



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 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 supervision. That produces better results than when friends do the initiating, and it reduces the frequency of intoxication.

Conversely, the younger children are when they begin drinking (and without parental supervision) 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 publication interprets the research in a simple, straightforward style to explain why children should not begin drinking too early without parental supervision, and why parents must remain watchful.

In short, the longer kids wait before getting drunk for the first time, and the more their introduction to alcohol occurs under appropriate circumstances and with parental supervision, 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 considered 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 to adulthood, i.e. from requiring supervision to being responsible for their own behaviour.¹

Although the brain of a 12-year-old is very different from that of an 18-year-old, a growing number of researchers are coming to agree that individual characteristics and social demands, rather than age alone, are what define adolescence.²

Given that periods of transition and upheaval are strongly associated with excessive drinking,³ adolescence itself is a risk factor for excessive drinking. It 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.

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 excessive drinking among adolescents is a result of their inability to anticipate the consequences of their actions. Other reasons are related to young people’s thrill-seeking tendencies, their desire to do what their peers are doing, and their need to be accepted by a group.

* 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 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 : p.7.

⁸ Zeigler et al., 2005.

⁹ Dahl, 2001:69.



ADOLESCENT DRINKING

ADOLESCENTS ARE STARTING TO DRINK LESS EARLY

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

One Statistics Canada study of 62,580 secondary school students in 2018-2019 found that the average age at which Canadian kids had their first drink was 13.4.¹⁰

Studies done regularly among secondary school students by the *Institut de la statistique du Québec* show that a growing number of young Quebecers are waiting longer before having their first drink.¹¹ From the 2010-11 school year to the 2016-2017 school year, the percentage of students who had their first drink before the age of 12 dropped from 10% to 6%.

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 drinking 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.¹²

The percentage of secondary school students who say they had a drink in the 12 months prior to the survey has dropped significantly in 17 years, but it remains high, falling from 71.3% to 52.6% between 2000 and 2017.

MOST ADOLESCENTS WHO DRINK DO SO OCCASIONALLY

Among secondary students who drink, most (62.4%) 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 23.5% of grade 10 students and 28.9% of those in grade 11 are regular drinkers who have alcohol at least twice a week.

¹⁰ Statistics Canada, Canadian Student Alcohol, Tobacco and Drugs Survey 2018-2019.

¹¹ Institut de la statistique du Québec, *Enquête québécoise sur le tabagisme chez les élèves du secondaire*, 2000 and 2002 and *Enquête québécoise sur la santé des jeunes du secondaire* 2016-17.

¹² Institut de la statistique du Québec, *Enquête québécoise sur le tabagisme chez les élèves du secondaire*, 2000 et 2002, and *Enquête québécoise sur la santé des jeunes du secondaire* 2016-17.

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

With teenagers, moderation is unfortunately not always the rule. In fact, all too often, when they drink, they tend to drink a great deal,¹³ a phenomenon corroborated by a number of European and American studies.¹⁴ In 2017, among Quebec secondary students, 34.1% of boys and 34.6% of girls said they had consumed five or more drinks on a single occasion. Among those who said they had drunk alcohol during the previous 12 months, the figures were 65.6% for boys and 64.9% for girls. By comparison, in 2017, 55% of male adult (18+) drinkers and 32% of female adult drinkers in Quebec said they drank excessively at least once a year.¹⁵

According to the Institut de la statistique du Québec, episodes of excessive drinking and repeated excessive drinking increase significantly among adolescents as they move through secondary school. From grade 7 to grade 8, the prevalence of excessive drinking more than doubles, from 8.2% to 20.4%. From grade 8 to grade 11, it triples, reaching 61.6%. 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). In grade 7, that prevalence is 1.1%. It triples to 3.2% in grade 8, then increases dramatically to 23.9% among students in grade 11. In short, about a quarter of teens in their last year of high school frequently drink excessively.

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 become significant.

