



# **Marijuana and driving in the United States: prevalence, risks, and laws**

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[iihs.org](http://iihs.org)

**IIHS** is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from crashes on the nation's roads.

**HLDI** shares this mission by analyzing insurance data representing human and economic losses from crashes and other events related to vehicle ownership.

Both organizations are wholly supported by auto insurers.

# Where are we?



Washington, DC



Arlington, VA



Ruckersville, VA

# Overview of marijuana and driving

- Alcohol-impaired driving provides a useful comparison for what we would like to know about marijuana and driving
- Measuring marijuana in a driver's system
- Prevalence of marijuana among drivers
- Effects of marijuana on driving performance and crash risk
- Laws governing use of marijuana and driving after using marijuana



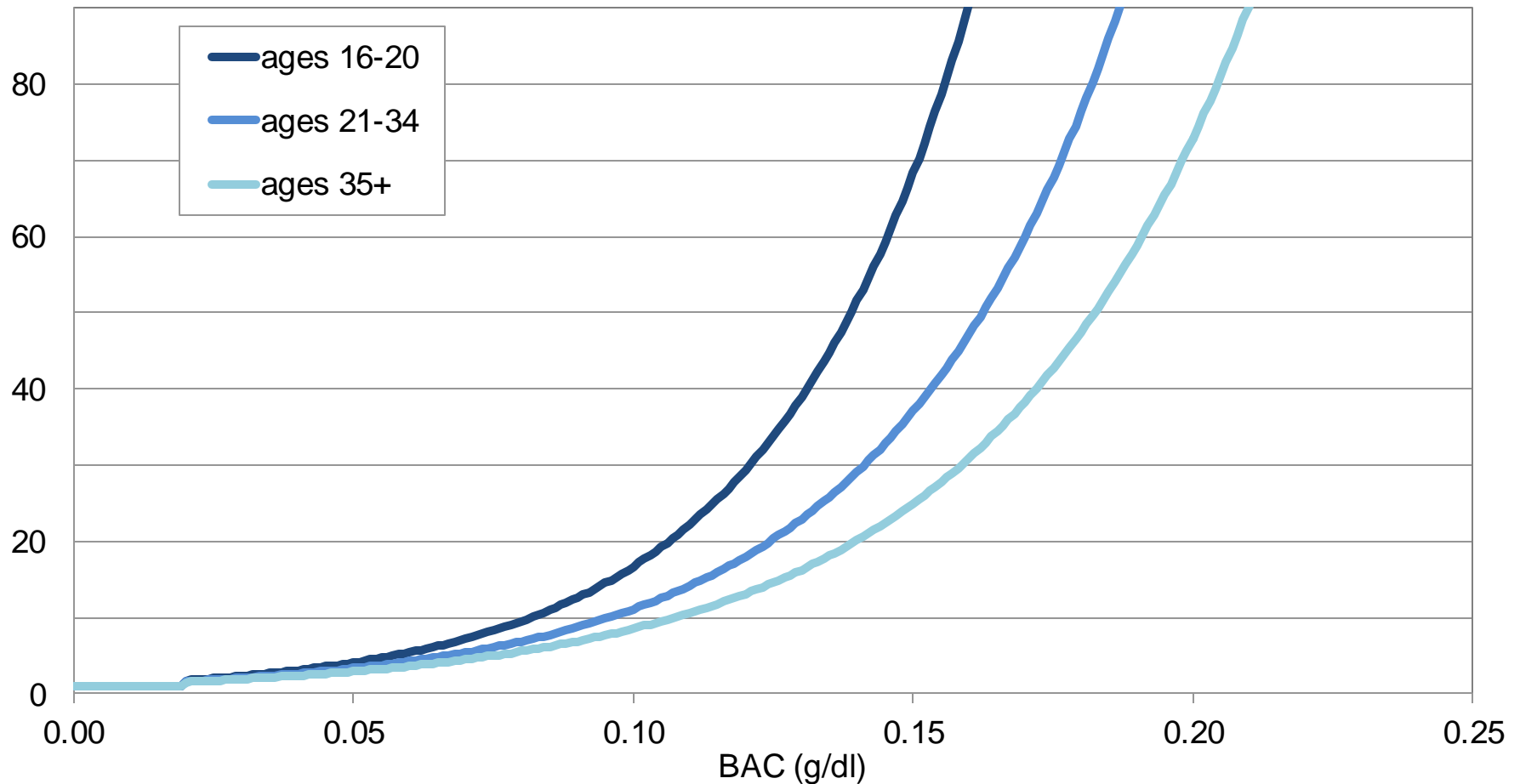
# **Alcohol-impaired driving provides a useful comparison**

