



TRANSPORT RESEARCH CENTRE

# DRUGS AND DRIVING

## Detection and Deterrence

*Summary Document*



## JOINT TRANSPORT RESEARCH CENTRE OF THE OECD AND THE INTERNATIONAL TRANSPORT FORUM

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**DRUGS AND DRIVING**  
***DETECTION AND DETERRENCE***

This is a summary of the report *Drugs and Driving: Detection and Deterrence*. The overall purpose of the report is to provide a state of the art review of evidence on the role and impact of drugs in traffic.

The report was prepared by an advisory group, chaired by Mr Horst Schulze (Germany). The full list of members can be found in the Appendix. The main report was drafted by a team of consultants composed of

- Doug Beirness (Canada)
- Philip Swan (Australia)
- Barry Logan (United States)

The report is based on a search and review of the scientific literature, including journals and technical reports as well as to the responses to a questionnaire to which 16 ITF/OECD countries responded.

This summary document comprises the executive summary, the conclusions and recommendations as well as the table of contents of the full report together with details of the experts that contributed to the work.

The report was formally approved by the Joint Transport Research Committee at its March 2010 session.



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## EXECUTIVE SUMMARY

On the heels of several decades of successful efforts to understand and reduce the magnitude of the problems associated with driving after consuming alcohol, driving while impaired by other psychoactive substances has emerged as a road safety issue of its own. There are a wide variety of substances that have the potential to adversely affect the cognitive and behavioural skills required to operate a vehicle safely. The list of substances includes many illegal drugs (*e.g.* cannabis, ecstasy), psychotropic medications (*e.g.* benzodiazepines, opiates), and some over-the-counter preparations (*e.g.* antihistamines, cough and cold remedies). Despite the apparent similarity with the problem of alcohol use and driving, drug-driving<sup>1</sup> presents a whole new array of challenges for research, policy, and programmes.

Efforts to deal effectively with the use of drugs by drivers have been hindered by the incomplete and sometimes inconclusive evidence pertaining to the issue. Whereas drinking and driving countermeasures have been aided by the considerable evidence on the problem that has accumulated over the past fifty years, the state of knowledge on drug-driving pales in comparison. To a large extent, this is because drug-driving is a much more complex issue. Not only are there numerous substances that have the potential to impair driving abilities, detecting and measuring these substances cannot be done using breath samples but require more intrusive methods to gather samples of bodily fluids such as blood, urine, and/or oral fluid. This creates methodological and logistical obstacles to the study of drivers on the road and drivers involved in crashes. In addition, whereas alcohol use is common among most segments of the driving age population, different types of drugs tend to be used by subgroups within the population for a variety of purposes. Each substance presents a new set of challenges.

### The Evidence

A complete understanding of the role of drugs in motor vehicle crashes requires evidence from two complementary research approaches – experimental and epidemiological research. The role of experimentation is to document the nature and extent of impairment produced by specific dosages of particular drugs. The role of epidemiological studies is to determine the extent to which drugs contribute to motor vehicle collisions.

A wide variety of psychoactive drugs, whether ingested for legitimate medical reasons, misused, or taken for illicit recreational purposes, cause changes in the brain, which disrupt normal cognitive and psychomotor functioning. They do this through a number of different mechanisms depending on the type of substance. Some affect alertness and perception; others increase impulsiveness; still others slow the speed at which the brain receives processes and responds to environmental information. All of these mechanisms have the same net effect – a decrease in the quality of mental and physiological effort dedicated to the driving task, decreasing performance and increasing the risk of crash involvement.

The use of psychoactive substances for their mood-altering and/or euphoric properties is not uncommon. Recent surveys indicate that about 15% of the population report the use of a psychoactive substance (excluding alcohol and prescription pharmaceuticals) at least once in the previous year. Given that the vast majority of people in Western countries drive a motor vehicle on a regular basis, it is not surprising that drug use and driving have occasion to occur in close temporal proximity.

Roadside surveys have been used to determine the extent to which drugs are used by drivers. Despite the logistical and technological challenges, roadside surveys of nighttime drivers in North America have determined that psychoactive drugs are found in 10 to 16% of drivers. Based on this evidence, the prevalence of drug use by drivers now rivals or exceeds that of drivers who have been drinking. In Europe, where roadside surveys of drug use among drivers are typically done at all times of day, drug use appears somewhat lower than in North America.

