Cannabis, 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 focusses on cannabis; others in the series focus on central nervous system (CNS) stimulants, CNS depressants 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

Cannabis, commonly known as marijuana, refers to the dried leaves and flowering tops of the mature cannabis plant, *Cannabis sativa*. Hashish is the dried dark brown or black resinous secretion of the cannabis plant. Raw or crude cannabis is typically rolled like a cigarette, known as a joint, and smoked. Cannabis can also be smoked in a pipe or bong.

Use of Cannabis among Youth

Cannabis is the most commonly used illicit drug among young Canadians. About 22% of youth aged 15 to 19 and 26% of young adults aged 20 to 24 reported using cannabis at least once during the past year in 2013. Among youth aged 15–24 who reported using cannabis in the past year in 2012, one in five used cannabis daily or almost daily. Based on responses on a scale of cannabis-related harms, about half of all cannabis users were deemed to be at moderate to high risk of developing problems associated with cannabis use.

Driving after Cannabis Use among Youth

A recent national survey found that 2.6% of Canadians reported driving within two hours of using cannabis at least once in the previous 12 months. Youth aged 18–19 were most likely to report driving after using cannabis (8.3%) followed by those aged 15–17 (6.4%). In addition, 21.5% of 18–19 year olds reported riding with a driver who had used cannabis, which compares with 14.1% of those aged 20–24 and 4.0% of those 25 years of age and over.

A random survey of nighttime drivers in British Columbia found 4.6% of all drivers tested positive for cannabis. Cannabis use was highest among drivers aged 16–24 (6.4%) followed by those aged 25–34 (5.7%). Among drivers 35 years of age and over, 2.9% were found to have been using cannabis.

Overall, among drivers killed in motor vehicle crashes in Canada between 2000 and 2010, 16.4% tested positive for cannabis. Drivers aged 16–24 were more than twice as likely as those 35 years of age and older to test positive for cannabis (25.8% vs 9.7%, respectively).

The high rates of motor vehicle use following cannabis use among youth would appear to be related to the fact that youth do not necessarily believe that cannabis impairs the ability to operate a motor vehicle safely. However, the evidence indicates that cannabis adversely affects the ability to drive safely and doubles the risk of being involved in a serious traffic crash.

Legal Status in Canada

In Canada, it is illegal to possess, grow, distribute, sell and import cannabis. Persons convicted of a cannabis-related offence have a criminal record, which can affect their options for education, employment and travel. The exception is those age 18 and over who have a medical document from medical practitioner that authorizes them to purchase dried marijuana from a licensed producer.

Driving while impaired by cannabis 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 cannabis 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.

Active Ingredients

Cannabis contains a class of chemicals called cannabinoids. Among these, Δ^9-tetrahydrocannabinol or THC is believed to be primarily responsible for the pleasurable psychoactive effects sought by recreational users. The potency of the drug is usually expressed as the percentage of THC per weight of dry cannabis. This percentage can vary considerably and over the years has been increasing as growers selectively produce plants with higher THC levels. Whereas in the past cannabis typically contained 1–4% THC, today THC levels are more commonly found in the range of 12%, but can be as high as 20%. Hashish typically contains higher concentrations of THC in excess of 20% and chemical extraction can result in a product with a very high concentration of THC. These are extremely potent products and can produce extreme effects in even experienced users.

Absorption, Distribution, Metabolism and Elimination

When cannabis is smoked, THC is rapidly transferred into the blood from the lungs. Blood THC concentrations rise quickly and reach a peak within minutes of smoking. THC blood levels fall as the THC is distributed into the fatty tissues of the body. The effects of THC generally dissipate slowly over a period of about 2–4 hours.

THC is extensively metabolized in the body and very little is excreted unchanged. The majority of THC is excreted in the feces with the remainder being eliminated as metabolites in the urine.

THC blood levels depend on the amount ingested, the concentration of THC in the cannabis, the amount of body fat, the extent of experience with cannabis and the manner in which the drug is used. Oral ingestion of cannabis delays the absorption of THC and results in a lower peak THC concentration.

