

Driving and Marijuana

Policy debates regarding marijuana-law reform invariably raise the issue of marijuana and driving. This is a valid concern. In fact, NORML's own "[Principles of Responsible Cannabis Use](#)" invoke a "no driving" clause, stating: "Although cannabis is said by most experts to be safer than alcohol and many prescription drugs with motorists, responsible cannabis consumers never operate motor vehicles in an impaired condition."



Nevertheless, concerns regarding doped driving should not be an impediment to marijuana-law reform. Alcohol is legal in America, yet every state maintains tough laws punishing those who choose to drive impaired by it. There is no reason why similar principles should not regulate cannabis consumption.

Moreover, emerging scientific research indicates that cannabis actually has far less impact on the psychomotor skills needed for driving than alcohol does, and is seldom a causal factor in automobile accidents. The following documents provide a comprehensive overview of the scientific evidence regarding marijuana's impact on psychomotor skills and driving.

[Cruising on Cannabis: Putting the Brakes on Doped Driving Misconceptions](#)

NORML/High Times NORMLIZER Report (August 2002)

[Marijuana and Driving: A Review of the Scientific Evidence](#)

NORML Report (2002)

[Schaffer Library of Drug Policy References on Drugs and Driving](#)

[Cannabis and Driving: A Review of the Literature and Commentary](#)

UK Department of Environment, Transport and the Regions (Road Safety Division) Report (2000)

[Cannabis and Road Safety: An Outline of the Research Studies to Examine the Effects of Cannabis on Driving Skills and on Actual Driving Performance](#)

National Drug and Alcohol Research Center (Australia) Report

[The Influence of Cannabis on Driving](#)

UK Department of Environment, Transport and the Regions (Road Safety Division) Report (2000)

[Marijuana and Actual Driving Performance](#)

US Department of Transportation National Highway Traffic Safety Administration
Report (1993)

[Erowid Library on Cannabis and Driving](#)

[BBC Report on Marijuana and Driving](#)

Cruising on Cannabis: Putting the Breaks on Doped Driving Misconceptions

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Policy debates regarding marijuana-law reform, including those involving the legalization of medicinal cannabis, invariably beg the question: "What about marijuana and driving?" The concern is a valid one. In fact, NORML's own "Principles of Responsible Cannabis Use" invoke a "no driving" clause, stating: "Although cannabis is said by most experts to be safer than alcohol and many prescription drugs with motorists, responsible cannabis consumers never operate motor vehicles in an impaired condition."

Nevertheless, concerns regarding doped driving should not be an impediment to marijuana-law reform. Alcohol is legal in America, yet every state maintains tough laws punishing those who choose to drive impaired by it. There is no reason why similar principles should not regulate cannabis consumption.

Moreover, emerging scientific research indicates that cannabis actually has far less impact on the psychomotor skills needed for driving than alcohol does, and is seldom a causal factor in automobile accidents. A pair of international studies released in the spring of 2001 bolsters this argument.

The first, conducted by Britain's Transport Research Laboratory, found that volunteers performed better on a driving simulator under the influence of pot than they did after consuming alcohol. According to the study, marijuana only adversely impacted subjects' ability to maintain a constant speed and control while driving around a figure-eight loop. Reaction time and all other measures of driving performance remained unaffected. Researchers also noted that the subjects who had smoked marijuana - unlike alcohol users - were aware of their impairment and attempted to compensate for it by driving more cautiously.

Similar results were also reported in March by a South Australian team at the Department of Clinical and Experimental Pharmacology at the University of Adelaide. Their

epidemiological review of automobile accidents found that alcohol "overwhelmingly plays the greatest role in road crashes ... [and] conversely, ... marijuana has a negligible impact on culpability." The study was a follow up to a 1998 analysis of 2,500 injured drivers that previously determined cannabis to have "no significant effect" on drivers' culpability in motor vehicle accidents.

In fact, most marijuana and driving experiments give pot a relatively clean bill of health, particularly when compared to alcohol. A review of two-decades worth of driving simulator and on-road studies by Alison Smiley for Toronto's Centre for Addiction and Mental Health concluded that although marijuana temporarily impairs driving behavior, "this impairment is mitigated in that subjects under marijuana treatment appear to perceive that they are indeed impaired [and] where they can compensate, they do."

