Clearing the Smoke on Cannabis

Cannabis Use and Driving
– An Update

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This is the third in a series of reports that reviews the effects of cannabis use on various aspects of human functioning and development. This report on the effects of cannabis use on driving provides an update of a previous report with new research findings that validate and extend our current understanding of this issue. Other reports in this series address the effects of chronic cannabis use on cognitive functioning and mental health, maternal cannabis use during pregnancy, and respiratory effects of cannabis use. This series is intended for a broad audience, including health professionals, policy makers and researchers.
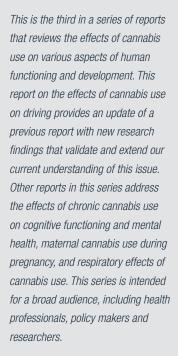
Key Points

- Among young drivers, driving after using cannabis is more prevalent than driving after drinking.
- Cannabis impairs the cognitive and motor abilities necessary to operate a motor vehicle and doubles the risk of crash involvement.
- After alcohol, cannabis is the most commonly detected substance among drivers who die in traffic crashes.
- The police have the tools and authority required to detect and arrest drivers who are impaired by cannabis.

Background

Cannabis, also referred to as marijuana, is the most widely used illicit drug in Canada. According to the 2013 Canadian Tobacco, Alcohol and Drugs Survey (CTADS), 10.6% of Canadians aged 15 years and older reported using cannabis at least once in the past year (Statistics Canada, 2015), unchanged from 10.2% in 2012. The use of cannabis is generally more prevalent among youth, with 22.4% of youth aged 15 to 19 and 26.2% of young adults aged 20 to 24 reporting past-year use. Approximately 27% of Canadians aged 15 and older who used cannabis in the past three months reported that they used this drug every day in 2012 (Health Canada, 2013).

A growing body of evidence suggests that cannabis use can negatively impact several aspects of people's lives, including mental and physical health, cognitive functioning, ability to drive a motor vehicle, and pre- and postnatal development among children (Volkow, Baler, Compton, & Weiss, 2014). This report—one in a series reviewing the effects of cannabis use on various aspects of human functioning and development (see Diplock & Plecas, 2009; Kalant & Porath-Waller, 2014; Porath-Waller, 2009; Porath-Waller, 2015)—provides an update on the topic of cannabis use and driving.

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After over three decades of successful efforts to change behaviour and to increase social intolerance of driving while impaired by alcohol, drug-impaired driving has emerged as an increasingly important public health and road safety issue. Given the prominence of cannabis as a drug of abuse, this report presents the evidence on the prevalence of driving following the use of cannabis, the impact of cannabis on driving performance and collision risk, and the detection of drivers who are impaired by this substance. This report concludes by discussing implications for policy and practice.

What is Drug-Impaired Driving?

Drug-impaired driving refers to the operation of a motor vehicle while one's ability is adversely affected by a drug, including illegal drugs, prescription drugs, over-the-counter medications and volatile inhalants such as toluene or nitrous oxide.

Drug-impaired driving is a criminal offence in Canada. According to the *Criminal Code* (S. 253a), "everyone commits an offence who operates a motor vehicle or ... has the care or control of a motor vehicle, ... whether it is in motion or not, while the person's ability to operate the vehicle ... is impaired by alcohol or a drug." The law applies to the operation of any type of motor vehicle, including snowmobiles,

Cannabis is a tobacco-like greenish or brownish material consisting of the dried flowering, fruiting tops and leaves of the cannabis plant, Cannabis sativa. *Hashish or cannabis resin is the dried brown or black resinous secretion of the flowering tops of the cannabis plant. The acute effects of cannabis include euphoria and relaxation, changes in perception, time distortion, deficits in attention span and memory, body tremors, and impaired motor functioning. It is a controlled substance under the* Controlled Drugs and Substances Act—*meaning that the acts of growing, possessing, distributing and selling cannabis are illegal. There is an exception for those possessing cannabis for medical purposes as supported by a physician.*

all-terrain vehicles (ATVs), boats, trains and airplanes. It also does not matter whether the vehicle is being operated on a public roadway or on private property.