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. In Quebec, 9.3% of teens 15-17 drink energy drinks regularly or occasionally.¹⁶

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.¹⁷

One¹⁸ 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.

¹³ Demers & Quesnel-Vallée, 1999; Davis, 2006.

¹⁴ Kuntsche, Rehm & Gmel, 2004 ; Morbidity Mortality Weekly Report, 2009.

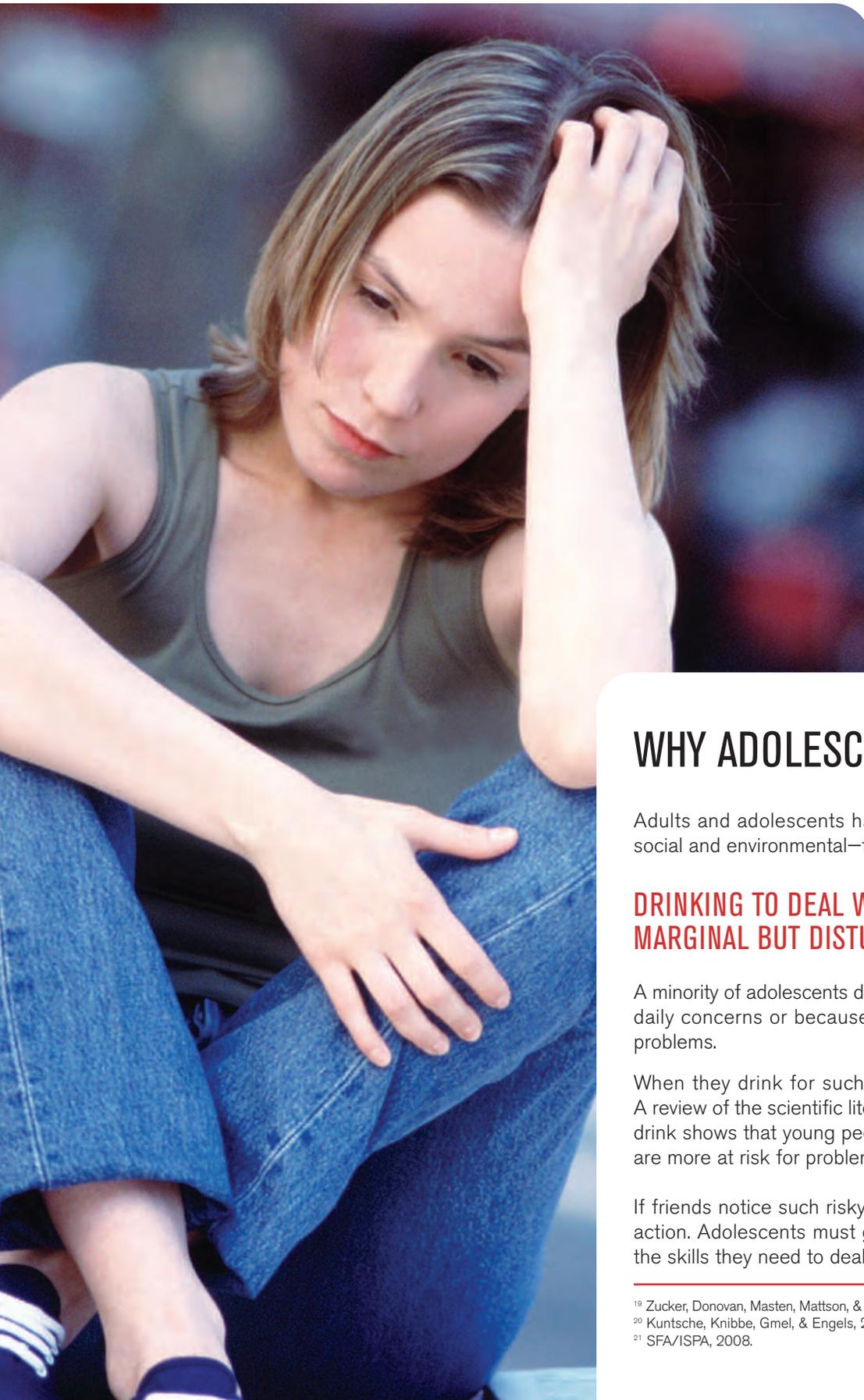
¹⁵ Éduc'alcool, 2017.