Drivers who have used drugs also tend to become involved in serious crashes. Numerous studies have examined the incidence of drugs among drivers injured or killed in motor vehicle crashes. The majority of studies report the overall incidence of drugs to be in the range of 14% to 17%. Cannabis is the most commonly found substance, followed by benzodiazepines. Estimates vary widely and depend on the type of crash and selection of cases. Nevertheless, the evidence clearly demonstrates that drugs other than alcohol are not uncommon among drivers involved in serious road crashes.

The key issue, however, is not how frequently drugs are detected among drivers, but the extent to which consumption of a particular psychoactive substance contributed to the crash. Analytic epidemiological studies seek to determine the extent to which drugs are disproportionately represented among drivers who become involved in road crashes and to quantify the crash risk associated with the use of various types of drugs. Three approaches have been used to estimate crash risk: case-control studies, crash responsibility/culpability studies, and pharmacoepidemiological studies. These studies face many methodological obstacles and the differences in findings may be attributable, in part, to a variety of factors – *e.g.* approach (case-control, responsibility analysis); severity of crash (*e.g.* injury, fatal); fluid tested (*e.g.* urine, blood); and sample size. Nevertheless, despite these challenges, the overall weight of the evidence reveals an increased risk of crash involvement among drivers who consume various types of substances. Two things are eminently clear. First, the magnitude of the crash risks associated with drug use is typically lower than those associated with alcohol use, particularly those at higher blood alcohol levels. Second, impairing substances pose greater risks when combined with even small amounts of alcohol.

Further studies employing large samples and rigorous methods will enhance our understanding of the extent of the risk posed by the use of drugs by drivers. Some of this research is currently being conducted as part of the DRUID<sup>2</sup> project in various centres across Europe. In addition, in the United States the National Highway Traffic Safety Administration is developing a plan to conduct a large-scale case-control study to examine the risks associated with driving after drug use. The results of these projects will provide valuable information that will be instrumental in furthering our understanding of the issue, establishing public policy, and developing enforcement and prevention programmes.

### **Legislation, Enforcement, and Prevention**

Efforts to deal effectively with drug-driving usually involve a combination of legislative initiatives, enforcement practices, and primary prevention activities. To date, the nature of these efforts have been modelled on the wealth of experience with measures introduced to control the drink-driving problem. A great deal has been learned over the past 30 years about effective ways to reduce drinking and driving and these lessons have guided the development and implementation of measures to control the drug-driving problem.

Despite the obvious parallels between drink- and drug-driving, there are numerous differences that must be taken into account in the adaptation of countermeasure programmes. For example, the term “drugs” encompasses a wide variety of substances. Some are illegal but are widely used for their euphoric effects (*e.g.* cannabis, cocaine); others are prescribed for legitimate medical purposes (*e.g.*



benzodiazepines); still others can be purchased directly by consumers to treat minor ailments (*e.g.* antihistamines). In addition, some prescription medications are used inappropriately (*e.g.* wrong dose, with alcohol) or by those for whom they were not prescribed. Each of these situations involves different behaviours, motivations, and subgroups within the population. Any approach must take account of these various situations.

To a large extent, countries have used their drink-driving legislation as a model for their legal approach to drug-driving. Legislation falls into two general categories – behaviour-based (*i.e.* impairment) statutes and *per se* laws. Behaviour-based statutes focus on the degradation of driving skills as a consequence of consuming a psychoactive substance. These types of laws date back to the early part of the twentieth century and were introduced as a means to control “drunk driving” or “driving while intoxicated.” Over the years, a more objective standard of “impairment” was introduced and standardised protocols have been implemented to demonstrate the extent to which a driver’s ability had been compromised. These standards have been adapted and applied to deal with the drug-driving situation.

*Per se* laws also have their roots in efforts to deal with drink-driving. Based on the established relationships between blood alcohol concentration (BAC), impairment and crash risk, *per se* laws specify that drivers have committed an offence if their BAC exceeds a specified value. Such laws create a legal “short cut”, eliminating the requirement to demonstrate that the driver was adversely affected by the consumption of alcohol. Adapting *per se* laws to the drug-driving situation has proven somewhat more difficult. Whereas research over the past fifty years has clearly established the link between alcohol, impairment and crash risk, similar evidence is not available for every potentially impairing substance.

The alternative used by a number of jurisdictions is to set the *per se* limit for drugs at zero. So-called “zero tolerance” laws specify that any detectable amount of particular substances found in the body of a driver would be considered to constitute an offence. Several countries have zero tolerance laws for illegal drugs and/or specifically named substances. In the absence of definitive research evidence supporting an alternative *per se* limit, zero tolerance laws serve to reinforce existing laws against the possession and/or use of illegal substances.