Prevalence of Cannabis Use and Driving

Data from the 2012 Canadian Alcohol and Drug Use Monitoring Survey (CADUMS) reveal that 2.6% of drivers in Canada admitted driving within two hours of using cannabis at least once in the previous 12 months (Health Canada, 2013). This represents an estimated 632,576 persons who reported making 10.4 million trips after using cannabis, an average of approximately 16 trips per person per year. This compares with 2.04 million persons (8.4% of all drivers) who made an estimated 13.3 million trips after consuming two or more drinks in the previous hour, an average of 6.5 trips per persons per year.

The reported prevalence of driving after using cannabis was higher among young people and males (Health Canada, 2013). Drivers aged 18–19 were most likely to report driving after using cannabis (8.3%), followed by those aged 15–17 (6.4%). Males were three times more likely than females to drive after cannabis use.

On July 2, 2008, the Tackling Violent Crime Act *(Bill C-2; Government of Canada, 2008) was enacted. This legislation revised the* Criminal Code of Canada *to provide police with the authority to demand a driver suspected of being under the influence of drugs to submit to a Standardized Field Sobriety Test (SFST), to participate in an evaluation of drug influence by an officer trained in the Drug Evaluation and Classification program (known as a Drug Recognition Expert or DRE), and to provide a sample of blood, breath or oral fluid to determine the type of drugs used.*

The SFST consists of a set of three tests: walk-and-turn, one-leg stand, and an examination of eye movements known as nystagmus. This set of tests provides validated evidence of impairment and is widely used throughout the United States.

A Drug Evaluation and Classification assessment involves a systematic and standardized 12-step procedure to assess the common effects associated with various classes of drugs. It concludes with the demand for a sample of blood, urine or oral fluid for toxicological testing for drug content. Refusal to comply with any of these demands is a Criminal Code *offence with penalties that are equivalent to those for an impaired driving conviction.*

The CADUMS data reveal that riding as a passenger in a vehicle with a driver who has used cannabis is a common behaviour as well, particularly among young Canadians. Whereas 6–8% of youth reported driving after using cannabis, 15.8% reported having been a passenger with a driver who had smoked cannabis within the previous two hours (Beirness, 2014). The prevalence of the behaviour decreases among young people who are beyond high school age. Nevertheless, these data indicate that the risks are not restricted to those who drive after using cannabis but extend to those who choose to ride with these drivers as well.

In a series of recent roadside surveys that collected oral fluid and breath samples from a random sample of nighttime drivers in British Columbia, 5.5% of drivers tested positive for cannabis (Beasley, Beirness, & Boase, 2013). Of these, 16% also tested positive for alcohol. Young drivers age 16–18 were most likely to test positive for cannabis (7.5%), followed by those age 19–24 (6.8%).

After alcohol, cannabis is the most commonly detected substance among drivers arrested for impaired driving. In the United States, of more than 35,000 drug evaluations conducted on suspected impaired drivers in 2013, 30% involved cannabis. In Canada, cannabis and depressant drugs each accounted for 29% of all drug evaluations conducted in 2013 (International Association of Chiefs of Police, 2014).

Cannabis use is not uncommon among drivers involved in collisions. In a study of seriously injured drivers admitted to a regional trauma unit in Toronto, 13.9% tested positive for cannabis (Stoduto, et al., 1993). An examination of fatally injured drivers in Canada between 2000 and 2010 revealed that 16.6% of those tested were positive for cannabis (Beasley, Beirness, & Boase, 2013). Four out of ten fatally injured drivers who had used cannabis prior to the crash were between 16 and 24 years of age. It should be noted, however, that the data only indicate the presence of cannabis and do not necessarily address the issue of driver impairment.

Effects of Cannabis on Driving Performance

Studies have assessed the nature and extent of the effects of cannabis on a wide variety of cognitive and motor tasks (e.g., Ashton, 2001; Berghaus & Guo, 1995; Hartman & Huestis, 2013; Ramaekers, Robbe, & O'Hanlon, 2000). Performance deficits have been found in tracking, reaction time, visual function, concentration, short-term memory, and divided attention. Studies of driving performance (both simulated and on-road) show increased variability in lateral position in the lane, following distance, and speed as a function of cannabis use. Cannabis also impairs performance on divided attention tasks — those tasks that require the ability to monitor and respond to more than one source of information at a time. Cannabis also compromised the ability to handle unexpected events, such as a pedestrian darting out on the roadway. Combining cannabis with even small amounts of alcohol greatly increased the negative effects on driving skills (Downey, et al., 2013; Ramaekers, et al., 2000).

