasons why young people are denied free access to alcohol. Scientific data clearly shows the harmful effects. By interpreting that data for a broader audience, Éduc'alcool hopes to delay the start of drinking as long as possible.

In some societies, young people are introduced to drinking in specific circumstances and under parental control. That kind of initiation has a beneficial impact and reduces the frequency of intoxication.

Conversely, the younger children are when they begin drinking without guidance, the more frequently they drink, and to excess.

Here is another troubling fact: alcoholics and people who have difficulty controlling their impulses and emotions often began drinking a great deal very early in adolescence. Fortunately, there are now help lines in Quebec where people with such problems can get advice and assistance.

Recent research is helping us understand the neurobiological processes in the brain at the age when adolescents tend to exhibit risky behaviour or drink large quantities of alcohol.

This monograph interprets the research in a simple, straightforward style to explain why children should not begin drinking too early without parental guidance, and why parents must remain watchful.

In brief, the longer adolescents wait before getting drunk for the first time, and the more their introduction to alcohol occurs under appropriate circumstances and with parental guidance, the better it will be for them. Once they start to drink, of course, moderation is always in good taste.



ADOLESCENCE

Adolescence is the period of transition from childhood through puberty to adulthood. It is generally acknowledged to be a very *awkward* time.

Adolescence is often defined by physical and biological changes, but there is more to it than that. Significant social changes also occur as people pass from childhood, i.e. requiring supervision, to adulthood, i.e. responsible for their own behaviour.¹

Increasingly, researchers are coming to agree that individual characteristics and social demands, as opposed to simply age, are what define adolescence.²

Given that periods of transition and upheaval are strongly associated with excessive drinking, adolescence itself is a risk factor for excessive drinking.³ It therefore comes as no surprise that this is the time when most young people have their first experience with alcohol.

¹ Dahl, 2004

² White, 2003

³ *Alcoholism*, 2006

HOW THE ADOLESCENT BRAIN DEVELOPS

The brain exemplifies the changes and transitions of adolescence. Contrary to what neurologists and psychiatrists believed for so long, the brain of an adolescent is not yet fully developed. In fact, just like the body, it goes through a major transformation during this particular period.⁴

During the pre-teen and teenage years, the brain is “reconfigured” and the areas responsible for emotions undergo particular modification. The emotional intensity of adolescence, which some adults recall with nostalgia, is one phenomenon that can be explained by neurochemical developments in the brain. Last to mature is the frontal lobe*, which is involved in planning, strategizing, organization, concentration and attention.⁵

Adolescents may thus be defined as young people who feel everything intensely but have great difficulty thinking ahead and anticipating the consequences of their behaviour, particularly risky behaviour.

It's true that the adolescent brain has more neurons than the adult brain. This gives it enormous plasticity and young people sometimes have better memory functions and cognitive skills than adults. But many researchers decry the false perception that young people have adult decision-making skills. In fact, because their neural networks are not yet fully developed, adolescents have trouble with stable decision-making.⁶

Some researchers believe that adolescents who drink excessively do so largely because of their inability to anticipate the consequences of their actions.

* The frontal lobe and the prefrontal cortex.



THE BRAIN'S SLOWER PACE OF DEVELOPMENT MAY CAUSE EXCESSIVE DRINKING

The adolescent brain may be slow to develop, but children are reaching puberty earlier and earlier. This remarkable contradiction is identified as a risk factor in alcohol abuse among young people.

Puberty causes hormonal and brain changes within the adolescent's reward and motivation system. Those changes create a tendency toward reckless behaviour and thrill-seeking at a time when the ability to anticipate consequences is still underdeveloped.

For many adolescents, drinking alcohol is one way to experiment with thrill-seeking. *“Adolescents like intensity, excitement and arousal (...). Adolescence is a time when sex, drugs, very loud music and other high-stimulation experiences take on great appeal.”*⁷

This puts adolescents doubly at risk for alcohol abuse: their capacity to think properly and make good judgements is still developing, and they are thrill seekers.⁸ That makes them awkward. As R.E. Dahl says, *“being an adolescent is like starting an engine without yet having a skilled driver behind the wheel.”*⁹

⁴ Neuroscience, 2007

⁵ Moss, 2008

⁶ De Pratoncal, 2005

⁷ Dahl, 2004

⁸ Zeigler *et al.*, 2005

⁹ Dahl, 2001, vol. 69



ADOLESCENT DRINKING

ADOLESCENTS START DRINKING EARLY

In Quebec, you have to be 18 before you may legally purchase alcohol. But most young Quebecers take their first drink well before then.

