



Stimulants, Driving and Implications for Youth

This summary is one in a series of four that briefly review the current state of scientific evidence on the effects of various classes of drugs on driving behaviour, while highlighting implications for young drivers. This summary focuses on central nervous system (CNS) stimulant drugs such as cocaine, methamphetamine and amphetamines; others in the series focus on CNS depressants, cannabis and opioids. These categories of drugs were selected as they represent the most common licit and illicit drugs that are used by youth. This summary is intended for a broad audience, including drivers licensing bodies, health promotion and drug use prevention professionals, educators, health professionals and parents.

Definitions

Cocaine is derived from the leaves of the coca plant, which grows in South America, India and regions of Africa and Indonesia. It is a white powder that is typically snorted. Crack cocaine consists of pellets or “rocks” that are smoked in a glass pipe. Methamphetamine is a white powder, but can be chunky crystals that are smoked (“crystal meth”). Amphetamine is also a white, crystalline powder. Prescription amphetamines come as tablets or capsules.

Use of Stimulants among Youth

About 2.6% of Canadian youth aged 15–19 years report having ever used cocaine and 1.8% report having used amphetamine or methamphetamine. Among those aged 20–24, 8.3% report cocaine use and 3.6% report use of amphetamine or methamphetamine. The use of cocaine and other stimulants such as amphetamine and methamphetamine among those aged 25 and over (7.5% and 3.0%, respectively) is comparable to that among those aged 20–24.

Some stimulants (e.g., methylphenidate [Ritalin®], amphetamine [Adderall®]) are prescribed medically to treat attention deficit hyperactivity disorder (ADHD). In 2013, 3.5% of Canadian youth aged 15–19 and 1.8% of those aged 20–24 reported taking one of these drugs during the past year. While prescription stimulants are prescribed for therapeutic purposes, they have the potential to be misused because of their psychoactive properties. These medications are often misused for both cognitive enhancement and recreational purposes (i.e., to get high). For the former purpose, they increase wakefulness, alertness, focus and attention. When stimulants are used without medical supervision, used for the wrong purpose or administered inappropriately, there is an increased risk for adverse effects and harms. In 2012–2013, 1.8% of Canadian students in Grades 7–12 reported the past-year use of prescription stimulants to get high, rather than for medical use.

Driving after Stimulant Use among Youth

Surveys of nighttime drivers in British Columbia (2008–2012) found 3.6% of drivers aged 16–24 tested positive for cocaine, amphetamine or methamphetamine, a rate comparable to that among drivers 25 years of age and over (4.1%).



Overall, among drivers killed in motor vehicle crashes in Canada between 2000 and 2010, 8.5% tested positive for stimulants. Drivers aged 16–24 were as likely as those 25 years of age and older to test positive for a stimulant drug (8.8% vs 8.4%, respectively). It should be noted that testing positive for a stimulant does not necessarily imply that the driver was impaired.

Legal Status in Canada

In Canada, it is illegal to possess, distribute, sell and import cocaine, methamphetamine and amphetamine. It is also illegal—and dangerous—to produce or manufacture methamphetamine. The precursor chemicals used in the production of methamphetamine are strictly controlled substances. Conviction for one of these offences results in a criminal record, affecting future options for education, employment and travel. Those who have a prescription from a licensed practitioner for legitimate therapeutic purposes—for example, amphetamine prescribed for ADHD—are exempt.

Driving while impaired by a stimulant such as cocaine, methamphetamine or amphetamine is an offence under the [Criminal Code of Canada](#) and those convicted face the same penalties as those impaired by alcohol. Specially trained police officers can demand that drivers suspected of being impaired by a stimulant submit to a series of behavioural and clinical tests, including providing a sample of blood, breath or oral fluid to determine drug content. Refusing to comply is an offence that has penalties equivalent to those for impaired driving.

Absorption, Distribution and Elimination

Cocaine is rapidly absorbed as a result of smoking, snorting and injecting. The intense effect is almost immediate and will last up to 30 minutes. More general effects can continue for one or two hours. Cocaine is almost completely metabolized in the body and the metabolites are excreted in urine. When used with alcohol, cocaine forms a substance called cocaethylene, which has effects similar to cocaine that can last for several hours.

The effects of methamphetamine are similar to those of cocaine, but the onset is slower and less intense, with a considerably longer duration—typically 4–8 hours. Methamphetamine is rapidly absorbed creating an intense euphoria, feelings of restlessness, agitation, nervousness and paranoia. Methamphetamine is broken down in the body to amphetamine.

Amphetamine produces effects similar to methamphetamine, but they are less intense. Oral ingestion delays the onset of effects, but prolongs the duration. Street amphetamine (“speed”) is a white powder that can be snorted, smoked or injected.

Patterns of Use

Cocaine powder is typically snorted. Those who abuse the drug are most likely to smoke crack cocaine in a glass pipe. The intense but short duration of effects can lead to frequent, repeated use over a period of hours or even days, a pattern known as binge use that can increase the probability of physical and psychological addiction.

Cocaine is sometimes used in combination with cannabis, alcohol or opioids, such as heroin or morphine. The use of cocaine with alcohol, producing cocaethylene, can intensify and prolong the effects, but also increase the risk of sudden death. The impairing effects of cannabis can be enhanced by cocaine. When cocaine is used with heroin or morphine, known as a “speedball,” the euphoric effects of both drugs are combined, while the subsequent negative effects associated with either one are reduced. This combination is, however, potentially lethal.