With respect to comparisons between the effects of alcohol versus marijuana, the author asserted, "In contrast to the compensatory behavior exhibited by subjects under marijuana treatment, subjects who have received alcohol tend to drive in a more risky manner." Smiley's assessment concludes, "The more cautious behavior of subjects who have received marijuana decreases the impact of the drug on performance, whereas the opposite holds true for alcohol."

Transportation data says likewise. A 1997 examination of motor vehicle injuries by the University of Michigan Transportation Research Institute concluded that alcohol is "the major drug associated with injury," and found no evidence to support the accusation that illicit drugs are a major factor in auto crashes. An earlier analysis published by the U.S. National Highway Transportation Safety Administration of 1,882 drivers killed in motor vehicle accidents also determined that alcohol, not pot, was the "dominant problem" in drug-related traffic accidents.

That said, are we to believe that it's ever safe to get high and drive? Not at all. However, what is apparent is that marijuana's slight impairment on psychomotor skills generally falls within the range of safety Americans accept for prescription medications and other legal, potentially debilitating factors such as fatigue or cell phones. As such, the question of marijuana and driving should remain a public policy concern for drug law reformers, but not a serious political obstacle to marijuana-law reform.

Marijuana and Driving: A Review of the Scientific Evidence

It is well established that alcohol increases accident risk. Evidence of marijuana's culpability in on-road driving accidents is much less convincing.

Although cannabis intoxication has been shown to mildly impair psychomotor skills, this impairment does not appear to be severe or long lasting. In driving simulator tests, this impairment is typically manifested by subjects decreasing their driving speed and requiring greater time to respond to emergency situations.

Nevertheless, this impairment does not appear to play a significant role in on-road traffic accidents. A 2002 review of seven separate studies involving 7,934 drivers reported, “Crash culpability studies have failed to demonstrate that drivers with cannabinoids in the blood are significantly more likely than drug-free drivers to be culpable in road crashes.” This result is likely because subject under the influence of marijuana are aware of their impairment and compensate for it accordingly, such as by slowing down and by focusing their attention when they know a response will be required. This reaction is just the opposite of that exhibited by drivers under the influence of alcohol, who tend to drive in a more risky manner proportional to their intoxication.

Today, a large body of research exists exploring the impact of marijuana on psychomotor skills and actual driving performance. This research consists of driving simulator studies, on-road performance studies, crash culpability studies, and summary reviews of the existing evidence. To date, the result of this research is fairly consistent: Marijuana has a measurable yet relatively mild effect on psychomotor skills, yet it does not appear to play a significant role in vehicle crashes, particularly when compared to alcohol. Below is a summary of some of the existing data.

SUMMARIES

“At the present time, the evidence to suggest an involvement of cannabis in road crashes is scientifically unproven.

To date ..., seven studies using culpability analysis have been reported, involving a total of 7,934 drivers. Alcohol was detected as the only drug in 1,785 drivers, and together with cannabis in 390 drivers. Cannabis was detected in 684 drivers, and in 294 of these it was the only drug detected.

... The results to date of crash culpability studies have failed to demonstrate that drivers with cannabinoids in the blood are significantly more likely than drug-free drivers to be culpable in road crashes. ... [In] cases in which THC was the only drug present were analyzed, the culpability ratio was found to be not significantly different from the no-drug group.”

REFERENCE: G. Chesher and M. Longo. 2002. Cannabis and alcohol in motor vehicle accidents. In: F. Grotenhermen and E. Russo (Eds.) Cannabis and Cannabinoids:

Pharmacology, Toxicology, and Therapeutic Potential. New York: Haworth Press. Pp. 313-323.

“Cannabis leads to a more cautious style of driving, [but] it has a negative impact on decision time and trajectory. [However,] this in itself does not mean that drivers under the influence of cannabis represent a traffic safety risk. ... **Cannabis alone, particularly in low doses, has little effect on the skills involved in automobile driving.**”

REFERENCE: Canadian Senate Special Committee on Illegal Drugs. 2002. Cannabis: Summary Report: Our Position for a Canadian Public Policy. Ottawa. Chapter 8: Driving Under the Influence of Cannabis.