# Measuring alcohol impairment

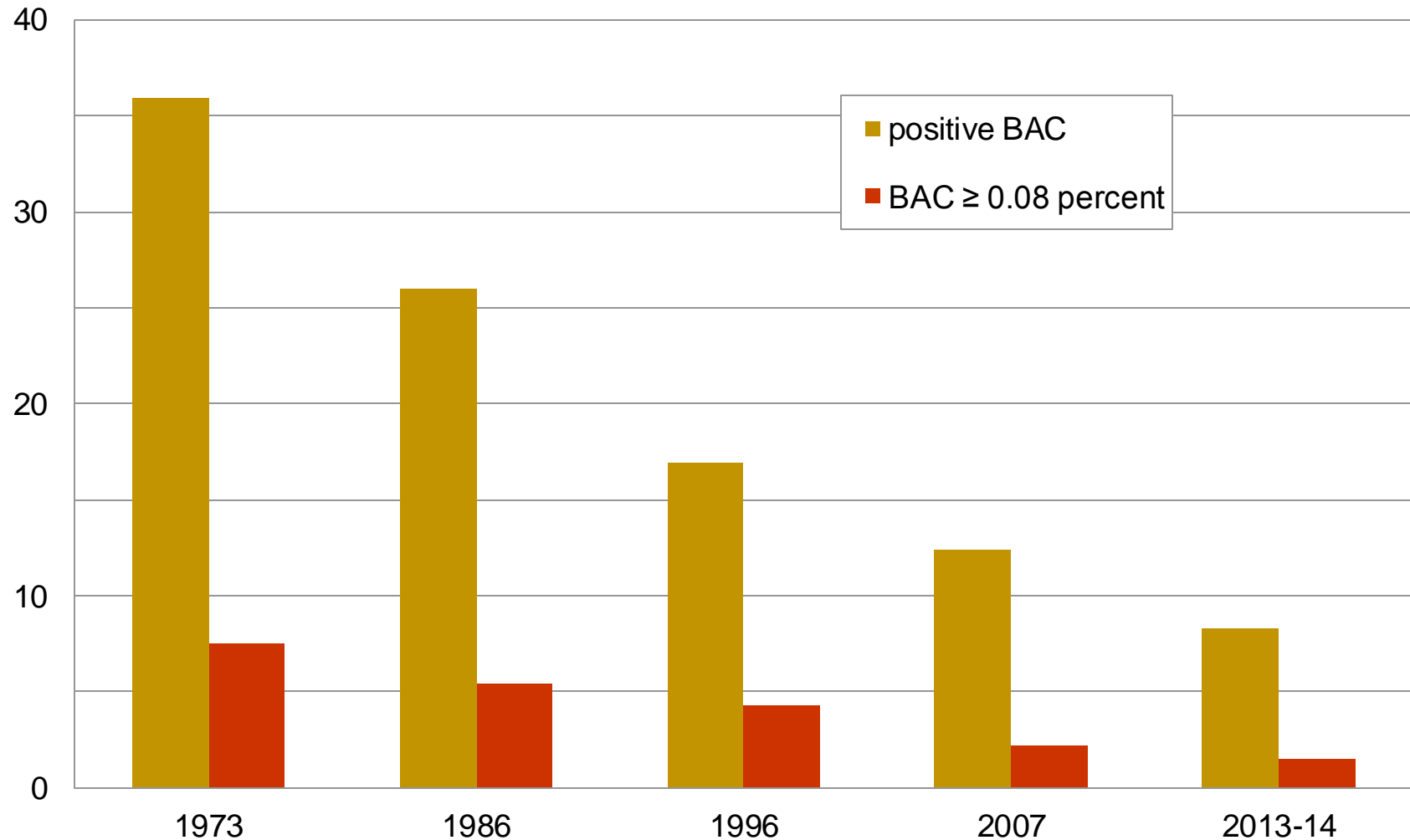
- Blood alcohol concentration (BAC) describes amount of alcohol in blood, e.g., 0.08 percent BAC indicates 80 mg of alcohol per 100 ml of blood
- BAC can be measured by analyzing exhaled breath
- Following arrest for alcohol-impaired driving, evidentiary breath test is inexpensive, easy to administer, and produces accurate and precise measure of BAC
- Relationship between BAC and amount of degradation in driving performance and driving-related skills and functions is well established across population

