LEGALIZATION OF MARIJUANA: Implications on Traffic Safety/
Study in California

Presented by
James C. Fell
NORC at the University of Chicago
Bethesda, Maryland USA
April 28, 2021
Agenda

- What is Marijuana (THC)?
- Legalization in the US.
- Effects on Driving.
- Prevalence and Crash Risk.
- Implications on Traffic Safety.
- Reducing Marijuana Impaired Driving.
- Minimum Legal Marijuana Use Age 21.
- Study in California.
- Black Market in California
- Summary
What is Marijuana?

- Marijuana is the term for the dried flowers and leaves of the *Cannabis sativa* plant
- **Cannabinoids** in marijuana are mind-altering chemicals
- **Marijuana** – herbal cannabis
- **Hashish** – cannabis resin
- **Cannabis** is a *psychoactive drug*, not a CNS stimulant nor a depressive
- Psychoactive ingredient in marijuana is: delta-9-tetrahydrocannabinol (THC)
How is Marijuana Consumed?

- Smoked (joint, pipe, bong)
- Eaten (brownies, cookies, cakes)
- Drank (Green Dragon: alcohol infused with THC; tea)
- Patch (in mouth above gum line)
- Pills (THC)
- Inhaled
How is Testing for Marijuana Use Accomplished?

- **Blood** - THC stays in blood for a few hours; measured in nanograms per milliliter [ng/ml]
- **Urine** – THC metabolites stay in urine for days
- **Saliva** – detects most immediate smoking of marijuana
- **Hair** – can detect marijuana use 3-4 months after
- **Breath?** – Working on it
# Marijuana Laws in the US: 2021

<table>
<thead>
<tr>
<th>Medical and Recreational THC Legal</th>
<th>Medical THC Legal and Recreational THC Decriminalized</th>
<th>Medical THC Only</th>
<th>Recreational THC Decriminalized</th>
<th>THC Illegal</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Colorado (2012)</td>
<td>• Connecticut</td>
<td>• Alabama</td>
<td>• Nebraska</td>
<td>• Idaho</td>
</tr>
<tr>
<td>• Washington (2012)</td>
<td>• Delaware</td>
<td>• Arkansas</td>
<td>• 1 State</td>
<td>• 1 State</td>
</tr>
<tr>
<td>• Oregon (2014)</td>
<td>• Maryland</td>
<td>• Florida</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Alaska (2014)</td>
<td>• Minnesota</td>
<td>• Georgia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• District of Columbia (2014)</td>
<td>• Missouri</td>
<td>• Hawaii</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• California (2016)</td>
<td>• New Hampshire</td>
<td>• Indiana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Maine (2016)</td>
<td>• New Mexico</td>
<td>• Iowa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Massachusetts (2016)</td>
<td>• New York</td>
<td>• Kansas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Nevada (2016)</td>
<td>• North Carolina</td>
<td>• Kentucky</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Michigan (2018)</td>
<td>• North Dakota</td>
<td>• Louisiana</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vermont (2018)</td>
<td>• Ohio</td>
<td>• Mississippi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Illinois (2019)</td>
<td>• Rhode Island</td>
<td>• Oklahoma</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Arizona (2020)</td>
<td>• 12 States</td>
<td>• Pennsylvania</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Montana (2021)</td>
<td></td>
<td>• South Carolina</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• New Jersey (2021)</td>
<td></td>
<td>• Tennessee</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• South Dakota (2021)</td>
<td></td>
<td>• Texas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 15 States + DC</td>
<td></td>
<td>• Utah</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 12 States</td>
<td></td>
<td>• Virginia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 21 States</td>
<td></td>
<td>• West Virginia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 21 States</td>
<td></td>
<td>• Wisconsin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 21 States</td>
<td></td>
<td>• Wyoming</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1 State</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 1 State</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• THC Illegal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Marijuana is most widely used illegal/legal drug in the U.S. (current estimated 18-22 million users) second to alcohol (60% of adults)

9%-13% of nighttime drivers on U.S. roads have marijuana (THC) in their systems
Signs of Marijuana Use

- Bloodshot eyes
- Increased heart rate
- Sleepiness
- Poor coordination
- Delayed reaction time
- Increased appetite
What Are the Effects of Marijuana on Driving?

- Some driving skills impaired (e.g., tracking, lane maintenance)
- Heavy marijuana use may increase the risk of being in a serious crash

[Sources: Sewell (2012), Yale University, Review of Literature; Li (2011), Meta-Analysis, Columbia University]
THC Not Like Alcohol

- Concentration of THC in the blood rises very rapidly after smoking marijuana and peaks in the blood after about 20-30 minutes. Then the concentration drops rapidly.
- However, the subjective “high” and measured impairment remain for 1-2 hours.
- So THC measured in the blood has no relationship to impairment.
Percent of Drivers on the Road with Positive BAC Levels (BAC ≥ .01) (Weekend Evenings)

Source: National Roadside Surveys

- 1973: 36% (1 out of 3)
- 1986: 26% (1 out of 4)
- 1996: 17% (1 out of 6)
- 2007: 12% (1 out of 8)
- 2013-14: 8% (1 out of 12)
Percentage of Weekend Nighttime Drivers with BACs $\geq 0.08$ g/dL* in the Five National Roadside Surveys

*During the period from 1973 through 1996, the States had BAC limits that ranged from 0.08 to 0.15 g/dL
Percentage of Drivers on U.S. Roads in 2007 and 2013-14 with Drugs Other than Alcohol (Oral Fluid and Blood)

- Drug Positive, 2007: 16.3%
- Drug Positive, 2013-14: 20.0%
- Marijuana (THC), 2007: 8.6%
- Marijuana (THC), 2013-14: 12.6%
ALCOHOL and THC

- The **odds of being in a crash** for drivers with THC (marijuana) in their systems is **1.05** (adjusted for age & gender) compared to drivers with no THC.