Effects of Cannabis

Cannabis affects neurotransmitter systems in the brain responsible for perceptual, cognitive, motor and physiological functions. Cannabis use can result in feelings of relaxation and euphoria. It can also cause distorted perception of time and space, impaired concentration, increased sedation and drowsiness, and relaxed inhibitions, and interferes with memory and the ability to divide attention. In addition, cannabis impairs coordination and balance. Higher doses can produce anxiety, paranoia, fear and hallucinations. Some of the acute physical effects of cannabis use include increased heart rate and blood pressure, reddened eyes, dry mouth and throat, dilated pupils, enhanced appetite, eyelid and leg tremors, and head jerks. With repeated use, tolerance can develop to some of the effects of cannabis.

In general, the effects of cannabis vary with the dose consumed. However, establishing a relationship between THC concentration and effects has been challenging, largely as a result of the considerably degree of variability in the effects between individual users. Pattern and manner of use, previous experience and extent of use, concentration of THC, acquired tolerance, sensitivity and differences in the amount of body fat can all influence the effects observed.

Effects of Cannabis on Driving

Research studies using laboratory tasks, driving simulators and on-road driving strongly suggest that cannabis can have detrimental effects on a wide range of motor and cognitive skills necessary for the safe operation of a motor vehicle that can last for 2–3 hours after use. Cannabis use results in impaired tracking performance, often demonstrated by greater variability within a lane of traffic. It can also produce greater variability in steering wheel adjustments. Performance on divided attention tasks is degraded, especially in novel or unexpected circumstances or on long monotonous drives. Drivers who have used cannabis also show increased variability in speed and following distance and take longer to respond to sudden changes in the driving environment (e.g., changing traffic lights).

The use of cannabis also causes detrimental effects on cognitive (i.e., mental) tasks that are important to the safe operation of a vehicle. Short-term memory, decision-making and executive functions (i.e., planning, organizing and managing time and space) are all impaired following cannabis use. Concentration is also affected, particularly the ability to monitor more than one piece of information at a time.

The magnitude of the effects of cannabis use can be quite variable and can depend on the amount of cannabis used, the strength of the product, the extent of experience with cannabis, the frequency and the manner of use, and the experience of the driver. The effects of cannabis can be considerably greater after consuming even small amounts of alcohol.

The effects of cannabis on memory, perception, concentration, problem-solving, information processing and motor coordination can have a detrimental effect on the ability to operate a vehicle safely. Drivers who use cannabis, however, often overestimate the degree of their impairment and might attempt to compensate for the impairing effects by driving more slowly and leaving greater following distances. Attempts at compensation, however, can be at the expense of vehicle control and divided attention. When the demands of the driving task increase, impairment becomes increasingly evident.

The driving behaviour of someone who has used cannabis appears very different than that of a driver who has used alcohol. Whereas many of the effects of alcohol on driving are overt and can be observed in the physical operation of a vehicle (e.g., risk-taking, speeding, poor lane control), the effects of cannabis are of a more cognitive nature and can be subtle. Someone who has used cannabis can display delayed reactions to traffic signs and signals, appear to drive more slowly or with greater speed variability, wander within traffic lanes and take more time to execute manoeuvers. Increased risk is associated with the combined use of alcohol and cannabis.

Detecting Cannabis Use in Drivers

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

- A distinct odour of marijuana in the vehicle;
- Dilated pupils;
- Eyelid and leg tremors;
- Lapses of attention and concentration; and
- Red eyes.

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. This 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 cannabis, which is known to interfere with information processing, attention and decision-making abilities, would be expected to have particularly profound effects on those who are still acquiring the skills and experience required to operate a vehicle safely in a complex driving environment. In fact, cannabis is the most common illicit drug found among young drivers who die in crashes in Canada.

The risks are not limited to those who drive after using cannabis. When young people travel together in the same vehicle, the risk of crash involvement increases. In addition, about 16% of 15–24 year olds in Canada report riding as a passenger with a driver who has smoked cannabis within the previous two hours. Not only do drivers have a responsibility to ensure the safety of their passengers, but passengers also need to take care not to ride with someone who has been using cannabis.

Additional Resources

- Clearing the Smoke on Cannabis: Cannabis Use and Driving
- Impaired Driving in Canada (Topic Summary)
- What Canadian Youth Think about Cannabis
- Cannabis (Canadian Drug Summary)

Selected References

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