CANNABIS AND DRIVING IMPAIRMENT: A Review of Evidence and Policy Approaches

A submission to the Canadian Task Force on Marijuana Legalization and Regulation from the Canadian Drug Policy Coalition (CDPC)

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This policy brief is the result of a review of the research on cannabis impairment and driving that is currently underway at the CDPC. This project has involved an extensive scoping review of research with the aim of critically assessing current understandings of cannabis impairment and approaches for detecting cannabis impairment for the purpose of reducing impaired driving and promoting traffic safety.

While the project is not yet complete, the final review will evaluate the evidence on a number of topics that are relevant to policy development in this area, including: the type of use (recreational or medical); use with other substances, such as alcohol; factors that impact impairment; functional effects; perceived and actual risks; education and decision making; and cannabis impairment testing, including legal and ethical implications.

The focus of this brief is to review the evidence on the detection of cannabis impairment, as we understand that this is an issue that is currently under discussion. Specifically, we review the evidence for psychomotor assessment procedures, the method currently used by law enforcement; and oral fluid testing, which has been proposed as an alternative. We then also discuss policy approaches to cannabis impairment and driving that are used in Canada, the United States, and other countries around the world.

We have also attached an extensive bibliography of key literature in this area (see the attached document) with the hope that it will help to inform policy decisions and create evidence-based policies.

**Introduction**

With the imminent legalization of cannabis in Canada, cannabis impaired driving is one of the top concerns cited by the public\(^1\). It is estimated that around 4% of drivers on the roads have used cannabis prior to driving\(^2\), although it is not known what proportion of these are actually impaired while driving. It is not known what impact, if any, legalization will have on the incidence of impaired driving; however, the change in federal policy makes this the opportune time to revisit impaired driving policies in Canada, particularly as they relate to cannabis.

The shift to legalize cannabis in Canada is based on the growing public recognition that cannabis prohibition is not effective and is related to a number of social harms. To align with the federal model of legalization, a new policy framework for cannabis impaired driving should aim to prevent the unsafe behaviour of driving impaired without penalizing drivers for the act of using cannabis, so that it does not inadvertently contribute to the social harms that are related to criminalization of drug use.

An impaired driving policy for cannabis that is evidence-based and uses a public health approach to drug use has the best chance at protecting people who use cannabis from social harms that could arise from implementing impaired driving policies that criminalize cannabis use by default, while promoting road safety.

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\(^1\) Huestis MA. Deterring driving under the influence of cannabis. Addiction. 2015 Nov 1;110(11):1697-8.

A Review of the Evidence on the Detection of Cannabis Impairment

Clearly, a valid means of detecting drivers who are impaired by cannabis use or evaluating the degree of their impairment would be a valuable component of a systematic approach to mitigating risk associated with cannabis-affected driving. The next section reviews and evaluates the evidence for the two main strategies for detecting cannabis impairment (apart from observation of inappropriate driving behavior).

Psychomotor Assessment

Psychomotor assessment procedures were developed initially for alcohol-related impairment, and include the Standardized Roadside Sobriety Test or the Drug Evaluation Classification procedures. However, these are also applied in the detection of cannabis-related impairment. Extensive research has been conducted to establish the validity of this procedure, both using data from "field" situations in which drivers were apprehended for suspicion of drug-affected driving and from laboratory studies in which critical confounding variables were controlled. The field research is subject to a number of fundamental biases, rendering its findings highly questionable. By contrast, laboratory research is able to control for these biases and obtain objective assessment of the validity of these procedures. A number of such validation studies have been done, examining the sensitivity of these procedures to the presence or level of THC or behavioral impairment in a driving simulation task; as well as specificity, which indicates being able to accurately identify when THC was not present or impairment was not evident (such as in driving simulator studies).3,4,5,6 A clear finding emerges from this literature: these assessment procedures fail to meet minimal standards for sensitivity or specificity. These procedures do not satisfy the criteria for validity of a test, let alone one that has such serious implications for individuals evaluated as "impaired".

Oral Fluid Testing

Oral fluid testing has been proposed as a method to determine a concentration level of THC in oral fluid sufficient to indicate likely impairment. If there were a per se concentration of THC in oral fluid that corresponded to the per se level in whole blood or serum associated with likely impairment, then one would have a conveniently-collected roadside test for likely impairment that would facilitate further data collection, presumably in the form of blood testing. However, the literature on oral fluid testing is clear that this procedure is subject to a number of confounding variables and extremely high inter-individual variability, such that oral fluid concentrations of THC cannot be extrapolated to blood concentrations.7 It is not possible to set a per se level for oral fluid that would indicate likely impairment. A leading expert on this kind of testing states the situation with regard to determining the ratio between oral fluid and blood concentrations, as follows:

"THC in oral fluid is largely a function of oral contamination from eating or smoking cannabis products, so there is a hugely variable ratio from less than 1 to 100+, depending on the route of administration and time since administration, such that it is widely considered to be impossible to predict a blood concentration from an oral fluid concentration."8

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8 Logan, B. PhD, F-ABFT, Vice President of Forensic Science Initiatives and Chief of Forensic Toxicology, NMS Labs, Philadelphia. (August 2016). Personal Communication.
There is a suggestion in the literature that a very high level of oral fluid THC would suggest recent use (though not identify intoxication or impairment). A very high level of oral fluid THC would be similar to other indicators such as the smell of cannabis in a car or a statement by the driver that he or she had recently used cannabis.