# Relative risk of fatal crash involvement at various BACs compared to zero BAC

Passenger vehicle drivers by age (Voas et al., 2012)



# Percent of weekend nighttime drivers with positive alcohol test in national roadside surveys



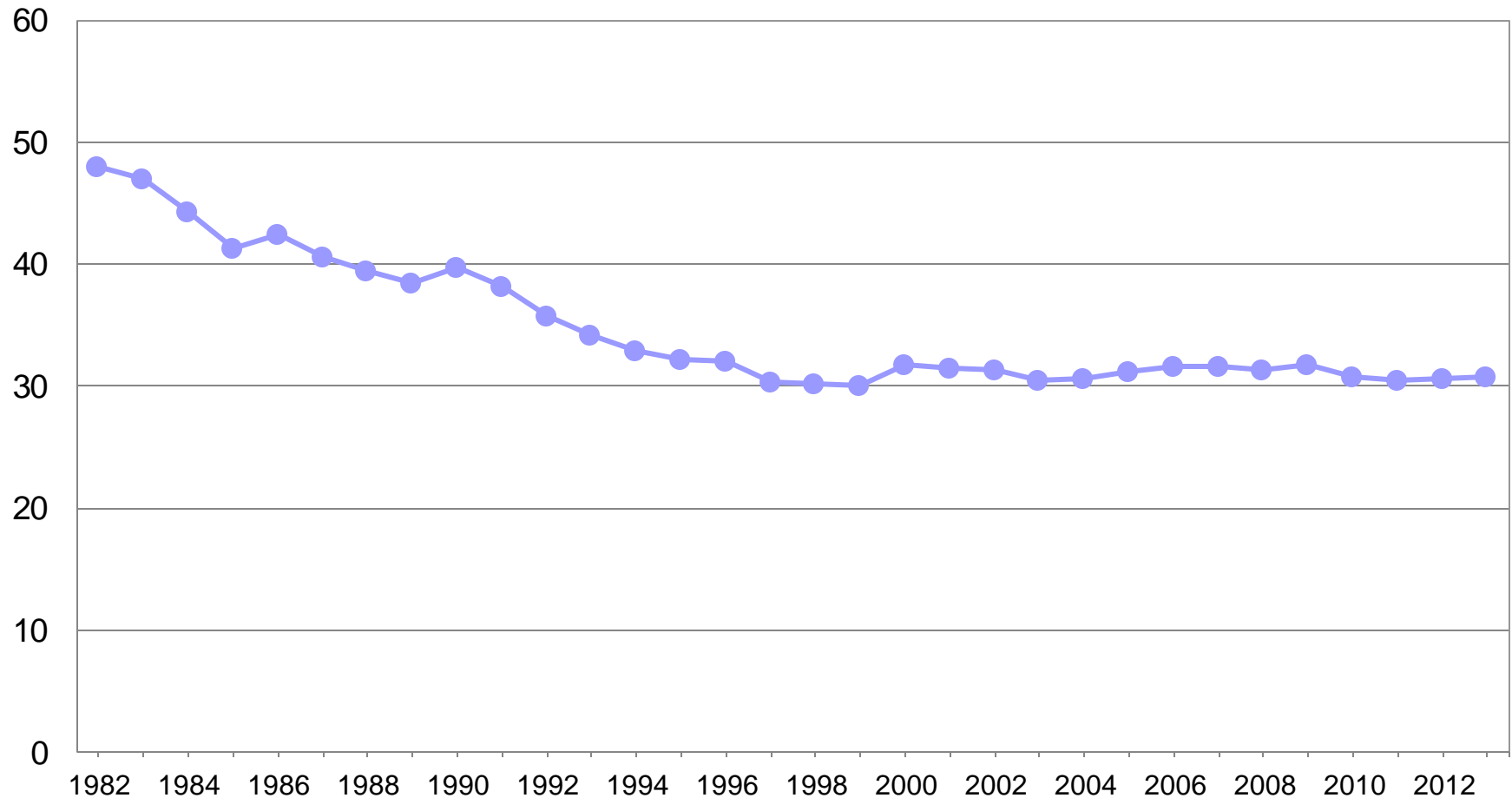


# Information on BACs in fatal crashes

- In national database of fatal crashes, BACs available for 72 percent of fatally injured drivers and 28 percent of surviving drivers in 2013
- However, BACs are imputed for drivers with missing BACs so that actual or imputed BACs are available for all drivers
- In 2013, 21 percent of drivers in fatal crashes had BACs of 0.08 percent or higher

# Percent of crash deaths involving at least one driver with BAC $\geq$ 0.08 percent

By calendar year, 1982-2013



# Well-established body of laws prohibiting alcohol-impaired driving

- In all states, *per se* laws make it a crime to drive with BAC of 0.08 percent or higher
- Regardless of alcohol test result, police officer may charge person with alcohol-impaired driving based on observed driving and behavioral signs of impairment after driver is stopped
- All states have strong penalties for drivers convicted of driving while intoxicated (DUI)
- Most states have administrative driver license suspension laws for refusing or failing alcohol tests
  - License removed after arrest regardless of court outcome

