ALCOHOL, DRUGS & CRASH RISK

SoberSmartDriving.tirf.ca

The Sober Smart Driving education program is produced by the **Traffic Injury Research Foundation** with funding from **Beer Canada**. It shares knowledge and science to answer common questions about alcohol, its effects on driving skills, and impaired driving.

What is a blood or breath alcohol concentration?

Blood alcohol concentration (BAC) refers to the concentration of alcohol in the blood. It is measured using a blood sample. It is expressed as the weight of alcohol in a fixed volume of blood and is used to measure the level of intoxication in drivers. BAC is measured by a percentage based on milligrams (mg) of alcohol per decilitre (dL) of blood. For example, 80mg is equivalent to .08 grams. The presence of .08 grams of alcohol in 100 millilitres (mL) is written as .08. In other words, 80 mg% is equal to .08 which is equal to 80 mg/dL. This value can also be described as .08 BAC.

Breath alcohol concentration (BrAC) is roughly equivalent to BAC and is much easier to measure. Since the measure of alcohol in blood and breath is strongly correlated (i.e., similar), it is possible to obtain a blood alcohol concentration by measuring the presence of alcohol in breath, and breath alcohol concentration is accepted in court in lieu of a blood alcohol concentration.

An individual's alcohol concentration is dependent on factors such as the amount of food consumed, body weight, sex, the quantity and rate of alcohol ingestion, and the rates of alcohol absorption and metabolism. One thing is constant, however, the higher the BAC, the greater the degree of physical and mental impairment.

How does alcohol consumption increase crash risk?

Driving a motor vehicle requires sensory, motor, and cognitive skills which can be impaired to varying degrees by alcohol. As the amount of alcohol consumed increases, essential driving skills become impaired. Drivers are less able to anticipate hazards, maintain situational awareness, control speed and brake quickly, maintain lane position, retain focus on driving, and pay attention to traffic signals. Repeated studies have demonstrated human performance skills, including driving, begin to decline at BACs above zero (Borkenstein et al., 1964; Blomberg et al., 2009; Peck et al., 2008). As impairment increases, so does the risk of crashing. This is called relative risk; essentially, as a driver's BAC increases, the risk of collision also increases.

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A study conducted in Long Beach, California and Fort Lauderdale, Florida demonstrated a notable relationship between risk and BAC begins at BAC levels of .04-.05 and increases exponentially once BACs reach .10 or greater (Blomberg et al., 2009). This means driving even after consuming small amounts of alcohol can increase crash risk. Each drink consumed can slow reaction times and at higher levels result in blurred vision and drowsiness.

How does combining alcohol and drugs affect driving?

An extensive body of research has established alcohol consumption by drivers can increase the risk of collision (e.g., Mayhew et al., 1986). Multiple studies have been conducted in many countries measuring the role of alcohol in fatal crashes. Since the 1980s, the prevalence of alcohol use by drivers has declined, along with the prevalence of alcohol in fatal crashes (Mayhew et al., 2005). More recently, progress has been less pronounced compared to the gains made in the 1990s and early 2000s. By contrast, much less is known about the contribution of drug-impaired driving to serious collisions or the prevalence of drug use by drivers. Specifically, while alcohol-impaired driving has declined for more than a decade in Canada, drugged driving seems to be increasing (Robertson et al. 2017).

There are many reasons for much less knowledge about the role of drugs in fatal crashes as compared to alcohol:

- challenges measuring drug use by drivers (alcohol can be easily detected and conveniently measured from breath samples but the detection and measurement of drugs requires sophisticated and expensive testing procedures using samples of blood);
- testing rates and testing protocols for drugs are varied whereas alcohol testing is standard and testing rates are high;
- many drugs can impair the ability to drive safely (each of which requires a specific test);
- poly-drug use and the frequent combination of drug use with alcohol use; and,
- the difficulty of determining causality.

(Source: Robertson, Woods-Fry, & Vanlaar, 2019)

What are the implications of combining alcohol and drugs?

Mixing alcohol with drugs (both legal and illegal drugs) can be very dangerous. Alcohol is a depressant that slows down the body's central nervous system which controls heart rate and breathing. The sedative effects of alcohol can be enhanced when combined with another drug to the point where the

body could completely shut down. This combined effect of alcohol and drugs further impairs the ability to drive and increases collision risk. Of great concern, the combined effect of alcohol with marijuana is greater than the impairment of either substance on its own (see **Alcohol, Marijuana & Driving Risk** fact sheet).

For example, there is a substantial body of evidence showing a high correlation between alcohol use and marijuana use (Christophersen, 2006). In studies investigating the presence of alcohol and drugs among drivers in fatal crashes, it is not uncommon to find ¾ of those who are positive for cannabis are also positive for alcohol. Based on 2006 survey data, 69% of those who reported driving after using marijuana also reported driving within two hours of drinking (Stewart 2006). In 2017, the Traffic Injury Research Foundation reported from 2000 to 2014 fatally injured drivers who tested positive for cannabis increased from 74% to 83%. Although this does correspond with an increase in testing, the data also revealed the presence of other types of substances, such as CNS depressants and hallucinogens (TIRF, 2017). In 2019, follow-up data supported these results and confirmed polysubstance use was on the rise among fatally injured drivers (TIRF, 2019).

How big is the drug-impaired driving problem?

