SWOV Fact sheet

Driving under the influence of drugs and medicines

Summary
Driving under the influence of drugs and psychoactive medicines is a threat to road safety. Especially the simultaneous use of alcohol and drugs and the combined use of various drugs causes a considerable increase of the risk. There are indications that the use of drugs among road users is growing in the Netherlands; combined usage of these substances occurs chiefly among young males. Unlike for alcohol, the Netherlands has as yet no legal limits for drugs and medicines. Just as for alcohol, there should be similar limits for these other substances, preferably based on factual information about the risks involved in their various concentrations and combinations. According to expectations, however, it will be some time before a system of effectively substantiated, accepted and workable risk-related limits has been established. Until that time, a zero-limit approach could be considered. Also of importance is providing police with sufficient manpower and usable means to enforce the limits. Saliva testers in particular have been undergoing intensive development in recent years and appear the most suitable means of screening drivers for drug use. Supplementary evidence could then be obtained by other means such as a blood test. In the case of medicines that could impair driving capability, physicians and pharmacists providing patients with good information could contribute to solving the problem.

Background
Article 8 of the Dutch Road Traffic Act makes it "an offence for a person to drive or to be in charge of a motor vehicle, when he is under such influence of a substance of which he knows or reasonably should know that its use – either in combination with or not in combination with the use of another substance – could diminish driving skills, that he must be considered unfit to drive". Included in these substances are alcohol, drugs and psychoactive medicines. This fact sheet addresses drugs and medicines; another fact sheet discusses the use of alcohol in traffic: *Driving under the influence of alcohol*.

Although the Netherlands has set legal limits for the consumption of alcohol, there are as yet no such limits for drugs and medicines. Drivers can be punished, however, if it can be demonstrated that they were driving under the influence as based on the concentration of substances detected in their blood. A major European study is currently being conducted to gain insight into the tolerance limits for drugs and psychoactive medicines: the DRUID Project (www.druid-project.eu). Whether this study will lead to recommendations for risk-related limits or for a 'zero-limit approach' is still unknown. In any case, it would appear that establishing the lowest possible limits for the use of drugs in combination with other psychoactive substances (other drugs, certain medicines and/or alcohol) would be best.

To what extent do drivers use drugs and medicines?
In recent decades, drug use among drivers in Europe has increased (Raes et al., 2008). There are also indications of an increase in the Netherlands. In the mid-1980s, a study in Rotterdam hospitals showed that 5% of the injured drivers had used drugs (Vis, 1989). In a more recent study conducted in the police district of Tilburg, nearly 20% of the injured drivers tested positive for drugs (Mathijssen & Houwing, 2005). Just as with alcohol, drugs are more frequently used during nighttime hours than during the rest of the day. In Tilburg and vicinity, about 10% of the drivers had used illegal drugs during the night as compared to 5% during the day.
The most commonly used drug among drivers is cannabis. In the study by Mathijssen & Houwing (2005), traces of cannabis were detected in nearly 5% of motorists. Not all drivers found positive, however, were actually under the influence of the drug. This is because cannabis is detectable for a long period but can adversely affect driving skills only up to twelve hours after use (De Grift, 2005).
A small number of drivers use a combination of alcohol and drugs. Approximately 0.3% of the drivers in Tilburg and vicinity were under the influence of such combinations. The blood alcohol concentration (BAC) of these combination users is generally very high, and their drug use is seldom limited to a single substance. Alcohol-drug and drug-drug combinations are found most among young males in the

ages 18 through 24; in 3% of this group of drivers one of these dangerous combinations was found. According to this study in Tilburg and vicinity, approximately 3% of the motorists had used benzodiazepine and codeine medicines.

How does the use of drugs and medicines affect driving skills?

The effect of drugs and medicines on driving skills varies according to the type of drug; there can be differences in the effects even within a single type of drug. The effect of cannabis, for example, is that the user becomes 'high' or 'stoned'. These users experience feelings of euphoria, relaxation and lethargy. Their reaction time increases, their coordination decreases, and their memory is affected. As a result, complex driving tasks in which the driver's attention has to be divided over various individual tasks are not performed as well. Experienced drug users, however, are aware of their diminished skills and adjust their driving behaviour so that the adverse effects generated by the substances are less than would be expected. In combination with alcohol, however, the use of cannabis leads to an extra deterioration of driving performance (Robbe, 1994; Steyvers & Brookhuis, 1996; Shinar, 2006). Findings of epidemiological research support the adverse effect of combined substance use (Haworth et al., 1997; Drummer et al., 2004; Mathijssen & Houwing, 2005).

Stimulant drugs such as amphetamines, ecstasy and cocaine make users feel more energetic and alert. These drivers become reckless and will drive faster and more aggressively. Drivers under the influence of stimulant drugs also take more risks even though their control over their vehicle diminishes (Shinar, 2006).

Medicines, particularly the benzodiazepines (sleeping pills, tranquilisers and anti-anxiety medications) and codeine can also affect driving skill. Their use can result in such effects as absent-mindedness, reduced coordination and a reduced ability to make judgements. These effects vary depending on the type of benzodiazepine. It is known, for example, that diazepam, flurazepam, flunitrazepam and lorazepam reduce a driver's control over the vehicle. Various researchers strongly advise against the use of benzodiazepines in combination with alcohol (see, for example, Steyvers & Brookhuis, 1996; Shinar, 2006).