A recent study of 481 Quebec students in grades 5 and 6 showed that 50% of boys and 35% of girls under the age of 12 had already tried alcohol; among this group, the first drink was usually around the age of 9.¹⁰ The most recent data, collected in 2006 among the 4,571 high school students (grades 7-11) who took part in the *Enquête québécoise sur le tabac, l'alcool, la drogue et le jeu chez les élèves du secondaire*, shows that the average age at which children had their first drink was 12.7 for girls and 12.4 for boys.¹¹

This is similar to the average age of 12.4 obtained by Statistics Canada in a 1998-99 study of 4,296 adolescents aged 12 to 15.¹²

It should be noted that having a first drink with family, in an appropriate setting where everyone is drinking moderately, is not at all the same as doing so with peers, where risk-taking and excess are valued. The drink may be the same, but when it comes to drinking habits, the results will be completely different. In the first instance, adolescents learn that moderate alcohol consumption is something that enhances the pleasure of being together; in the second, they learn that the goal is to get drunk.

ADOLESCENTS ARE DRINKING LESS THAN THEY USED TO

As for adolescent drinking habits, the results of the biennial Quebec study first done in 2000 are encouraging, although still worrisome.¹³

The percentage of high school students who say they had a drink in the 12 months prior to the survey has dropped significantly in six years, but it remains high, falling from 71.3% to 60.4% between 2000 and 2006.

MOST ADOLESCENTS ARE OCCASIONAL DRINKERS

Among pre-teens who say they have tried alcohol, almost all of them (89%) are "explorers" who report having taken a few sips, or no more than one drink, a few times during the previous year. Among high school students who drink, most (62.2%) are occasional drinkers who drink less than once a month or say they have drunk alcohol about once a month in the 12 months preceding the survey. Note, however, that 30% of grade 10 students and 36.8% of those in grade 11 are regular drinkers who have alcohol at least twice a week.

¹⁰ Laventure, M., 2009

¹¹ Dubé & Fournier, 2007

¹² Statistique Canada, 2004, *The Daily*

¹³ Institut de la statistique du Québec, *Enquête québécoise sur le tabagisme chez les élèves du secondaire*, 2000 et 2002 and *Enquête québécoise sur le tabac, l'alcool, la drogue et le jeu chez les élèves du secondaire*, 2004 and 2006

THE MORE PEOPLE MIX ALCOHOL WITH ENERGY DRINKS, THE MORE THEY DRINK

With teenagers, moderation is unfortunately not the rule. In fact, the opposite is true: when they drink, they tend to drink a great deal,¹⁴ a phenomenon corroborated by a number of European and American studies.¹⁵ Among Quebec high school students who said they had drunk alcohol during the previous 12 months, 67.4% of boys and 64.6% of girls had five or more drinks on a single occasion. By comparison, 50% of adult drinkers in Quebec say they drink excessively at least once a year.¹⁶

According to the *Institut de la statistique du Québec*, episodes of excessive drinking and repeated excessive drinking increase significantly among adolescents as they get older. "From 12 to 13, the prevalence of excessive drinking practically doubles, from 30% to 53%. From 13 to 15, it increases again, from 53% to 68%. After that, it continues to increase with each year, from 68% (age 15) to 78% (16) and then to 83% (17 and older). The same phenomenon is observed with regard to the prevalence of repeated excessive drinking (at least five episodes of excessive drinking in the last 12 months). From the age of 12 and under to age 15, the prevalence rises from 6% to 24%, then up to 36% and 42% among students 16 and 17 or older."¹⁷ In short, more than one young adolescent in 20 and at least one-third of teens 16 to 17 get drunk frequently.

Note: In drinking studies, "excessive drinking" is generally defined as 5 or more drinks per occasion. Risk curves show that this is the amount at which alcohol-related problems begin to appear.

While adolescents already have a tendency to drink excessively on a single occasion, the risk factor has been aggravated by energy drinks, which are extremely popular among young people. According to the Marin Institute in California, 31% of 12 to 17-year-olds drink energy drinks regularly.

Energy drinks contain taurine,* glucuronolactone** and about 80 mg of caffeine, or the equivalent of one cup of coffee. The drinks are sold and consumed for their stimulant effect, particularly at parties and raves.

Adolescents mix alcohol with energy drinks to stay awake longer and also to mask the unpleasant taste of alcohol. This can be expected to increase the number of alcoholic beverages consumed per occasion, as well as the speed at which alcohol is ingested.