# Current knowledge about marijuana and driving

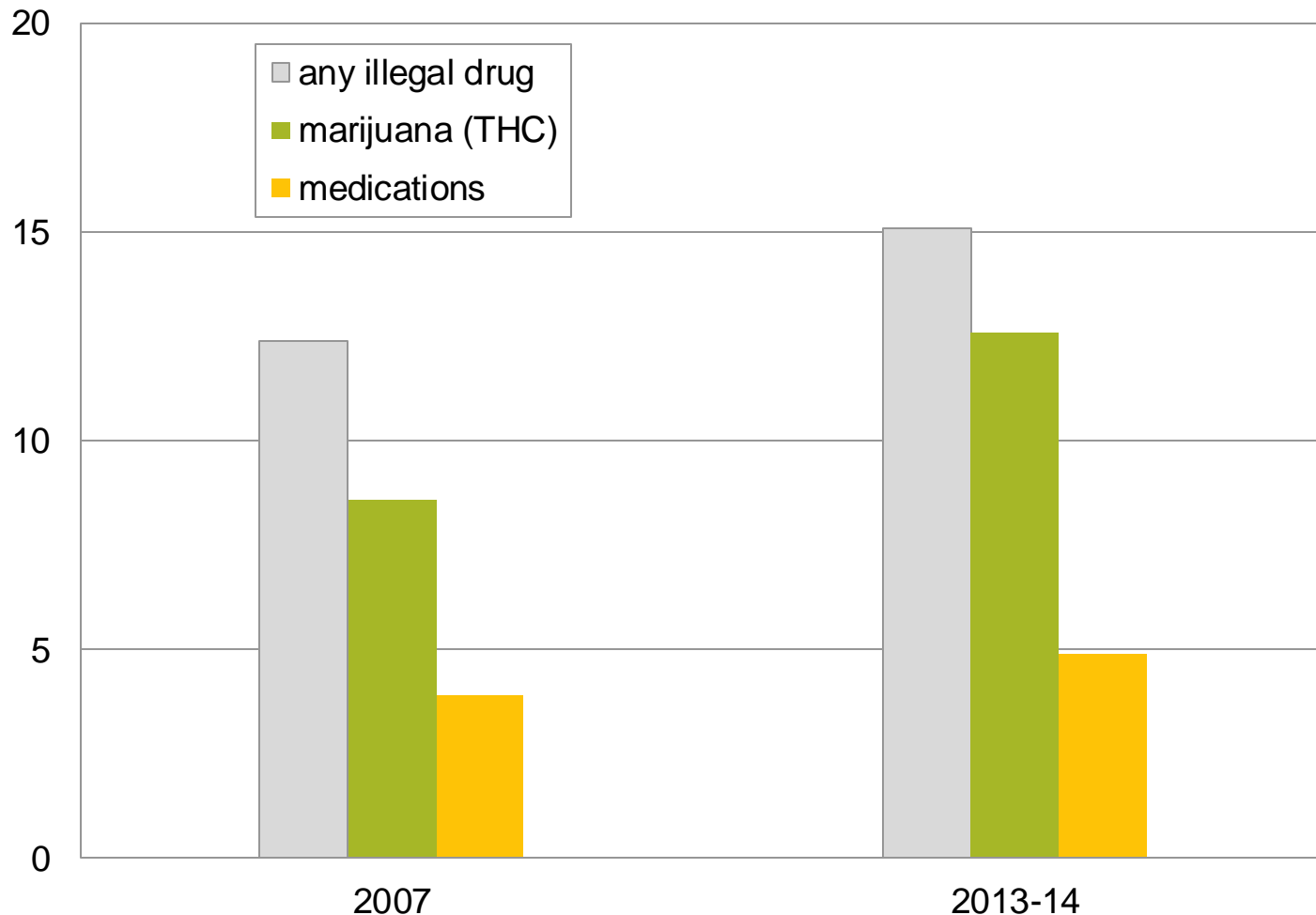


# Measuring marijuana in a driver's system

- Absorption, action, and elimination from body difficult to predict and considerable difference across individuals
  - Unknown sensitivity of tests to repeated use
- Tests may be based on THC (psychoactive ingredient of cannabis) or metabolites that may persist in blood or urine for several weeks following use
- Blood far superior to urine in indicating drug is active, although blood test also imperfect measure of recent use
- Saliva increasingly regarded as readily available and unobtrusive alternative for testing drugs
  - Research to date shows good correspondence with blood
- No evidence-based threshold for impairment