Whereas zero tolerance laws for illegal substances might be politically acceptable and expeditious, such is not the case for medicinal substances. Establishing a zero tolerance standard for all medicinal psychoactive drugs would disqualify a large number of individuals from operating vehicles, a position that lacks unqualified scientific support. Nevertheless, any approach must acknowledge that many psychoactive pharmaceuticals can cause driver impairment, particularly upon initial use, following a change in dosage, when used inappropriately, or when combined with the use of other drugs and/or alcohol.

To a large extent, enforcement practices are determined by the type of drug-driving legislation in the jurisdiction. Behaviour-based statutes require police officers to collect and document evidence of impaired behaviour and to demonstrate that a psychoactive substance capable of producing the observed behaviour was present in the driver at the time. This often requires police officers to be specially trained to assess impairment and recognise the signs and symptoms of drug use (*e.g.* Drug Evaluation and Classification [DEC] Programme). The officer must also arrange for the collection of a biological specimen from the driver to determine the type of substance present. The enforcement of *per se* statutes only requires the officer to collect a sample of bodily fluid that will be tested for the presence of psychoactive substances.

Checkpoints or controls have been used extensively in many countries to detect alcohol- and drug-impaired drivers. Although resource intensive, controls have been shown to be effective in identifying

drinking drivers and reducing alcohol-impaired driving, most likely by providing a strong deterrent. The impact of controls on drug-driving has yet to be demonstrated.

Jurisdictions differ in terms of circumstances under which drivers may be tested for alcohol or drugs. Some jurisdictions require officers to have a suspicion of alcohol or drug use, or reasonable grounds to believe the driver is impaired, before demanding a specimen for testing. In several jurisdictions in Europe and Australia, however, random alcohol testing, and more recently random drug testing, is permitted. This allows police to demand a bodily fluid sample at any time without cause or suspicion. When implemented on a large scale, this approach increases both the perceived and actual probability of detection, thereby enhancing overall general deterrence.

Primary prevention efforts directed at drug-driving have been relatively superficial. Most programmes have relied heavily on public education/awareness and deterrence through media and enforcement. Admittedly, prevention of drug-driving can be a complex issue. There are numerous types of substances involved and a variety of groups within the population that use different types of substances, each of which most likely requires a distinct and separate approach.

## **Conclusion**

Whereas there may be similarities and parallels between drink-driving and drug-driving, it is important to appreciate the real and substantive differences between the two issues. In this context, it cannot simply be assumed that the same techniques, policies, procedures and countermeasures that were developed for the drink-driving problem can be readily adapted or transferred to deal with the drug-driving issue. Drug-driving is a more complex issue. Many questions remain. At the very least, the approach to drug-driving must acknowledge the variety of different situations in which the behaviour occurs; at the extreme, several different strategies may be required, each with a unique perspective on prevention, enforcement, sanctions, and rehabilitation. Further research is required to help unravel the intricacies of the drug-driving problem and to facilitate the development of new and effective approaches to deal with it.

## **NOTES**

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- <sup>1</sup>. In this report, the term “drug-driving” refers to driving after the use of a psychoactive drug, including, but not limited to, driving while one’s ability to do so is impaired by drug use, referred to as “drug-impaired driving”. Similarly, the terms “drink-driving” and “driving after drinking” refer to the operation of a vehicle following the consumption of alcohol. This includes, but is not limited to, “alcohol-impaired driving”, which refers to driving after consuming sufficient alcohol to impair one’s ability to drive safely.
  - <sup>2</sup>. DRUID is the acronym of the European research project “Driving under the Influence of Drugs, Alcohol and Medicines”.

## CONCLUSIONS AND RECOMMENDATIONS

The contribution of drugs to motor vehicle crashes, injuries, and deaths continues to be a subject of considerable interest and debate. Although there is a growing volume of scientific literature on the topic, current methodological difficulties limit the pace at which knowledge and understanding in this area accumulates. There remain a great number of challenges to overcome and questions to be answered.

The experimental literature provides a substantive body of evidence on the impairing effects of a wide variety of psychoactive substances. Complementary evidence from epidemiological research indicates that drug use by drivers is not uncommon. Some American studies suggest that drugs may rival alcohol in terms of the frequency with which they are found among drivers involved in crashes, whereas this does not seem to be the case in Europe. A key issue, however, concerns the extent to which impairment from these drugs contributes to crashes. The available literature implicates a number of substances as increasing the risk of crash. The various methodological limitations of the research in this area to date, however, warrant that caution be used in making definitive statements about the magnitude of the risks involved. Further research following the guidelines produced by Walsh *et al.* (2008) will help provide the quality of evidence required to further our understanding of this complex issue. Some of this research is currently being conducted as part of the DRUID project in various centres across Europe. In addition, in the United States the National Highway Traffic Safety Administration is conducting a large-scale case-control study to examine the risks associated with driving after drug use. The results of all these studies are anticipated with considerable enthusiasm.