One study corroborates this expectation and finds that, compared to those who do not mix the two, people who mix alcohol and energy drinks:

- drink more on each occasion (5.8 vs. 4.5 drinks);
- have a higher maximum per occasion (8.3 vs. 6.1 drinks);
- get drunk weekly twice as often (1.4 vs. 0.73 times).

* Taurine is an amino acid initially isolated in bull bile and now produced synthetically for energy drinks.

** Glucuronolactone is a chemical composite produced naturally in the liver by the metabolism of glucose.



¹⁴ Demers & Quesnel-Vallée, 1999; Davis, 2006

¹⁵ Kuntsche, Rehm & Gmel, 2004 ; Morbidity Mortality Weekly Report, 2009

¹⁶ Éduc'alcool, 2007

¹⁷ Dubé & Fournier, 2007

¹⁸ Simon & Mosher, 2007

¹⁹ Ferreira, de Mello, Pompeia, & de Souza-Formigoni, 2006

²⁰ O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2007



WHY ADOLESCENTS DRINK

Adults and adolescents have different reasons—individual, social and environmental—for drinking too much.²¹

DRINKING TO DEAL WITH A PROBLEM IS A MARGINAL BUT DISTURBING PHENOMENON

A minority of adolescents drink out of boredom, to forget their daily concerns or because of family, school or relationship problems.

When they drink for such reasons, it's cause for concern. A review of the scientific literature on why 10 to 25-year-olds drink shows that young people who drink to solve a problem are more at risk for problem drinking.²² One very recent study of more than 30,000 American high school students reveals that teens who drink when they are depressed are significantly more at risk of attempting suicide than those who drink for other reasons.²³

If friends notice such risky behaviour, it is important to take action. Adolescents must get help so that they can acquire the skills they need to deal with life's problems.²⁴

²¹ Zucker, Donovan, Masten, Mattson, & Moss, 2008

²² Kuntsche, Knibbe, Gmel, & Engels, 2005

²³ Schilling, Aseltine, Glanovsky, James, & Jacobs, 2009

²⁴ SFA/ISPA, 2008



LIKE ADULTS, MOST ADOLESCENTS DRINK SOCIALLY

The vast majority of adolescents drink for social reasons. The principal factors motivating young people to drink are socializing with friends, having fun and giving in to peer pressure. According to Kuntsche, author of a recent paper on what motivates young people to drink, adolescents generally drink when they are partying with their friends.

At first glance, there is nothing unusual or problematic about this. Like adults, most adolescents drink socially. What's different about them, however, is that they tend to do their socializing in settings known to promote excessive drinking.

Among younger pre-teens (12 and under), the motivators are different. The girls tend to start drinking because they feel sad or lonely and turn to alcohol because they want to feel better and forget their problems. Boys drink more out of a desire to belong to a group and in response to behavioural problems. Curiosity is another reason why pre-teens try alcohol.



²⁵ Kuntsche *et al.*, 2005; Kuntsche, 2007

²⁶ Laventure, M., 2009

PROBLEMS ASSOCIATED WITH EXCESSIVE DRINKING

HEALTH PROBLEMS

While recent discoveries in neuroscience are helping us better understand why young people are predisposed to drink abusively, they also show that *excessive drinking is particularly harmful to adolescents*.

There are few studies on adolescents' biological sensitivity to alcohol, given the ethical issues related to administering alcohol to underage subjects for research purposes. Nonetheless, a number of animal studies reveal that the adolescent brain—particularly the hippocampus, which is the area of the brain responsible for memory—is more sensitive to the effects of alcohol than the adult brain.²⁷

The tremendous plasticity of the adolescent brain, and the fact that it undergoes so many changes during puberty *increases the risk that young people will damage their brains more than adults who drink the same amount of alcohol*.²⁸

Abusive drinking affects memory and brain plasticity in adolescents more than in adults.²⁹ Because the research on

this subject is still in its infancy, it is inappropriate to draw definitive conclusions about the long-term effects of alcohol abuse on adolescent memory and learning ability.³⁰ However, research on animals shows the potential long-term effects of early excessive drinking in the form of increased problems with impulse control and alcohol dependency in early adulthood.

It has also been found that early excessive drinking causes people to make more risky decisions and that this does not diminish over time.³¹ Human studies have shown time and again that difficulty with emotion control, delinquent behaviour and alcohol dependence in people in their early twenties are also associated with early alcohol consumption (age 13 or younger).