¹⁶ Camirand and Joubert, 2017.

¹⁷ Ferreira, de Mello, Pompeia, & de Souza-Formigoni, 2006.

¹⁸ O'Brien, McCoy, Rhodes, Waggoner, & Wolfson, 2007.





WHY ADOLESCENTS DRINK

Adults and adolescents have different reasons—individual, social and environmental—for drinking excessively.¹⁹

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.²⁰

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.²¹

¹⁹ Zucker, Donovan, Masten, Mattson, & Moss, 2008.

²⁰ Kuntsche, Knibbe, Gmel, & Engels, 2005.

²¹ 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 a 2005 study, adolescents generally drink when they are partying with their friends.²²

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, such as bars and house parties.

Among the youngest adolescents (12 and under), the motivators are different. 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.²³



²² Kuntsche et al., 2005; Kuntsche, 2007.

²³ Laventure, M., 2009.

PROBLEMS ASSOCIATED WITH EXCESSIVE DRINKING

HEALTH PROBLEMS

Recent discoveries in neuroscience are helping us better understand why young people are predisposed to drink excessively. They also show that *excessive drinking is particularly harmful to adolescents*.

There are few experimental studies on adolescents' biological sensitivity to alcohol, given the ethical issues related to administering alcohol to underage subjects for research purposes. Nonetheless, in a number of longitudinal studies, the brains of young people were examined using cerebral imaging, and participants were then followed over several years to see which factors might predict excessive drinking.²⁴ The studies showed that young people who are most at risk for excessive drinking by the end of adolescence already have some deficiencies in mid-adolescence in the areas of the brain responsible for inhibiting behaviour and for working memory (the part of memory that holds information temporarily for the purposes of mental exercises, such as making mental calculations).

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*.²⁵

Excessive drinking affects memory and brain plasticity in adolescents more than in adults.²⁶ Because the research on this subject is still in its infancy, it is inappropriate to draw definitive conclusions about the long-term effects of excessive drinking on adolescent memory and learning ability.²⁷ However, research on young adults who drank excessively as teenagers shows real changes in certain regions of the brain, particularly the areas involved in language comprehension, object recognition, motor skills and habit formation (which includes the brain's reward system).²⁸

It has also been found that early excessive drinking causes people to make more risky decisions and that this does not diminish over time.²⁹ 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%.³⁰

²⁴ Lees et al., 2005.

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

²⁶ Newbury-Birch et al., 2009; Masten, Faden, Zucker, & Spear, 2008; Windle et al., 2008.

²⁷ Spear & Varlinskaya, 2005; National Institute on Alcohol Abuse and Alcoholism, 2006.

²⁸ Lees et al., 2019, 2020.

²⁹ Nasrallah, N.A., Yang, T.W.H., & Bernstein, I.L., 2009.

³⁰ Norberg, K.E., Bierut L.J., Gruzza 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.³¹ 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.*³²

Ironically, 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 large amounts, since it takes longer for them to feel the immediate harmful effects.³³

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 get 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 excessively suffer side effects, such as changes in appetite, weight loss, eczema, headaches and sleep disturbances.*³⁴

* For a detailed description of these complications, see *Educ'Alcool*, 2019.

³¹ Dahl, 2004.

³² National Institute on Alcohol Abuse and Alcoholism, 2006.

³³ Windle et al., 2008.

³⁴ Newbury-Birch et al., 2009.