Among the effects of cannabis reported across various studies, a common finding is increased variability in performance. Although some of this variability can be attributed to differences in study design (e.g., cannabis dose, sensitivity of the task or equipment, time after smoking) (Hartman & Huestis, 2013), there also appears to be considerable variability among individuals. Whereas some people may show substantial impairment after relatively small amounts of cannabis, others show only moderate effects after the same dose. These differences may be related to task skill, prior experience with cannabis, and the usual dose and frequency of cannabis use. These differences make it somewhat difficult to predict the extent to which a given amount of cannabis will have an impact on a particular individual.

Although the weight of evidence clearly reveals significant psychomotor impairment as a result of cannabis use, it has been suggested that experienced users may be aware of their state of intoxication and impairment and attempt to compensate for it by employing behavioural strategies such as slowing down, increasing headway, and reducing risk-taking behaviours (Smiley, 1986). These tactics, however, may not be sufficient to compensate for all the impairing effects of cannabis—especially unexpected events and higher-order cognitive functions such as divided attention tasks and decision making. Attempts to compensate may be at the expense of vehicle control—e.g., speed control, lane position variability, reaction time—reflecting deficits in the ability to allocate attention. In summary, the research evidence leaves little doubt that cannabis has detrimental effects on driving performance, particularly when used in combination with other substances, most notably alcohol.

The Risk of Collision after Using Cannabis

Several studies have examined the risk of crash involvement associated with cannabis use by comparing the extent to which drivers who have used cannabis are overrepresented in collisions compared to drivers who have not used cannabis. Although some studies report no significant

increase in collision risk, recent research shows increased crash risk beginning at very low levels of cannabis and that the risk escalates with dose (Drummer et al., 2004; Laumon, Gadegbeku, Martin, Biecheler, & the SAM Group, 2005; Mura, et al. 2003). A recent meta-analysis of studies concluded that cannabis doubled the risk of crash involvement (Asbridge, Hayden, & Cartwright 2012). It should also be noted that the research demonstrates that drivers who have been using cannabis in combination with alcohol are at significantly greater risk of collision (Brault, 2004; Drummer et al., 2004; Longo, Hunter, Lokan, White, & White, 2000; Williams, Peat, Crouch, Wells, & Finkle, 1985).

Identifying Drivers Impaired by Cannabis

The detection and assessment of cannabis use among drivers are considerably more complex than for alcohol. Whereas most people are familiar with the usual signs and symptoms of alcohol use (e.g., odour of alcohol, bloodshot eyes, slurred speech, motor incoordination), the same is not true for cannabis. However, drivers who have been using cannabis often display one or more telltale signs of use. These can include a distinct odour of marijuana in the vehicle, dilated pupils, lapses of attention and concentration, and reddened conjunctiva (the white part of the eye). 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 perform the three tests of the Standardized Field Sobriety Test (SFST)—that is, horizontal gaze nystagmus, one leg stand, and walk and turn.

Drivers who demonstrate impaired performance on these tests are required to accompany the officer to the station for evaluation by an officer trained in the Drug Evaluation and Classification (DEC) program. The DEC procedure involves a series of tests of coordination and divided attention, eye examinations, measures of blood pressure and temperature, observations of the suspect, and an interview. The purpose of the procedure is to provide the officer with the necessary evidence to determine whether or not the suspect is impaired, whether the observed impairment is due to drugs, and which category or categories of drugs are most likely responsible for the observed impairment. Trained officers are able to identify the class of drugs responsible for the impairment with an accuracy rate of 95% (Beirness, Beasley, & LeCavalier, 2009).

Since it was first introduced over 30 years ago, the DEC program has grown substantially and is currently being used in all 50 U.S. states. The DEC program was first implemented in Canada in 1995. In 2008, new legislation made it mandatory for drivers suspected of drug use to participate in a drug evaluation, thereby providing the police with the tools required to aid in the detection and arrest of drivers whose ability to operate a vehicle is impaired by cannabis.