Furthermore, one longitudinal study has shown that when young people drink before the age of 21, the risk of drug problems later on increases by 70%.³²

²⁷ White & Swartzwelder, 2004

²⁸ Zeigler *et al.*, 2005

²⁹ Newbury-Birch *et al.*, 2009; Masten, Faden, Zucker, & Spear, 2008; Windle *et al.*, 2008

³⁰ Spear & Varlinskaya, 2005; National Institute on Alcohol Abuse and Alcoholism, 2006

³¹ Nasrallah, N.A., Yang, T.W.H., & Bernstein, I.L., 2009

³² Norberg, K.E., Bierut L.J., Gruzca R.A., 2009

ADOLESCENT HORMONES ARE IN A DELICATE BALANCE

Adolescence is associated with pronounced hormonal changes and an increase in the production of sex hormones. This, in turn, stimulates the production of growth hormones, which are essential to human development.³³ These changes are complex and relatively synchronized, which makes drinking during this time *particularly likely to disturb the hormonal balance necessary for the development of organs, muscles, bones and the reproductive system.*³⁴

It is ironic that the adolescent brain, which is more vulnerable to the neurotoxic effects of alcohol than the adult brain, is actually less sensitive to the sedative and motor effects of alcohol. Consequently, adolescents—whose brains are more likely to suffer short and long-term damage from excessive drinking—are more likely than adults to drink greater quantities, since it takes longer for them to feel the immediate effects.³⁵

EXCESSIVE DRINKING CAN CAUSE PHYSICAL DYSFUNCTION

Clearly, prolonged excessive drinking causes a number of health problems. And while alcohol may cause fewer problems among young people than among adults, the truth is that *when adolescents gets drunk, even just once, they are at risk for serious physical dysfunction, which they ignore all too often.*

Excessive drinking can obviously lead to nausea, vomiting and fainting, but it can also cause gastrointestinal bleeding, cardiac arrhythmia, a cerebrovascular accident (CVA, or stroke) and respiratory depression that can lead to coma and death.*

Studies show that *adolescents who drink frequently and abusively suffer secondary effects, such as changes in appetite, weight loss, eczema, headaches and sleep disturbances.*³⁶

* For a detailed description of these complications, see *Educ'alcool*, 2007.

³³ Dahl, 2004

³⁴ National Institute on Alcohol Abuse and Alcoholism, 2006

³⁵ Windle *et al.*, 2008

³⁶ Newbury-Birch *et al.*, 2009



INCIDENTS AND ACCIDENTS

Young people report all kinds of social problems associated with their drinking, since they get drunk frequently and take a lot of risks. Abusive drinking promotes risk-taking, so it's not surprising that *a disproportionately high number of adolescents report incidents and accidents caused by excessive drinking.*³⁷

RISKY SEXUAL BEHAVIOUR

One work group has reviewed a number of studies on the effects of alcohol on teenage sexual relations. Briefly, drinking is associated with lack of condom use in first and subsequent sexual encounters, the risk of sexual activity at a younger age, unprotected sex and unplanned pregnancy, and increased risk of sexually transmitted disease (STD).³⁸

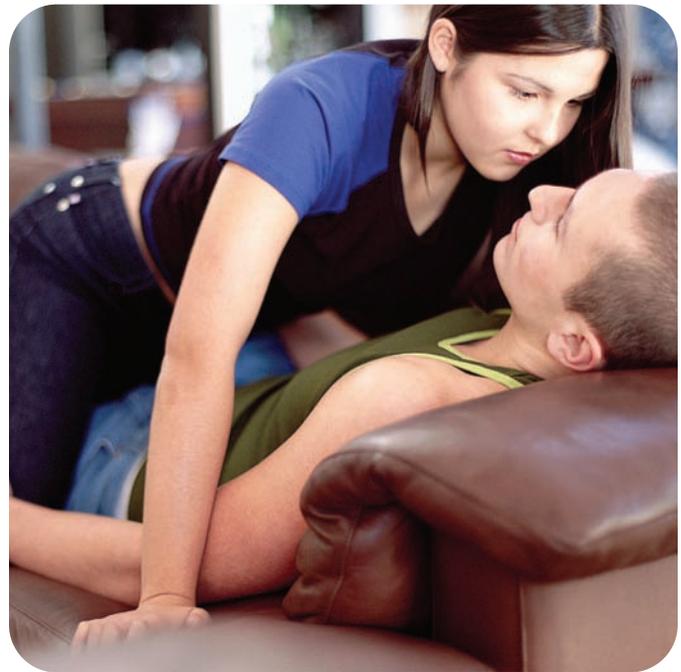
While this is not necessarily a causal relationship, the authors note that the association is strong enough to allow the conclusion that *alcohol probably contributes to poor judgement with regard to sexual behaviour.*

LINK BETWEEN ALCOHOL AND VIOLENCE

Young drinkers are more involved in violent altercations, as both assailants and victims. As with adults, alcohol makes some young people more inclined to be aggressive.³⁹

However, this connection is probably not due solely to alcohol's pharmacological properties, but rather to the interaction of biological, psychosocial, situational and cultural factors. Several studies show that the link between alcohol and violence varies greatly, depending on the drinking circumstances and social values regarding the use of violence.

