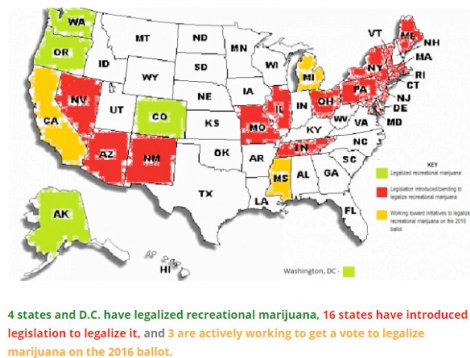


# Hit a Joint and Take a Ride: The Effects of Marijuana on Driving Performance

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As of April 1<sup>st</sup> 2015, four states (Washington, Colorado, Alaska, and Washington D.C.) have legalized the use of recreational marijuana (“State Marijuana Laws Map,” 2015).



(<http://azmarijuana.com/wp-content/uploads/2015/04/Marijuana-Map-America.jpg>)

Since the trend in the United States appears to be increased acceptance of marijuana, many people have raised alarms about the effects of marijuana use on driving (Sullum, 2014). This paper will attempt to address that question by examining the data from three studies:

“Marijuana's Impairing Effects on Driving are Moderate When Taken Alone But Severe When Combined with Alcohol,” “Marijuana use and car crash injury,” and “Marijuana, Alcohol and Actual Driving Performance.”

The three studies were conducted outside of the United States and tested the effects of natural marijuana that “contains the mind-altering chemical delta-9-tetrahydrocannabinol (THC)” (“DrugFacts: Marijuana,” 2015).

The first study conducted by H. Robbe is called “Marijuana's Impairing Effects on Driving are Moderate When Taken Alone But Severe When Combined with Alcohol.” The experiments in this study examine the effects of marijuana and alcohol. Robbe used participants between the ages of twenty-one and forty who smoked three marijuana cigarettes

until they had achieved the psychological effect of the drug (Robbe, 1998).



<http://www.drugfree.org/wp-content/uploads/2014/06/marijuana-joint-Join-Together-News-Service-Partnership-for-Drug-Free-Kids.jpg>

In experiment one, participants were required to maintain a speed of ninety miles per hour and a steady lateral position (drive straight) in the lane (Robbe, 1998). The data collected from this experiment indicates that participants who had smoked marijuana had a more difficult time maintaining speed and staying in their lane than those who didn't smoke any marijuana (Robbe). H. Robbe referenced a study by Louwerens (1987) in his paper, which indicates that the amount of marijuana smoked for this experiment mimic the effect of a blood alcohol level of  $0.03 \pm 0.07\%$  (Robbe).

For the second experiment the marijuana was administered double blind, which means neither the participants nor the researchers knew who smoked the actual marijuana and who was given a placebo. Then the participants were asked to complete a car following test for about fifteen minutes (Robbe, 1998). The main thing that the researchers were measuring was the reaction time of the participant's in relation to the movements of the vehicle in front of them on the roadway (Robbe). The participants who smoked marijuana before driving drove slightly slower than the average participant who hadn't smoked any marijuana (Robbe).

Although none of the speed changes were major, they may be explained by altered brain functioning. In a recent study on cognition, it was revealed that in marijuana users there were persistent, negative dose-related effects including those which effected executive functioning, visuoperception, psychomotor speed, and manual dexterity—all things that

would effect driving capabilities (Bolla, Brown, Eldreth, Tate, & Cadet, 2006). However, the longevity of the effects of marijuana were short and faded quickly (Bolla, 2006). This may be why the participants who smoked did drive slightly slower but not for an extended period of time.

In general, the data outlined in the article by H. Robbe indicates that the smoking of marijuana no major effects on the driving performance of the participants in the various experiments. The effects of the marijuana are dose related. The experiments also suggest that marijuana actually encourages caution when driving (Robbe, 1998).



<https://cannapan.files.wordpress.com/2014/02/marijuana-traffic-light.jpg?w=700>

This is interestingly in line with the paper, “Marijuana Use, Driving, and Related Cognitions,” which suggests that from a cognitive perspective, marijuana users who “drive under the influence of marijuana...do not perceive driving high as risky for themselves or others” (Arterberry, Treloar, Smith, Martens, Pedersen, & Mccarthy, 2013). Although the effects of marijuana alone on driving performance were not major, they suggest a loss of driving that when paired with other drugs or alcohol could become very serious.

The second paper with important evidence about the effects of marijuana contains research is titled “Marijuana use and car crash injury” (Blows, Ivers, Connor, Ameratunga, Woodward, & Norton, 2005). The researchers who conducted these experiments had the expressed purpose of investigating the relationship between marijuana use prior to driving and car crash injury. The participants in this case-control study were the population in Auckland, New Zealand (Blows et al.). The study included analysis on 571 vehicle crashes in which at least one person had been hospitalized or killed and 588 control vehicles (Blows et

al.).