INCIDENTS AND ACCIDENTS

Young people report all kinds of social problems associated with intoxication and risk-taking. Excessive drinking promotes risk-taking, so it's not surprising that *a disproportionately high number of adolescents report incidents and accidents caused by excessive drinking.*³⁵

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 diseases (STDs).³⁶

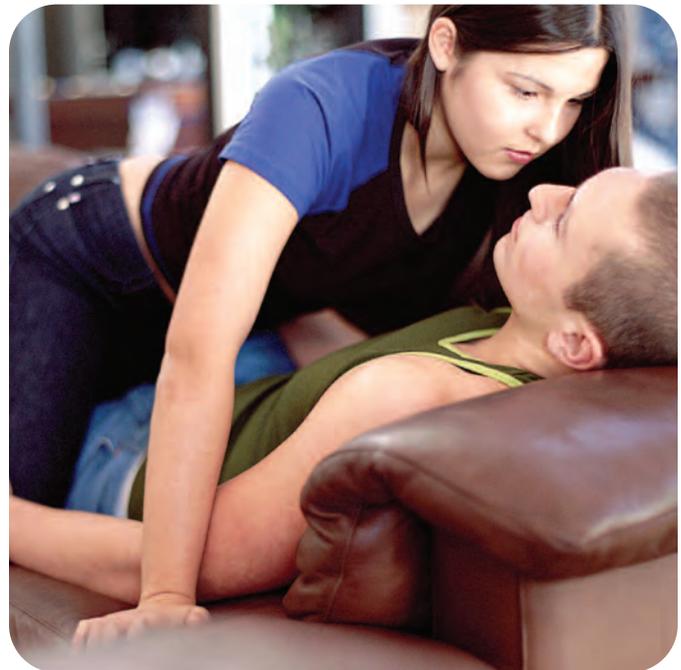
While this is not necessarily a causal relationship, the authors note that the association is strong enough to allow the conclusion that *alcohol probably contributes to poor judgement with regard to sexual behaviour.*

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.³⁷

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 facilitates the expression of violence among those who are predisposed to it.*



³⁵ Chaloupka et al., 2002; Edwards et al., 1994; Giesbrecht, 2000; Mosher, 1999; Wechsler, 1996.

³⁶ White & Swartzwelder, 2004; Newbury-Birch et al., 2009.

³⁷ Newbury-Birch et al., 2009.

ROAD ACCIDENTS

Alcohol is one of the main causes of death on Quebec roads. It is estimated that, from 2010 to 2014, 140 Quebecers of all ages died every year in road accidents in which at least one driver was under the influence of alcohol.³⁸

In 2010, close to 36.8% of drivers who died in a road accident had been drinking. The situation has improved considerably since then: in 2018, only 20.1% of drivers who died in Quebec road accidents had a blood alcohol content greater than 0.08 (80 mg of alcohol per 100 ml of blood).³⁹

Despite the zero tolerance rule for new drivers, *drinking and driving is still a disastrous combination for young people*, far too many of whom are unfortunately involved in serious accidents where alcohol is a factor. From 2008 to 2012, 44% of drivers under the age of 20 who died in a road accident had alcohol in their blood; 31% of these young drivers were over the legal limit of 80 mg of alcohol per 100 ml of blood.⁴⁰

The Société de l'assurance automobile du Québec (SAAQ) reports that drivers aged 20 or older who have 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.



³⁸ SAAQ, *Profil détaillé des faits et des statistiques touchant l'alcool et les drogues au volant*, 2017.

³⁹ SAAQ, *Road Safety Statistics* 2019.

⁴⁰ SAAQ, *Profil détaillé des faits et des statistiques touchant l'alcool et les drogues au volant*, 2017.



CONCLUSION

Recent discoveries in pediatric neuropsychology reveal that adolescence is a time when major transformations 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 excessively, 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 have questions or find yourself 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 your teens' first drink as long as possible.
- Arrange it so that your teenage children 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 with them, or if you lose control of the situation.

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

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