

# Health and Safety Endpoints: Injury and Death, and Crime Rates

Roadway Safety Subcommittee  
Governor's Marijuana Advisory Commission  
November 14, 2017

## Executive Order No. 15-17

- “In order to establish a common baseline understanding of the most credible data regarding health endpoints of marijuana use and safety impacts of legalization, on or before November 15, 2017, the Subcommittees on Highway Safety and Education and Prevention shall assess high-quality primary research, including evidence-based Vermont data to the extent it is available, for the following groups of health and safety endpoints and report to the Commission . . .”
  - Injury and death:
    - Current roadway injury and death data related to marijuana
  - Crime rates:
    - Increase/decrease in crime rates in states where marijuana has been decriminalized and legalized

## Research Questions

- **Motor Vehicles Injury and Death:**
  - Is marijuana **use**, alone or in combination with other substances, associated with an increased risk of (1) motor vehicle crashes and (2) motor vehicle fatalities?
  - Is marijuana **legalization** associated with an increased risk of (1) motor vehicle crashes and (2) motor vehicle fatalities?
- **Crime Rates:**
  - Do crime rates (i.e., rates of violent crime, property crimes or other collateral crimes) increase or decrease when marijuana is (1) decriminalized or (2) legalized for recreational use?

## Motor Vehicles Injury and Death Endpoint

- Is marijuana **use**, alone or in combination with other substances, associated with an increased risk of (1) motor vehicle crashes and (2) motor vehicle fatalities?

1. National Academies of Sciences, Engineering, and Medicine. 2017. *The health effects of cannabis and cannabinoids: The current state of evidence and recommendations for research*. Washington, DC: The National Academies Press
2. Rogeberg, O., and R. Elvik. 2016. The effects of cannabis intoxication on motor vehicle collision revisited and revised. *Addiction* 111(8):1348–1359
3. Compton, R. (2017, July). Marijuana-Impaired Driving - A Report to Congress. (DOT HS 812 440). Washington, DC: National Highway Traffic Safety Administration
4. Li G, Chihuri S, Brady JE. *Role of alcohol and marijuana use in the initiation of fatal two-vehicle crashes*. *Ann Epidemiol*. 2017;27(5):342-347
5. *Monitoring Health Concerns Related to Marijuana in Colorado: 2016 – Changes in Marijuana Use Patterns, Systematic Literature Review, and Possible Marijuana-Related Health Effects*. Colorado Department of Public Health and Environment (2016)

## National Academies of Sciences 2017

### Conclusion:

- “There is substantial evidence of a statistical association between cannabis use and increased risk of motor vehicle crashes”
  - Based on Rogeberg and Elvik 2016 (a study summarized below), the magnitude of the impact low to moderate in range

## Rogeberg and Elvik 2016

### Conclusion:

- Acute cannabis intoxication “is related to a statistically significant risk increase” for motor vehicle crashes, and “[t]he increase is of low to medium magnitude”
- “roughly 20–30% of traffic crashes involving cannabis use occur because of the cannabis use”

## National Highway Traffic Safety Administration Report to Congress, July 2017

### Conclusions:

- “Despite the variability in results, this research has demonstrated the potential of marijuana to impair driving related skills”
- More research needed on marijuana use in combination with alcohol

## Li, Chihuri, Brady 2017

### Conclusion:

- Study results “indicate that the risk of crash initiation from concurrent use of alcohol and marijuana among drivers may increase by more than fivefold when compared with drivers who test negative for alcohol and marijuana[.]”

## Colorado Department of Public Health and Environment Report 2016

### Conclusions:

- “the risk of a motor vehicle crash increases among drivers with recent marijuana use”
- “the higher the blood THC level, the higher the motor vehicle crash risk”
- “using alcohol and marijuana together increases impairment and the risk of a motor vehicle crash more than using either substance alone”

## Motor Vehicles Injury and Death Endpoint

- Is marijuana **legalization** associated with an increased risk of (1) motor vehicle crashes and (2) motor vehicle fatalities?

1. Jayson D. Aydelotte et al. "Crash Fatality Rates After Recreational Marijuana Legalization in Washington and Colorado", *American Journal of Public Health* 107, no. 8 (August 1, 2017): pp. 1329-1331
2. Rocky Mountain High Intensity Drug Trafficking Area. *The Legalization of Marijuana in Colorado: The Impact*. Volume 5, October 2017
3. AAA Foundation for Traffic Safety. *Prevalence of Marijuana Involvement in Fatal Crashes: Washington, 2010-2014* (May 2016)

## Aydelotte et al. 2017

### Conclusion:

- “Three years after recreational marijuana legalization, changes in motor vehicle crash fatality rates for Washington and Colorado were not statistically different from those in similar states without recreational marijuana legalization”

## Rocky Mountain High Intensity Drug Trafficking Area Report, October 2017

### Conclusions:

- “Marijuana-related traffic deaths when a driver tested positive for marijuana more than doubled from 55 deaths in 2013 to 125 deaths in 2016.”
- “Marijuana-related traffic deaths increased 66 percent in the four-year average (2013-2016) since Colorado legalized recreational marijuana compared to the four-year average (2009-2012) prior to legalization.”
  - “During the same time period, all traffic deaths increased 16 percent.”
- “In 2009, Colorado marijuana-related traffic deaths involving drivers testing positive for marijuana represented 9 percent of all traffic deaths. By 2016, that number has more than doubled to 21 percent.”