Cannabis has a unique DEC profile that includes poor coordination and balance, reduced ability to divide attention, elevated pulse and blood pressure, dilated pupils, inability to cross one's eyes, reddening of the conjunctiva, and eyelid or body tremors. The evaluation concludes with a demand for a sample of bodily fluid (blood, oral fluid or urine) to be sent to a toxicology lab for analysis. The results of the DEC evaluation, when combined with the findings from the toxicological analysis of the sample, are sufficient to proceed with impaired driving charges.

Penalties for Drug-Impaired Driving

Drivers who are impaired by drugs are subject to the same penalties as those impaired by alcohol. For a first offence, impaired drivers face a fine of not less than $1,000, a mandatory driving prohibition of 12 months and a possible jail sentence of up to 18 months. A second offence leads to a mandatory minimum of 30 days in jail and a two-year prohibition from driving. For third and subsequent offences, the penalty is imprisonment for a minimum of 120 days plus a three-year driving prohibition. Impaired drivers who cause an accident face a maximum 10-year period of incarceration in the case of causing bodily harm, and a life sentence in the case of causing death. In addition, provincial/territorial licensing authorities often impose longer periods of suspension for an impaired driving conviction and may require offenders to complete an alcohol/drug assessment, attend an educational program or participate in a rehabilitation program.

Many provinces also authorize the police to impose an immediate short-term suspension (usually 24 hours) for driving after drug use or poor performance on the SFST. There are efforts underway in some jurisdictions to make these administration sanctions equivalent to those for driving with a blood alcohol level of at least 50 mg/dL. The changes may include monetary penalties, recording the suspension on the driver's record and escalating sanctions for repeat violations (Canadian Centre on Substance Abuse, 2014).

Conclusions and Implications

Drivers who have used cannabis are not uncommon on Canada's roadways. Cannabis is second to alcohol as the drug most frequently found among drivers involved in crashes and drivers charged with impaired driving. Among young drivers, driving after using cannabis now exceeds the rate of driving after drinking.

The incidence of driving after cannabis use, particularly among young Canadians, may be attributable in part to the fact that they do not necessarily perceive their driving ability to be adversely affected. In addition, many young people believe that it is difficult for police to detect and charge drivers for driving while impaired by cannabis (Porath-Waller, Brown, Frigon, & Clark, 2013). Such beliefs are unfounded and greater efforts must be made to ensure that drivers understand the risks associated with driving after using cannabis.

Although there is much to be learned from years of efforts to reduce drinking and driving, societal attempts to control driving after cannabis use must recognize the substantial differences that exist and develop an innovative and comprehensive approach to deal specifically with this issue. Such an approach requires a combination of research, prevention, enforcement, and treatment and rehabilitation. Research is needed to provide better estimates of the magnitude of the problem and greater understanding of the factors that give rise to the behaviour. Awareness and education programs need to be developed for both the general population and specific high-risk groups—such as youth—to provide factual information and dispel common myths. Schools, driver licensing offices and driver education programs are among the potential targets for the implementation of such prevention activities.

Enforcement efforts can be bolstered with more widespread application of the DEC program and enhanced training for frontline police officers in the detection of the common signs and symptoms of drug use. In addition, several countries are currently using or investigating the use of roadside drug screening devices that can detect drugs including cannabis in samples of oral fluid (saliva). These devices would provide evidence of recent drug use, which could lead to further evidential drug testing. Such devices, if implemented in Canada, could enhance the ability of the police to detect cannabis use by drivers. The test results would facilitate drug-impaired driving investigations and enhance the use of administrative sanctions (e.g., immediate short-term licence suspensions) for driving after drug use (Canadian Centre on Substance Abuse, 2014).

Assessment and rehabilitation programs also play a role in an overall strategy. For those convicted of drug-impaired driving, the extent of their drug use should be assessed and, where warranted, treatment and rehabilitation programs made available to help ensure the behaviour does not recur or escalate. Together, these elements can be integrated to create a comprehensive and effective response to the issue of driving while impaired by cannabis.

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