Self-report surveys have been used to examine the extent to which people consume drugs and drive. The Road Safety Monitor (RSM) from TIRF reports 7% of respondents reported driving within two hours after cannabis consumption, and 3% reported driving within two hours of cannabis use and alcohol consumption (TIRF, 2019).

Roadside surveys have also been used to study the drugged driving issue, including one conducted in British Columbia in 2011. This survey showed 10% of drivers tested positive for alcohol consumption and 7% tested positive for drugs (Beirness and Beasley, 2011). In the US, the most recent national roadside survey was conducted in 2013-2014 and demonstrated 8.3% of weekend nighttime drivers on the road had consumed alcohol and 1.5% of weekend nighttime drivers had a BAC at or above .08 (Ramirez et al., 2016).

Moreover, all the studies conducted in Canada over the past few decades have found the most commonly detected illegal substance was cannabis; 11% in the TIRF studies in Ontario (Cimbura, 1982; Cimbura et al., 1990; Beirness and Beasley, 2011), 13% in the B.C. study, and 19.5% in the Quebec study, both of which were cited above. Drivers who were positive for cannabis were much more likely to be male and under the age of 25. Such findings are not unique to Canada (see for example Drummer et al. 2004 for examples of Australia). However, one of the factors that make it difficult to determine what role cannabis played in fatal crashes is the presence of not only the drug but alcohol as well. For example, in the Ontario study, among those who were positive for cannabis, 84% were also positive for alcohol. Similar results are found based on TIRF's National Fatality Database. Among all fatality injured drivers who tested positive for cannabis, over two-fifths (43.4%) also tested positive for a second substance; among those, 73.0% were positive for cannabis and alcohol (Brown et al., 2019). Therefore, it becomes difficult to determine which substance caused the impairment (and to what degree) that resulted in the fatal collision.

What does the Sober Smart Driving Education Program (SSD) contain?

The Sober Smart Driving Education Program contains facts to help Canadians learn about the risks associated with drinking and driving and encourages everyone to speak up and talk about why they choose not to drink and drive.

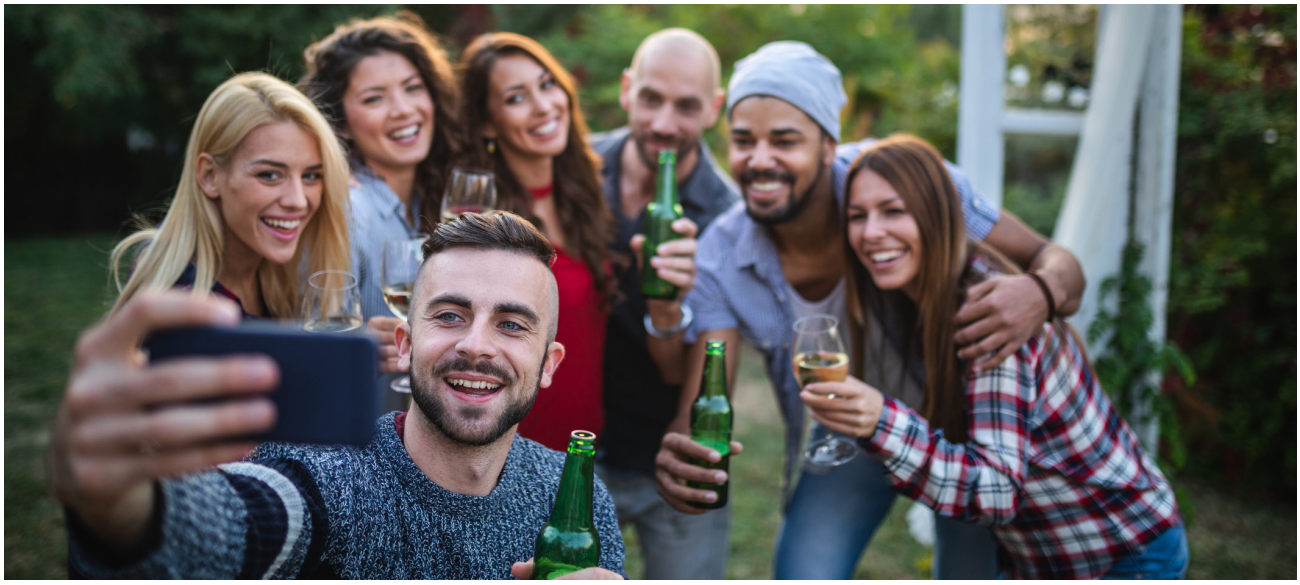
Key topics discussed on this site include:

- Drinking and its effects on driving
- Magnitude & characteristics of drinking & driving
- Basics of the impaired driving system
- Impaired driver programs & penalties
- Myths & misconceptions about drinking and driving

Each of these topics contains a series of fact sheets structured in a question and answer format which are available for free download and sharing (with attribution). These resources are designed to support the education and prevention efforts of communities, schools, health and road safety professionals and advocacy organizations.

To view more fact sheets, or to get more information about alcohol, its effects on driving skills, and impaired driving, visit **SoberSmartDriving.tirf.ca**.

Decide to drive alcohol free.



Traffic Injury Research Foundation

The mission of the Traffic Injury Research Foundation (TIRF) is to reduce traffic-related deaths and injuries. TIRF is a national, independent, charitable road safety research institute. Since its inception in 1964, TIRF has become internationally recognized for its accomplishments in a wide range of subject areas related to identifying the causes of road crashes and developing programs and policies to address them effectively.

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