A word of caution is warranted. There is tremendous tendency for public and political attention to be drawn towards new issues and away from old ones, particularly those that have a long legacy without an end in sight. In this context, the recent level of concern and interest in the issue of drug-driving may overshadow efforts to reduce drink-driving. This would be a most unfortunate situation. Despite the tremendous progress that has been made over the past 30 years on the issue of drink-driving, a problem of significant magnitude remains. Alcohol continues to be the single most prominent factor in serious road crashes. The issue of drug-driving should not detract from the ongoing battle to reduce or eliminate alcohol-related crashes. Nor should drug-driving be viewed as simply another facet of the drink-driving problem. It is a distinct and separate issue that requires a societal response of a magnitude at least comparable to that directed at drink-driving. Resources to address drug-driving should not be siphoned away from those allocated to drink-driving; there needs to be new resources dedicated to the drug-driving issue. It is a unique and complex issue that must be tackled on many fronts.

In the context of broader social concerns about drug use, much of the focus on the issue of drug-driving has been directed at ways to control the problem. Some might argue that many of these efforts are premature and misdirected because the evidence regarding the contributory role of drugs to motor vehicle crashes and injuries is incomplete and inconclusive. Nevertheless, most jurisdictions have recognised the need to take action on the issue and have responded to the challenge and introduced legislation, policies and procedures in an attempt to deal with the problem.

To a large extent, the types of measures that have been introduced have been modelled on those that have proven successful in dealing with alcohol-impaired driving. But whereas there may be similarities and parallels between drink-driving and drug-driving, it is important to appreciate that the differences are

substantial. In this context, it cannot simply be assumed that the same techniques, policies, procedures and countermeasures that were developed for the drink-driving problem can be readily adapted or transferred to deal with the drug-driving issue. In many respects, drug-driving is a more complex issue. For example, whereas alcohol is a legal substance the use of which permeates many aspects of society, most of the drugs of concern are either illegal to possess or restricted to those who require them for therapeutic purposes. The exception is over-the-counter medications – such as antihistamines – which are widely available to treat a variety of common ailments. Each of these three types of drugs represents a distinct issue, each of which is associated with different patterns of use and somewhat different populations of users. Hence, several different strategies may be required, each with a unique perspective on prevention, enforcement, sanctions, and rehabilitation.

Among the countries surveyed for this report, the current legislative and enforcement environment was a mix of behaviour-based statutes and *per se* laws. There are strengths and limitations associated with each. Behaviour-based statutes target impaired driving, regardless of the type of substance or the amount consumed. Such an approach provides a means of dealing with drivers impaired by prescription and over-the-counter medications as well as drugs used in combination with alcohol. The major limitation for this is the intensive training and the amount of time required to gather the evidence required to support a drug-impaired driving charge. *Per se* laws provide a convenient short-cut in terms of training and evidence collection, but the scientific evidence required to support setting limits for the wide variety of drugs is not yet available. An alternative approach used in many jurisdictions is to set the *per se* limit at zero. So-called “zero tolerance” laws provide a clear message to drivers – *i.e.* driving after any drug use is not tolerated – and a relatively straightforward approach to enforcement. However, most zero tolerance laws are restricted to illegal substances. Drivers impaired by pharmaceuticals are not included.

Drug-driving prevention initiatives have been very limited. For the most part, prevention has been restricted to education/awareness campaigns with a heavy reliance of the deterrence inherent in enforcement activities. The Australians have pioneered wide-scale random drug testing to enhance the perceived likelihood of being detected, thereby creating a strong deterrent. The use of roadside oral fluid drug tests with high specificity, but relatively low sensitivity, has facilitated the widespread implementation of this technique. The results of evaluation studies will be viewed with considerable interest.

The use of pharmaceuticals by drivers presents special challenges for legislation and enforcement. At the same time, however, the controls on the distribution of these substances provide unique opportunities for prevention. Health professionals can play a critical role in providing consumers with vital information on the relative safety of these products for drivers. In addition, product labels, such as those used in France, provide consumers with guidance about the risks associated with the use of these products by drivers.