What is the prevalence of psychoactive substances among injured drivers?

An analysis of the international literature (Raes et al., 2008) shows that drugs and psychoactive medicines were detected among between 10 and 50% of injured motorists. The most recent Dutch study into the use of psychoactive substances among injured motorists is the study conducted by Mathijssen & Houwing (2005). They found that in addition to alcohol, traces of drug-drug and alcohol-drug combinations in particular were detected in the blood of injured motorists in Tilburg and vicinity.

Psychoactive substance	Percentage among injured motorists (N=184)
No psychoactive substances	55.4%
Alcohol (BAC ≥ 0.2 g/l)	18.6%
Cannabis	3.4%
Benzodiazepines	3.6%
Codeine	1.0%
Morphine	0.5%
Drug + drug	7.2%
Drug + alcohol 0.2-0.8 g/l	2.0%
Drug + alcohol > 0.8 g/l	8.3%

Table 1. *Prevalence of psychoactive substances among severely injured motorists (Mathijssen & Houwing, 2005)*.

Table 1 shows the percentages of severely injured motorists in Tilburg who had used psychoactive substances. A total of 184 cases of severely injured motorists were examined. Among these motorists, the most prevalent substances used without being combined with any other substance were cannabis (3.4%) and benzodiazepines (3.6%). More than 10% had used both alcohol *and* drugs, and more than 7% had used a combination of various drugs. The percentage of severely injured drivers who had consumed only alcohol (BAC ≥ 0.2 g/l) is still higher than the percentage that used drugs.

What are the risks of using drugs and medicines?
By comparing the prevalence of their use in ordinary traffic with the prevalence of their use among injured drivers, we can obtain an indication of the relative risk associated with the use of drugs and psychoactive medicines. The study conducted by Mathijssen & Houwing in Tilburg and vicinity showed the following after correcting for gender, age and time period (Houwing et al., 2009).

Use of a single drug
For cannabis, the Tilburg study found a slight but insignificant increase in risk up to 24 hours after use. The risk for more recent use (up to 4 hours after use), however, is higher. From a review of the available literature, Drummer (2009) concluded that the relative risk of being involved in a crash resulting in injury after recent cannabis use was almost 3 times higher than that for sober drivers. Both ecstasy and cocaine were each found in almost a half percent of the drivers in the Tilburg and vicinity. Since these drugs were not found in the hospital population, an increase in risk was not demonstrated. In a similar study in Canada, the use of cocaine increased the risk by a factor of 4.5 (Brault et al., 2004).

Use of a single medicine
The situation involving the use of psychoactive medicines by drivers is fairly complex. In the Tilburg study, users of tricyclic antidepressives showed no increased risk of injury, but users of benzodiazepines and codeine did. The risk of injury among users of benzodiazepines was 3.5 times higher than drivers who had used nothing; that of codeine users was even 7 times higher (Houwing et al., 2009). The increase in risk associated with the use of benzodiazepines, according to the Tilburg study, is comparable to a BAC of 0.5 g/l. The increase in risk associated with the use of codeine is comparable to a BAC of 1.0 g/l. But experimental research shows that there are great differences in risk between incidental and novice users on the one hand and chronic users on the other (Verster & Ramaekers, 2009). The use of benzodiazepines in particular is associated with the problem of illegal and/or improper use and often involves doses higher than prescribed therapeutically or using them in combination with alcohol and/or drugs. In the Tilburg study, one in eight of the multiple drug users used benzodiazepines in combination with drugs and/or alcohol (Mathijssen & Houwing, 2008).

Use of combinations of alcohol and drugs
A combined use of various drugs, psychoactive medicines and/or alcohol greatly increases the risk of being injured in a road crash. Although the group of drivers who combined alcohol and drugs was not even one percent of the drivers in Tilburg traffic, this combination was found in more than 10% of the severely injured motorists. The higher the BAC, the higher the risk characterizes this combination. The risk of being injured in a road crash among members of the group who combined alcohol and drugs and had a BAC that exceeded 0.8 g/l was more than a hundred times higher than that for sober drivers. This is just as the same as the risk for a driver with a BAC exceeding 1.3 g/l who has not used any drugs.

Use of multiple drugs
Users of multiple drugs is also a threat to road safety. In the Tilburg study, less than one percent of all drivers had used multiple drugs, but they made up 7% of the severely injured drivers. The risk among users of multiple drugs for being injured in a road crash is around 10 times higher than for sober drivers.

How can the use of drugs and medicines among drivers be detected?
In practical situations, the best way to demonstrate the recent use of drugs and medicines that impair driving skills involves the use of blood or saliva tests. Although other methods such as the testing of hair, urine and sweat can indicate drug use, they have a longer detection window. This means that traces of drugs or medicines may be detected, but cannot be indicated with certainty whether that person is still actually under their influence. In addition, urine tests are both difficult to conduct and prone to fraud. And they violate physical integrity, as for that matter do blood tests.