Young people who drink must remain vigilant because *alcohol probably facilitates the expression of violence among those who are predisposed to it.*



³⁷ Chaloupka *et al.*, 2002; Edwards *et al.*, 1994; Giesbrecht, 2000; Mosher, 1999; Wechsler, 1996

³⁸ White & Swartzwelder, 2004; Newbury-Birch *et al.*, 2009

³⁹ Newbury-Birch *et al.*, 2009

ROAD ACCIDENTS

Alcohol is one of the main causes of death on Quebec roads. It is estimated that, from 1995 to 2003, 1,655 Quebecers died in road accidents in which at least one driver was under the influence of alcohol. In 2000, close to 40% of drivers who died on the road had been drinking.⁴¹

The situation has improved considerably since then. In 2007, only 28% of drivers who died on Quebec roads had a blood alcohol content greater than 0.08 (80 mg of alcohol per 100 ml of blood).⁴²

Despite the zero tolerance rule for new drivers, *drinking and driving is still a disastrous combination among young people*, far too many of whom are unfortunately involved in serious accidents where alcohol is a factor. From 2002 to 2006, 41% of drivers under the age of 25 who died in a road accident had alcohol in their blood; 34% of young drivers were over the legal limit of 80 mg of alcohol per 100 ml of blood.⁴³

The *Société de l'assurance automobile du Québec (SAAQ)* reports that people aged 20 or older who are driving with a blood alcohol content between 80 and 100 mg per 100 ml of blood are five times more at risk of having a fatal accident than sober drivers of the same age. Teenagers 16-19 who drive with the same blood alcohol content are 40 times more likely to have an accident than sober drivers the same age. The risk is even higher among very young drivers 16 and 17.



⁴⁰ CCATM, 2005

⁴¹ SAAQa, 2006

⁴² SAAQa, 2008

⁴³ SAAQb, 2008



CONCLUSION

Recent discoveries in pediatric neuropsychology reveal that adolescence is a time of major transformations that essentially reconfigure the brain. These studies have highlighted how vulnerable the adolescent brain is to the effects of alcohol. They have also led to a better understanding of the frequency of high-risk behaviour among adolescents, so much of which is due to alcohol, and the effects of which can be so devastating.

In Quebec, data shows that excessive drinking is widespread enough to warrant taking the behaviour seriously.

In order to avoid health and social problems, Éduc'alcool makes the following recommendations for teens and pre-teens:

- Delay the start of drinking as long as possible.
- Never drink abusively, no matter what the circumstances.
- Avoid taking any additional risks while under the influence of alcohol.
- Remember that alcohol plays games with your perceptions.
- Never drive while impaired.
- Don't be afraid to ask for help if you're in trouble.

Éduc'alcool has the following recommendations for parents:

- Keep the lines of communication open and easy with your teens and pre-teens.
- Listen to your teens and pre-teens and talk about drinking with them.
- Delay their first drink as long as possible.
- Arrange it so that they have their first drink under your control and watchful eye, ideally at a family meal where alcohol enhances the pleasure of being together.
- Watch to see if and how your teens and pre-teens are drinking, and take action to monitor them more carefully if they are engaging in risky behaviour.
- Don't be afraid to ask for help if your adolescent child is in trouble, if you are unable to communicate, or if you lose control of the situation.

And above all, remember that moderation is always in good taste.

IN THE SAME COLLECTION:

The reports in Éduc'alcool's Alcohol and Health series are well-researched and easy to read. Each one gets straight to the point and is a valuable health, education and information resource.

All of them may be downloaded from the Éduc'alcool website www.educalcool.qc.ca or ordered by calling 1-888-ALCOOL1.



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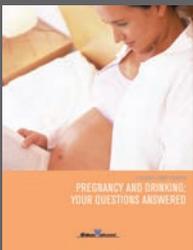
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ABOUT ÉDUC'ALCOOL

Éduc'alcool is an independent, not-for-profit organization whose sole mission is to improve the relationship between Quebecers and alcohol.

To that end, it implements prevention, education and information programs designed to help young people and adults make responsible, enlightened decisions about drinking. Éduc'alcool's commitment is accurately reflected in its slogan: La modération a bien meilleur goût / Moderation is always in good taste.

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Moderation is always in good taste.

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