- The odds of being in a crash for a driver with a BAC = .05 is **2.07** (adjusted for age & gender) compared to drivers with a BAC = .00.

- The odds of being in a crash for drivers with a BAC = .08 is **3.93** (adjusted for age & gender) compared to drivers with a BAC = .00.

- The odds of being in a crash for drivers with a BAC = .15 is **12.18** (adjusted for age & gender) compared to drivers with a BAC = .00.

Source: NHTSA, Compton & Berning (2015), DOT HS 812-117
Prevalence of Marijuana in Seriously and Fatally Injured Crash Victims

- 21% of drivers had THC in their system at the time of the crash before the COVID-19 pandemic. That increased to 33% during the pandemic.

- 22% of drivers had alcohol in their system before the COVID-19 pandemic. That increased to 28% during the pandemic.

- 19% of pedestrians had THC in their system before the pandemic. That increased to 31% during the pandemic.
What Are the Implications for Traffic Safety?

- Marijuana impairs some driving skills:
  - Tracking
  - Unexpected events difficult to handle

- Combination of alcohol and THC exacerbates impairment effects

- Acute cannabis (THC) consumption can increase the risk of a crash involving serious injury or death according to some studies

- But the risk of being killed in a single vehicle crash at .02-.04 BACs is 3 to 4 times that of a sober driver
Hand-Held Ion Mobility Spectrometers (IMS)
Ion Mobility Spectrometers
Field Prototype

- Detects vapor-phase chemicals
  - Flash-vaporized THC from breath

- Low ng level of material are able to be detected, including THC

- Onboard computer or tethered to laptop
Summary and Conclusions

- Continue to monitor the States where recreational marijuana is legal very closely.

- **Balance** our limited enforcement resources between alcohol-DWI and drug-DUI enforcement.

- Establish **separate statutes** for alcohol-DWI and drug-DUI (DUID) and **more severe sanctions** for the combination of alcohol and DUID.
Minimum Legal Purchase Age

Based upon the effectiveness of MLDA-21 concerning alcohol in the U.S.:

- **Use** marijuana, **lose** driver’s license (90 days)

- No amount (**zero tolerance**) of THC in system if driving

- **Age of seller** should also be 21

- **Fake ID Retailer Support**: ID scanners, distinctive drivers’ licenses, confiscate fake IDs
Minimum Legal Purchase Age

Study sponsored by the Insurance Institute for Highway Safety (IIHS):

- Conducted by NORC in cooperation with the University of Minnesota
- “An Examination of the Minimum Legal Marijuana Use Age 21 Laws and Their Enforcement in California: A State Where Recreational Marijuana is Legal.”
- Submitted for publication in the Journal of Studies on Alcohol and Drugs
OBJECTION:
Assess the ease of access to marijuana by underage patrons

- Documented the MLMU-21 Laws in the State
- Conducted a Random Survey of 25 Law Enforcement Agencies in the State
- Sent pseudo-underage patrons into 50 randomly selected licensed recreational marijuana outlets (3 turned out to be medical marijuana only)
California MLMU-21 Study

RESULTS:

- Pseudo-underage patrons were required to show age identification to enter the outlets in all 47 (100%) of the recreational outlets visited.

- Law enforcement agencies do not consider enforcement of the recreational marijuana market a priority and depend upon retail store security to enforce MLMU-21
RESULTS:

- Only 15 of the 47 outlets visited used electronic ID scanners.
- Only 13 stores had signs outside indicating that entry was prohibited for persons under age 21.
- Penalty for furnishing marijuana to underage: up to 6 months in jail and a fine up to $500.
CONCLUSIONS:

- Licensed California recreational marijuana outlets appear to avoid selling to underage customers.

- However, according to a recent published scientific study and numerous news reports, there are hundreds, if not thousands, of illicit marijuana dispensaries in California.

- Future research should focus on whether youth are obtaining marijuana from illicit stores.
SUMMARY
How Can We Limit Marijuana Impaired Driving in Legal States?

- Enforce the minimum legal purchase age (MLPA) [21 in the US].
- Enforce drugged driving using roadside saliva testing.
- Establish a standardized field sobriety test (SFST) for THC.
- Establish a DUID Visual Detection Guide similar to the NHTSA guide for alcohol
Additional References


Additional References


Additional References


Contact Information

James C. Fell
Principal Research Scientist
National Opinion Research Center (NORC) at the University of Chicago
Bethesda, Maryland 20814
Cell Phone: 240-354-2137
E-mail: fell-jim@norc.org