# Prevalence of marijuana among drivers

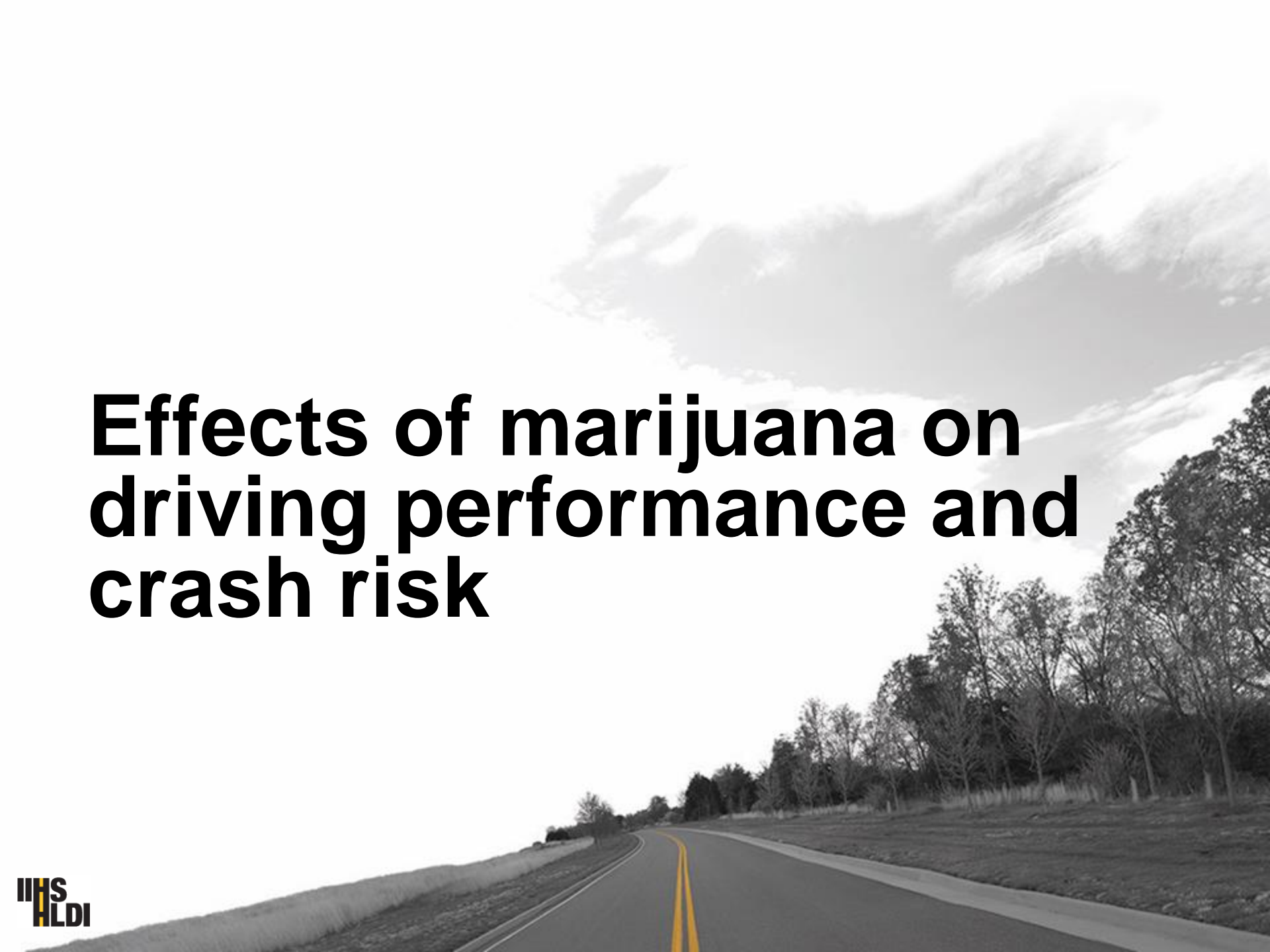
# Percent of weekend nighttime drivers with positive drug test in national roadside surveys





# Information on marijuana use among drivers in fatal crashes

- After alcohol, marijuana most common drug
  - Of drivers with drug test results in 2013, 13 percent had positive marijuana test
- However, drug test results available for only about 36 percent of drivers, and no means to estimate missing drug results
- Drug testing varies widely across jurisdictions
  - who is tested, types of drugs tested, specimens (blood, urine, saliva), thresholds for positive test, test protocols
- Presence but not amount of drug available; positive test does not necessarily indicate impairment
- Therefore, impossible to derive reliable estimate of prevalence of marijuana use that is comparable to roadside survey information



# Effects of marijuana on driving performance and crash risk

# Effects of marijuana on driving performance

- Using marijuana just prior to driving increased driver reaction times and impaired distance estimation and lane-keeping in simulator and on-road studies
- Higher doses generally related to greater impairments
- Federal study found that unlike alcohol-impairment, drivers under the influence of marijuana tend to compensate for their impairment
  - Retain insight into performance and compensate where they can, e.g., slowing down
  - Adverse effects on driving performance “appear relatively small”
- Other research found that drivers dosed with marijuana may not fully compensate for their deficits, especially at higher doses