## AAA Foundation for Traffic Safety Report, May 2016

### Conclusions:

- Before and immediately after legalization the “proportion of drivers positive for THC was generally flat”
- That the proportion “began increasing significantly at a rate of 9.7 percentage points per year approximately 9 month” after legalization
- In the year 2014, “the number and proportion of drivers in fatal crashes who were positive for THC were both more than double the averages from the prior four years”

## Vermont Crash Data - Example

### Vermont Fatal Crash Data for 2017:

#### 2017 Fatal Crash data known to-date (October 23, 2017):

- **6** Operators **suspected** as driving under the influence of alcohol only.
- **10** Operators **suspected** as driving under the influence of drugs only.
- **6** Operators **suspected** as driving under the influence of both alcohol & drugs

\*Of the 16 operators with alcohol & drugs or drugs alone in their system, 11 were positive for Active Cannabis – Delta 9 THC.



## Vermont Pre- and Post-Decriminalization: Crashes by crash type in Vermont, where at least one driver tested positive for cannabis

### Pre-Decriminalization of Cannabis:

Crash Type	Number of Crashes
Fatal	33
Injury	25
Property Damage Only	13
Grand Total	71

*\*Dates used: 1/1/2010 - 6/30/13*

### Post Decriminalization of Cannabis:

Crash Type	Number of Crashes
Fatal	44
Injury	26
Property Damage Only	21
Grand Total	91

*\*Dates used: 7/1/2013 - 12/31/16*

## Crime Rates Endpoint

- Do crime rates (i.e., rates of violent crime, property crimes or other collateral crimes) increase or decrease when marijuana is **decriminalized**?

1. Arthur Huber III, Rebecca Newman, Daniel LaFave, *Cannabis Control and Crime: Medicinal Use, Depenalization and the War on Drugs*, The B.E. Journal of Economic Analysis & Policy, Vol. 16, Issue 4
2. Jerome Adda, Brendon McConnell, and Imran Rasul, *Crime and the Depenalization of Cannabis Possession: Evidence from a Policing Experiment*, Journal of Political Economy, Volume 122, Number 5 (October 2014)

### Huber III, Newman, LaFave 2016

#### Conclusion:

- This article found a statistically significant increase in burglaries (6.6%) and robberies (11.6%) in the 5 years following depenalization of marijuana

## Adda, McConnell, Rasul 2014

### Conclusion:

- Arrest rates for non-drug crimes (violence against the person, sexual offenses, robbery, burglary, theft and handling, fraud and forgery, and criminal damage) rose 28.4% in Lambeth relative to the rest of London during the thirteen-month policy period

## Crime Rates Endpoint

- Do crime rates (i.e., rates of violent crime, property crimes or other collateral crimes) increase or decrease when marijuana is **legalized for recreational use**?

1. Colorado Department of Public Safety. *Marijuana Legalization in Colorado: Early Findings* (March 2016)
2. Rocky Mountain High Intensity Drug Trafficking Area. *The Legalization of Marijuana in Colorado: The Impact*. Volume 5, October 2017

**Colorado Department of Public Safety. *Marijuana Legalization in Colorado: Early Findings* (March 2016)**

**Findings:**

- In Colorado, arrest rates for property crime increased 15% in 2013 and another 10% in 2014
- Denver saw a slight increase in the number of reported crimes committed in and around marijuana establishments, from 170 reports in 2012 to 183 in 2015.
- The most common reported crime is burglary, representing 62% of all industry-related crimes.
- Decrease in the number of plants being seized on public land from a high of 46,662 in 2012 to 25,030 in 2015.
- Juvenile marijuana arrests have increased 5% from 3,235 in 2012 to 3,400 in 2014.
- Reported marijuana offenses occurring in elementary and secondary schools have increased 34% from 1,766 in 2012 to 2,363 in 2014.

## Rocky Mountain High Intensity Drug Trafficking Area Report, October 2017

### Conclusions:

- The number of marijuana interdiction seizures increased from a pre-legalization high of 321 in 2011 to 346 in 2016.
- US Postal Inspection Service reported an increase in the number of parcels containing marijuana mailed from Colorado to another state from 158 in 2012 to 854 in 2016.
- In Denver:
  - crimes against property increased approximately 8% from 2014 to 2016.
  - unlawful public display/consumption of marijuana increased from a pre-legalization low of 8 incidences in 2012 to 590 in 2016.

Questions