“This report has summarized available research on cannabis and driving.

... Evidence of impairment from the consumption of cannabis has been reported by studies using laboratory tests, driving simulators and on-road observation. ... Both simulation and road trials generally find that driving behavior shortly after consumption of larger doses of cannabis results in (i) a more cautious driving style; (ii) increased variability in lane position (and headway); and (iii) longer decision times. **Whereas these results indicate a 'change' from normal conditions, they do not necessarily reflect 'impairment' in terms of performance effectiveness since few studies report increased accident risk.**

REFERENCE: UK Department of Environment, Transport and the Regions (Road Safety Division). 2000. *Cannabis and Driving: A Review of the Literature and Commentary*. Crowthorne, Berks: TRL Limited.

“Overall, we conclude that the weight of the evidence indicates that:

- 1) **There is no evidence that consumption of cannabis alone increases the risk of culpability for traffic crash fatalities or injuries for which hospitalization occurs, and may reduce those risks.**
- 2) The evidence concerning the combined effect of cannabis and alcohol on the risk of traffic fatalities and injuries, relative to the risk of alcohol alone, is unclear.
- 3) It is not possible to exclude the possibility that the use of cannabis (with or without alcohol) leads to an increased risk of road traffic crashes causing less serious injuries and vehicle damage.”

REFERENCE: M. Bates and T. Blakely. 1999. “Role of cannabis in motor vehicle crashes.” *Epidemiologic Reviews* 21: 222-232.

“In conclusion, marijuana impairs driving behavior. **However, this impairment is mitigated in that subjects under marijuana treatment appear to perceive that they are indeed impaired.** Where they can compensate, they do, for example by not overtaking, by slowing down and by focusing their attention when they know a response will be required. ... Effects on driving behavior are present up to an hour after smoking but do not continue for extended periods.

With respect to comparisons between alcohol and marijuana effects, these substances tend to differ in their effects. **In contrast to the compensatory behavior exhibited by subjects under marijuana treatment, subjects who have received alcohol tend to drive in a more risky manner. Both substances impair performance; however, the more cautious behavior of subjects who have received marijuana decreases the impact of the drug on performance, whereas the opposite holds true for alcohol.”**

REFERENCE: A. Smiley. 1999. Marijuana: On-Road and Driving-Simulator Studies. In: H. Kalant et al. (Eds) The Health Effects of Cannabis. Toronto: Center for Addiction and Mental Health. Pp. 173-191.

“Intoxication with cannabis leads to a slight impairment of psychomotor ... function. ... [However,] **the impairment in driving skills does not appear to be severe, even immediately after taking cannabis, when subjects are tested in a driving simulator.** This may be because people intoxicated by cannabis appear to compensate for their impairment by taking fewer risks and driving more slowly, whereas alcohol tends to encourage people to take great risks and drive more aggressively.”

REFERENCE: UK House of Lords Select Committee on Science and Technology. 1998. Ninth Report. London: United Kingdom. Chapter 4: Section 4.7.

“The evidence suggests that marijuana presents a real, but secondary safety risk; and that alcohol is the leading drug-related accident risk factor.”

REFERENCES: D. Gieringer. 1988. Marijuana, driving, and accident safety. Journal of Psychoactive Drugs 20: 93-101.

CRASH CULPABILITY STUDIES

“For each of 2,500 injured drivers presenting to a hospital, a blood sample was collected for later analysis.

There was a clear relationship between alcohol and culpability. ... **In contrast, there was no significant increase in culpability for cannabinoids alone. While a relatively**

large number of injured drivers tested positive for cannabinoids, culpability rates were no higher than those for the drug free group. This is consistent with other findings.”

REFERENCE: C. Hunter et al. 1998. The Prevalence and Role of Alcohol, Cannabinoids, Benzodiazepines and Stimulants in Non-Fatal Crashes. Adelaide: South Australia: Forensic Science, Department for Administration and Information Services.

“Blood samples from 894 patients presenting to two Emergency Departments for treatment of motor vehicle injur[ies] ... were tested for alcohol and other drugs.