Methamphetamine is snorted, but individuals often progress to smoking the crystalline form, known as crystal meth. Methamphetamine can also be injected intravenously. Users can engage in repetitive use over a period of many hours or days, trying to maintain or regain the initial rush. When they discontinue use, they experience a period of intense fatigue, sleepiness and depression.

Prescription amphetamines (e.g., Adderall®, Dexedrine®) come as tablets or capsules of various strengths. When used in the treatment of ADHD or narcolepsy, the dose of amphetamine is taken daily, sometimes in divided doses to maintain a consistent effect throughout the day. Non-medical users can use the drug on occasion to get a “lift” when elevated levels of concentration are required. It is common for users to ingest larger doses to obtain the high and feelings of energy. Street amphetamine, known as “speed,” is less potent than methamphetamine and has less intense effects, but is often used in a similar manner.

Effects of Stimulants

Stimulants affect neurotransmitter systems in the brain, which are responsible for attentional, perceptual, cognitive and motor functions. They also interfere with mechanisms known to cause delusions, perceptual disturbances and psychosis.

Smoked or injected stimulants are rapidly absorbed and produce intense feelings of euphoria, excitement, alertness, sense of well-being and reduced impulse control. Oral doses produce delayed and less intense effects. Physiological effects include elevated heart rate, respiration rate, blood pressure and temperature. Behavioural effects include agitation, inability to focus, poor ability to divide attention, confusion, and poor balance and coordination. Once drug levels begin to fall, the user may experience restlessness, paranoia, aggression, delusions, extreme fatigue and sleepiness.

Chronic use of stimulants is associated with obsessive-compulsive behaviour, aggression, paranoia, severe weight loss and dental problems. Stimulants are considered to have a high potential for abuse and dependence.

Effects of Stimulants on Driving

Research using laboratory tasks and driving simulators has demonstrated that stimulants can have detrimental effects on a wide range of motor and cognitive skills necessary for the safe operation of a motor vehicle. Research has shown that low doses of stimulants can help counteract the detrimental effects of fatigue on attention and arousal, but the effect is only evident in drivers who are fatigued. There is no improved performance among healthy, well-rested individuals. When used to combat fatigue, however, the effect is temporary. As the stimulant effects wear off, the fatigue not only returns but can be intensified.

Higher doses produce agitation, inability to focus, reduced ability to divide attention, increased risk-taking, and deficits in balance and coordination. Among drivers stopped by the police who were subsequently found to have been using stimulants, inattention, speeding, risk-taking, poor impulse control and aggressive driving are common. As drug levels wane, users experience fatigue, depression, inattention and sleepiness, all of which can affect the ability to operate a vehicle safely.

The magnitude of the effects depends on the particular substance used, dose ingested, extent of prior use and manner of use. Combining stimulants with other substances, including alcohol, can enhance the detrimental effects on driving performance.



Detecting Stimulant Use in Drivers

Drivers who have been using stimulants often display one or more telltale signs of use. These include:

- Dilated pupils;
- Body tremors;
- Restlessness and agitation; and
- Talkativeness.

These signs are often sufficient for police officers to form a reasonable suspicion of drug use, which allows them to proceed with a demand for the driver to submit to a Standardized Field Sobriety Test (SFST). Drivers who demonstrate impaired performance on these tests are required to accompany the officer to the station for drug influence evaluation by an officer trained in the Drug Evaluation and Classification (DEC) program. The evaluation includes a demand for a sample of blood, urine or oral fluid to be tested for drugs

Implications for Young Drivers

It is well known that young drivers are at particularly high risk of crash involvement, in part as a result of their relative inexperience with the complex demands of driving. The use of stimulants, which are known to interfere with attention and impulse control, and to increase aggressiveness, can have an adverse impact on driving behaviour. The negative effects on driving can be intensified when stimulants are combined with alcohol, cannabis or opioids. The increased likelihood of engaging in risky behaviours while driving after the use of stimulants, with or without other drugs, can have a profoundly detrimental effect, especially on those already prone to such behaviour.

Using stimulants to combat fatigue when engaging in prolonged tasks or activities such as driving is not recommended. The initial stimulation is temporary. As the drug effects wear off, the fatigue returns and can be more pronounced.

Riding with a driver who has used a stimulant can be dangerous. The impairing effects of stimulants might not be immediately obvious, leading potential passengers to believe that the person is safe to drive. Passengers should avoid riding with any driver who has used stimulants in the previous few hours.

Additional Resources

- Impaired Driving in Canada (Topic Summary)
- Cocaine (Canadian Drug Summary)
- Prescription Stimulants (Canadian Drug Summary)
- Cannabis, Driving and Implications for Youth (Topic Summary)
- Opioids, Driving and Implications for Youth (Topic Summary)

Selected References

- Julien, R.M., Advokat, C.D., & Comaty, J.E. (2010). *A primer of drug action. A comprehensive guide to the actions, uses, and side effects of psychoactive drugs*. New York: Worth Publishers.
- Logan, B.K. (1996). Methamphetamine and driving impairment. *Journal of Forensic Science*, 41(3), 457–464.
- Statistics Canada. (2015). *Canadian Tobacco, Alcohol and Drugs Survey: Summary of results for 2013*. Ottawa: Author.



Canadian Centre
on Substance Abuse
Centre canadien **de lutte**
contre les toxicomanies

The Canadian Centre on Substance Abuse changes lives by bringing people and knowledge together to reduce the harm of alcohol and other drugs on society. We partner with public, private and non-governmental organizations to improve the health and safety of Canadians.

CCSA activities and products are made possible through a financial contribution from Health Canada. The views of CCSA do not necessarily represent the views of the Government of Canada.