**Policy Approaches**

This section discusses policy approaches to cannabis impairment and driving that are used around the world, including advantages and disadvantages to each.

**Impairment/Effect Based**

An impairment or effect based policy approach aims to prosecute individuals on the basis of impairment while driving. This requires the ability to successfully identify individuals who are impaired and prove that the impairment affected their ability to drive safely.

In Canada and most US states, roadside tests such as Standardized Field Sobriety Tests (SFSTs) are used to initially identify individuals who are impaired, and further examination with a Drug Recognition Evaluation (DRE) is undertaken at the police station. In some jurisdictions, such as the UK, this policy framework is supplemented with an initial roadside screening of oral fluid to identify drivers who have recently taken drugs.

The challenge of this approach is that the tests used to determine impairment are largely based upon research on alcohol impairment. The evidence supporting their effectiveness for detecting cannabis impairment, as well as impairment by other drugs, is quite weak. In order for this policy approach to be most effective, further research needs to be done to develop tests specific for cannabis impairment.

**Zero-tolerance**

A zero-tolerance policy framework aims to prosecute individuals who have any detectable level of drugs in their biological fluid (typically blood, saliva, or urine). This approach is used in a number of US states, including Michigan and Arizona, as well as Australia and Sweden. The legal assumption is that having any level of drugs in the body causes impairment to an individual’s ability to drive safely.

However, there are serious issues in making this assumption. In the case of cannabis, THC can be detected in blood up to two days after initial use, and THC metabolites can be detected in blood and urine for days or weeks. This means that under a zero-tolerance policy, a biological sample from an individual may test positive due to past use, which does not indicate impairment – and in essence prosecutes based on drug use, not the act of driving while impaired.

**Per se level**

A per se policy framework defines a set limit for drugs in biological fluid above which the driver is considered legally impaired. This level should be based on scientific evidence that having levels of a drug in the body above that level reduces an individual’s ability to drive safely. This is the approach that is predominantly used for alcohol impairment around the world. It is used for cannabis impairment in some jurisdictions including Colorado, Washington, Portugal and Norway.

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The advantages to using a per se approach for cannabis is that it does not penalize the use of a drug, as individuals can still drive with levels that are below the set per se limit. This makes it a good complement to a legalization policy framework for cannabis.

There has been a push in many jurisdictions for per se laws for cannabis due to the success of the approach with alcohol. However, the introduction of per se laws for alcohol were supported by decades of research demonstrating increased crash risk at set levels of Blood Alcohol Concentration (BAC) as well as the invention of the breathalyzer which enabled quick and accurate measurements of BAC at the roadside.

The evidence base for cannabis impairment and crash risk is less robust than for alcohol; however, there have been some high quality reviews that have suggested a per se limit of 5ng/mL THC in whole blood or 7-10ng/mL in blood serum. These limits are deemed low enough to capture impairment but high enough that residual THC or presence of low dose THC from oral medical doses are not classified as indicative of impairment.

While there are some remaining complications with using THC levels in blood to indicate impairment, including tolerance to impairment effects and the variation in effects from different strains of cannabis, these do not preclude the possibility of a meaningful per se level for THC being set for use in body fluids. Implementing this type of policy framework would also require the standardization of body fluid testing, including specific procedures for which body fluid is collected, used, and then analyzed that do not infringe on human rights, in order to ensure that the policy is applied consistently to all individuals.

Two-tiered approach

Some jurisdictions in Europe, such as Denmark and Germany, have implemented a ‘two-tiered’ approach, which uses both biological measures and a judgment on impairment. Less severe penalties, such as fines, are used when an individual has low levels of THC in biological fluid, while harsher penalties are given if there is evidence that the individual was impaired to the point that it affected their driving ability. This approach could potentially have the advantages of both an effect-based and per se level policy frameworks, however it still requires that effective measures for impairment are developed and that any biological measures used do not by default penalize people for drug use rather than the act of driving impaired.

Recommendations and Conclusion

It is clear that roadside sobriety testing and the suggested use of oral fluid testing are ineffective measures of impairment by cannabis. The method of detection of cannabis impairment and the accompanying policy framework has large implications for human rights and civil liberties relating to drug use. Based on the evidence discussed in this brief, we recommend that:

- A program of high-priority research to find innovative methods of identifying cannabis-related impairment at the roadside, as based on current research, an accurate measure of cannabis impairment that can feasibly be performed at the roadside does not exist;

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• Until there is a test for cannabis impairment and driving that is based in science we expect that inaccurate measures will continue to be used, however we urge the government to adapt interim policies that ensure that we protect people from possible discrimination from random and inaccurate measures. These measures and the way they are implemented should balance road safety with the possibility that inaccurate tests can inadvertently criminalize or Penalize people based on drug use, including patients who may not be impaired despite their use of cannabis, and must protect people from invasive testing (including oral fluid and blood collection) unless there is a reasonable basis for such testing;

• A focus on public education on the risks of driving while impaired and more importantly, guidelines for reducing the risks, as has been done for public awareness campaigns for alcohol use and driving, is used to complement policy changes in this area; and

• A policy approach that upholds the values of legalization of cannabis, including human rights and the reduction of social harms, while still promoting traffic safety is developed for cannabis impairment and driving.

This brief aims to inform Canada’s policy framework on cannabis impairment and driving as part of the new legalization model. We also invite you to refer to the attached bibliography of relevant literature for resources, which would be useful to further inform policy decisions in this area. We would welcome the opportunity to continue this discussion and would be happy to share the findings of our final review with the Task Force at the completion of our project.