... Based on alcohol and drug testing of the full range of patients ... alcohol is clearly the major drug associated with serious crashes and greater injury. **Patients testing positive for illicit drugs (marijuana, opiates, and cocaine), in the absence of alcohol, were in crashes very similar to those of patients with neither alcohol nor drugs. When other relevant variables were considered, these drugs were not associated with more severe crashes or greater injury.**”

REFERENCE: P. Waller et al. 1997. Crash characteristics and injuries of victims impaired by alcohol versus illicit drugs. Accident Analysis and Prevention 29: 817-827.

“Blood specimens were collected from a sample of 1,882 drivers from 7 states, during 14 months in the years 1990 and 1991. The sample comprised operators of passenger cars, trucks, and motorcycles who died within 4 hours of their crash.

... While cannabinoids were detected in 7 percent of the drivers, the psychoactive agent THC was found in only 4 percent. ... **The THC-only drivers had a responsibility rate below that of the drugfree drivers. ... While the difference was not statistically significant, there was no indication that cannabis by itself was a cause of fatal crashes.**”

REFERENCE: K. Terhune. 1992. The incidence and role of drugs in fatally injured drivers. Washington, DC: US Department of Transportation National Highway Traffic Safety Administration, Report No. DOT HS 808 065.

ON-ROAD PERFORMANCE STUDIES

“Marijuana's effects on actual driving performance were assessed in a series of three studies wherein dose-effect relationships were measured in actual driving situations that progressively approached reality.

... THC's effects on road-tracking after doses up to 300 µg/kg never exceeded alcohol's at bacs of 0.08%; and, were in no way unusual compared to many medicinal drugs. Yet, THC's effects differ qualitatively from many other drugs, especially alcohol. **Evidence from the present and previous studies strongly suggests that alcohol encourages risky driving whereas THC encourages greater caution, at least in experiments. Another way THC seems to differ qualitatively from many other drugs is that the formers users seem better able to compensate for its adverse effects while driving under the influence.**"

REFERENCE: H. Robbe. 1995. Marijuana's effects on actual driving performance. In: C. Kloeden and A. McLean (Eds) Alcohol, Drugs and Traffic Safety T-95. Adelaide: Australia: HHMRC Road Research Unit, University of Adelaide. Pp. 11-20.

"This report concerns the effects of marijuana smoking on actual driving performance. ... This program of research has shown that marijuana, when taken alone, produces a moderate degree of driving impairment which is related to consumed THC dose. **The impairment manifests itself mainly in the ability to maintain a lateral position on the road, but its magnitude is not exceptional in comparison with changes produced by many medicinal drugs and alcohol. Drivers under the influence of marijuana retain insight in their performance and will compensate when they can, for example, by slowing down or increasing effort. As a consequence, THC's adverse effects on driving performance appear relatively small.**"

REFERENCE: W. Hindrik and J. Robbe and J. O'Hanlon. 1993. *Marijuana and actual driving performance*. Washington, DC: US Department of Transportation National Highway Traffic Safety Administration, Report No. DOT HS 808 078.

TABULATED SUMMARY OF ROAD TRIALS OF CANNABIS AND DRIVING
Table compiled by the UK Department of Transport (2000)

DRIVING SIMULATOR STUDIES

"Overall, it is possible to conclude that cannabis has a measurable effect on psychomotor performance, particularly tracking ability. Its effect on higher cognitive functions, for example divided attention tasks associated with driving, appear not to be as critical. **Drivers under the influence of cannabis seem aware that they are impaired, and attempt to compensate for this impairment by reducing the difficulty of the driving task, for example by driving more slowly.**

In terms of road safety, it cannot be concluded that driving under the influence of cannabis is not a hazard, as the effects of various aspects of driver performance are

unpredictable. **However, in comparison with alcohol, the severe effects of alcohol on the higher cognitive processes of driving are likely to make this more of a hazard, particularly at higher blood alcohol levels.”**

REFERENCE: B. Sexton et al. 2000. *The influence of cannabis on driving: A report prepared for the UK Department of the Environment, Transport and the Regions (Road Safety Division)*. Crowthorne, Berks: TRL Limited.

TABULATED SUMMARY OF SIMULATOR STUDIES OF CANNABIS AND DRIVING

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