Blood tests are expensive and cannot well be used along the side of the road. Most drugs can be detected in the blood until approximately 24 hours after use. Some drugs, such as heroin, have a detection window in the blood of one to two hours. In other words, they can be detected in the blood up to one to two hours after use, but they can affect driving skills for a longer time.

Saliva tests have been undergoing rapid development in recent years. Unlike blood and urine tests, they violate physical integrity scarcely at all, can be conducted fairly easily at the side of the road, are less prone to fraud than urine tests, and result less often in a false-positive result. Saliva specimens have the same short detection window as blood samples and are thus suitable for establishing recent drug use. Certain drugs such as cannabis and ecstasy, however, reduce the production of saliva, thus making it difficult to obtain a sufficient specimen. For some drugs, the sensitivity of saliva tests is still inadequate (Verstraete & Raes, 2006), but whether this disadvantage outweighs the previously mentioned advantages is questionable. The saliva test therefore appears suitable as a screening agent. Should police suspect drug use, they could then order a blood test or, in exceptional cases, a urine test as supplementary evidence.

In addition to the presence of substances in the body, drivers can also be examined on the basis of clinical signs and a number of coordination exercises. In some European countries such as Belgium, Portugal and Sweden, this is done by specially trained police. An experiment is being conducted in the region of Twente in which the police are examining drivers for drug use as based on clinical signs. The police in Twente are being supported in their assessments of clinical signs by a drugs expert.

Saliva testers are being studied for their reliability and usability as part of the European research project DRUID (www.druid-project.eu). The findings of these studies are expected to be issued by the end of 2010. These findings will not be available in time for the Ministry of Transport to use in the discussion about the possible introduction of saliva testers as an agent for screening drivers for drugs and medicines. Therefore, the Dutch Ministry of Transport requested a test programme to be carried out to investigate the quality of a small selection of saliva testers between October 2008 and January 2009. Based on the results of this test programme, the National Police Services Agency (KLPD, 2009) draws the conclusion that "the predictability of certain drug use by drivers of vehicles acquired from the used saliva testers is of a level which is acceptable to the police" and that these saliva testers can be used as a preselective tool. In September 2009, the Dutch transport minister announced that he is preparing a bill which will make the saliva test a legal tool in tracing drug use by drivers. The blood test remails nessessary as legal evidence.

What measures can be taken?

Current measures to counteract driving under the influence are aimed primarily at alcohol consumption and very to a very limited extent at the use of drugs and medicines. Even so, there are measures that could reduce the use of medicines and drugs that impair driving skill.

Introducing limits

The introduction of risk-related limits for drugs, just as we have for alcohol, would be the most desirable solution when considering safety. The use of risk-related limits means that the use of drugs exceeding a certain limit is not punishable until it can be scientifically established that that concentration unacceptably influences the risk. This limit is more difficult to establish for drugs than for alcohol because various drugs result in different levels of risk when used in different concentrations and in different combinations. This means that various limits would have to be established. Therefore, it will probably be some time before a properly supported and accepted system of limits can be defined. Yet it would be undesirable to wait this long since many drugs have a highly adverse effect on road safety and there are indications that drug use among road users is growing. Until that time, a zero-limit approach could be considered in which any detected quantity would be punishable. In Europe, a number of countries, among which Belgium, France and Sweden use a zero-tolerance limit for drugs. The effects/results are not yet known to us. For a zero-limit, it would be advisable to focus enforcement particularly on groups with the highest risk such as drivers who combine various drugs and who combine drugs with alcohol. This also requires sufficient enforcement capacity which should not be made available by removing this capacity from the enforcement of other traffic violations.

Providing information about medicines that impair driving skill

Drivers should be warned of the potential risk of combining medicine use and driving. This could be accomplished by various forms of communication such as warning labels on the packaging of medicines, issuing leaflets, and running public information campaigns in the media. The objective of national campaigns initiated by the government such as *Drive safely with medicines* is to make users of medicines that impair driving skill aware of the risks of participating in traffic. These campaigns are launched at regular intervals.

Another possibility is having physicians and pharmacists provide individual patients with good information. For either of these forms of providing information, the medicines first have to be classified in a uniform manner according to their potential effect on driving skill. Such a system is also being set up within the DRUID European research project (www.druid-project.eu).

Conclusions and recommendations

There are various indications that drug use among road users is increasing. Particularly important factors leading to a considerable increase in risk are the simultaneous use of alcohol and drugs and the combined use of various drugs. The combined use of these substances occurs most frequently among young males. A drug limit could contribute to counteracting the use of drugs among drivers. When considering safety, there should be a drug limit or limits, just as for alcohol, that would preferably be based on factual information about the risks involved in using the various concentrations and combinations. For as long as this is not possible, a zero-limit approach could be considered. Also of importance is providing police with sufficient manpower and sufficient, reliable and usable means to enforce the limit or limits.

Certain medicines also have an adverse effect on road safety. Effective communication provided by physicians and pharmacists about the potential dangers of combining driving with using medicines that can impair driving skill can contribute to a reduction in the number of road casualties among this group of users.

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