The data was collected through the administration of a 155 questionnaire on the telephone (Blows et al., 2005). As a part of that questionnaire the participants were asked to answer two specific questions about their acute and chronic use of marijuana (Blows et al.). For all of the vehicular crashes included in the study, the drivers' self-reported using marijuana up to three hours prior to the car crash (Blows et al.). The participants were also asked to report their habitual marijuana use over the course of the past twelve months for the purposes of the study (Blows et al.).

After the researchers had accounted for the potential confounding variables, they found that acute marijuana use had no significant effect on risky driving behavior at the time of the crash. However, when the data for habitual marijuana use was also adjusted for confounding variables it remained statistically significant (Blows et al., 2005). The results of the paper "Marijuana use and car crash injury" indicate that habitual marijuana users are ten times more at risk for causing car crash injury or death compared to infrequent marijuana users and to non-users (Blows et al.).

From a cognitive perspective, the paper, "Marijuana Use, Driving, and Related Cognitions" argues that marijuana users attempt to reduce cognitive dissonance by asserting that marijuana use actually helps increase their focus while driving (Arterberry et al., 2013). This would be in line with the data, because it indicates that when there is a perceived discrepancy between behavior and outcome, people will alter their beliefs to accommodate (Robbe, 1998). In the context of the legalization of recreational marijuana, the data about habitual marijuana use is equally as pertinent. The data speaks to the fact that there is potential for some long-term effects of marijuana legalization that are not yet visible in the community.

The final paper, which includes important information about the potential effects of

marijuana on driving, is titled “Marijuana, Alcohol and Actual Driving Performance” (Ramaekers, Robbe, & O'Hanlon, 2000). This paper assessed data about the effects of marijuana as well as the effects of marijuana paired with alcohol on driving performance.



(<http://blog.sfgate.com/smellthetruth/files/2013/11/beerweed.jpg>)

The study included nine male and nine female participants who were twenty to twenty eight years old (Ramaekers et al., 2000). The researchers recruited the participants from a local newspaper advertisement (Ramaekers et al.).

The data included in the paper “Marijuana, Alcohol and Actual Driving Performance” contains information on the comorbid effects of marijuana paired with alcohol but also analysis the effects of marijuana smoked while not intoxicated on a participant’s driving abilities. Participants participated in driving tests thirty minutes after they had smoked a joint of marijuana (Ramaekers et al., 2000). The driving tests collected data on multiple aspects of the participants’ driving behaviors, but notably included a car following test and a road tracking test. As the name suggests, the car following test tracked the participant’s ability to follow a car in front of them on the road (Ramaekers et al.). For the road tracking test each of the participants was also asked to rate their driving performance and level of psychological effects of the drugs to gather data surrounding their own beliefs about smoking and driving ability (Ramaekers et al.).

The data from this study indicates that smoking marijuana caused the average participant to have a significant difference in the following and road tracking tests when

compared with the participants who didn't smoke marijuana (Ramaekers et al., 2000). These changes were actually a higher increase than the researchers had been predicated. Therefore, although the effects of low doses of marijuana in the study were not massively dangerous, they were present. On top of that, pairing low levels of marijuana in the body with alcohol has even more exacerbated and dangerous effects on the driving condition and safety of the participants (Ramaekers et al.). The effects of marijuana and alcohol could be especially dangerous for brain functioning because marijuana causes the brain to take "longer to complete recall and concentration tasks, which may factor into the reason participants who smoked the marijuana drove slower than other drivers (Hart, 2001). This study reinforces that data that was highlighted in the first paper by H. Robbe. It also is converging evidence of a statistical significance with marijuana use of some kind as indicated in Blows et al. as having an effect on participants driving ability.

As a resident of Washington, understanding the effects of the legalization of recreational marijuana is critical. Since a handful of states in the US have already legalized marijuana and many more are voting on the issue soon, the effects of marijuana on the lives of community members is an important issue to explore. The three studies explored in this paper attempt to shed some light on this concern. Although the evidence in these papers is certainly not comprehensive, they do reveal some common trends and some contradictory evidence for further research to be conducted on.

The three articles analyzed in paper collectively suggest that acute marijuana use causes increased driving concerns when compared with driving free of the influence of marijuana. Using marijuana while driving did not have a large enough impact on the driving performance of participants to raise alarm, but when paired with alcohol these concerns were exacerbated. As the use of marijuana becomes more widespread in the United States through the process of legalization for recreational purposes, it will be important to understand what

effects this will and will not have on day to day life.

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