In conclusion, the drug-driving problem requires a comprehensive societal response consistent with its overall contribution to serious road crashes. At the same time, however, it is important to acknowledge the persistence of alcohol as the single most prominent factor in road safety. Hence, it would be unwise to introduce drug-driving countermeasures at the expense of existing measures to deal with drink-driving. Although drug-driving shares many commonalities with drink-driving, it must be treated as an additional issue, one that requires a separate response specific to the unique issues it presents.

The search for information to enhance our understanding of the drug-driving issue needs to continue. Ensuring that the knowledge is transferred to stakeholders and policy-makers in a format that is

straightforward and acceptable will facilitate its uptake and its translation into effective policies and programmes to make the roads safer for all.

### Recommendations

- Recognise that, although there is overlap between drink-driving and drug-driving, there are substantive differences between the two issues so as to warrant a distinct and separate stream of funding for research, policy, enforcement, and prevention.
- Acknowledge that drug-driving is a complex issue of sufficient magnitude to warrant a societal response comparable to that afforded the problem of drink-driving.
- Encourage and solicit research activities to enhance surveillance, monitor trends and further the collective understanding of the risks of crash involvement and the factors that contribute to the problem.
- Make every effort to ensure that research adheres to international guidelines to enhance validity and facilitate comparisons among studies.
- Establish international consensus on a list of key substances that pose a risk to road safety and for which toxicological testing should take place.
- Work towards establishing international standards on toxicological testing protocols.
- Continue to encourage the development and refinement of oral fluid testing devices for use at roadside.
- Conduct a systematic review of existing legislation, policy and programmes to make certain they meet existing needs and address the problems of drug-driving.
- Ensure new programmes and policies are evidence-informed and based on the best available knowledge.
- Encourage and support the passing of legislation that addresses the increased risks associated with the use of all types of psychoactive substances by drivers.
- Ensure that drug-driving legislation focuses on enhancing road safety and is not used to identify and prosecute drug drivers.
- Enhance training programmes for enforcement personnel to develop and improve their ability to identify the signs and symptoms of impairment caused by drug use.
- Engage in awareness and education programmes to help reduce the prevalence of driving after drug use. Such efforts should be targeted to specific audiences and focused on the key substances used by particular groups.
- Encourage healthcare practitioners to discuss the potential for certain medications to interfere with the cognitive and motor skills required to operate a vehicle safely.
- Facilitate the safe use of pharmaceutical products by establishing a list of potentially impairing substances and labelling them with the appropriate warning.
- Work with health care providers and the appropriate regulatory bodies to establish prescribing and dispensing guidelines for psychoactive pharmaceutical that reflect the potential risk to road safety.

Table 1. Key Features of Alcohol and Drug-Impaired Driving Legislation

Country	Per Se Alcohol Limit*	Random Testing		Mandatory test after Collision		Evidential Standard Drugs Driving		Drug Testing Medium		
		Alcohol	Drugs	Alcohol	Drugs	Per se	Impairment	Blood	Urine	Oral Fluid
Australia	50	√	√	√	√	Zero tolerance (specific drugs)	√	√		√
Austria	50	√	x	Injury	x	x	√	√		
Belgium	50	√	√	x	x	Zero tolerance (illegal drugs)		√		
Canada	80/50	x	x	x	x	x	√	√	√	√
Denmark	50	√	√	x	x	Zero tolerance (illegal drugs)	√	√		
France	50	√	√	√	√	Zero tolerance (illegal drugs)		√		
Germany	50	x	x	x	x	Zero tolerance (illegal drugs)	√	√		
Israel	50	√	√	x	x	Zero tolerance (illegal drugs)		√		√
Netherlands	50	√	x	√	Rare	x	√	√		
New Zealand	80	√	x	√	x	x	√	√		
Poland	20	x	x	√	√	Zero tolerance	√	√		√
Portugal	50	x	x	√	x	Zero tolerance (illegal drugs)		√	√	
Slovenia	50	√	√	√	√	Zero tolerance		√	√	
Sweden	20	√	√	√	√	Zero tolerance		√		
Spain	50	√	x	√	√	x		√		√
Switzerland	50	√	x	√	If suspected	Zero tolerance (illegal drugs)		√	√	√ (also sweat)
United Kingdom	80	x	x	x (unless requested)	x	x		√	√	
United States	80	x	x	x	x	Varies by state	Varies by state	√	√	

Notes: \*= mg/100 ml blood; √= Yes; x= No

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## ACKNOWLEDGEMENTS AND LIST OF PARTICIPANTS

The report was prepared by an advisory group, chaired by Mr Horst Schulze (Germany) and composed of experts from 12 countries (see below). The main report was drafted by a team of consultants composed of

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The Secretariat is very appreciative of all the time and effort the contributors dedicated to this report.

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