# Prior research on marijuana's effects on crash risk

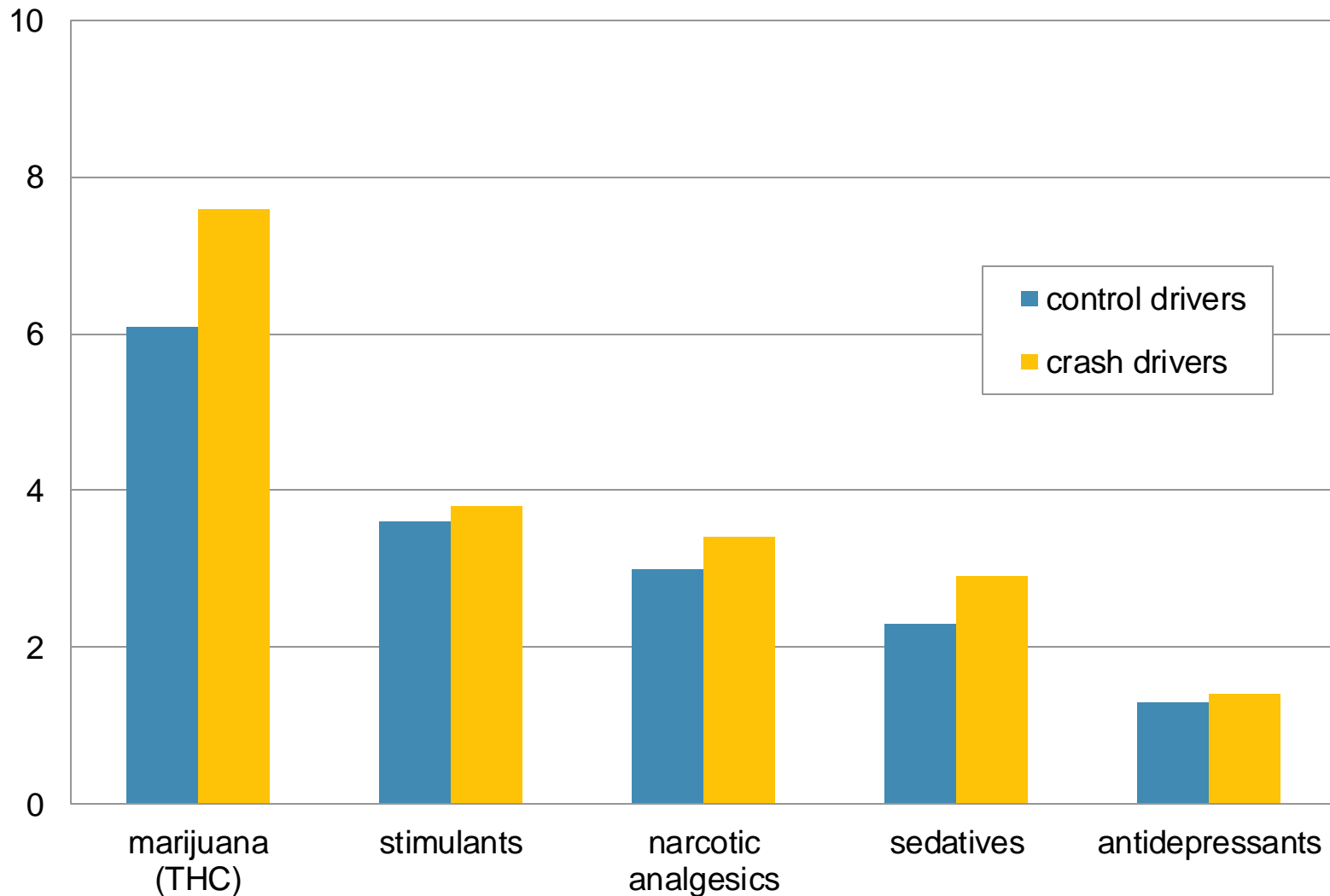
- Studies using a variety of methods have found conflicting results
  - Some studies found using marijuana could more than double crash risk, while others found a minimal or no effect
- Challenges in prior research
  - Marijuana often used with alcohol
  - Some studies relied on drivers' self-reported marijuana use
  - Some studies relied on urine tests, which can detect marijuana used several days prior
  - Difficult to find adequate control group of non-crash-involved drivers or other mechanism to account for confounding factors like driver age and gender or other lifestyle factors, bias in which drivers are tested after crashes, etc.

# New drug and alcohol crash risk study

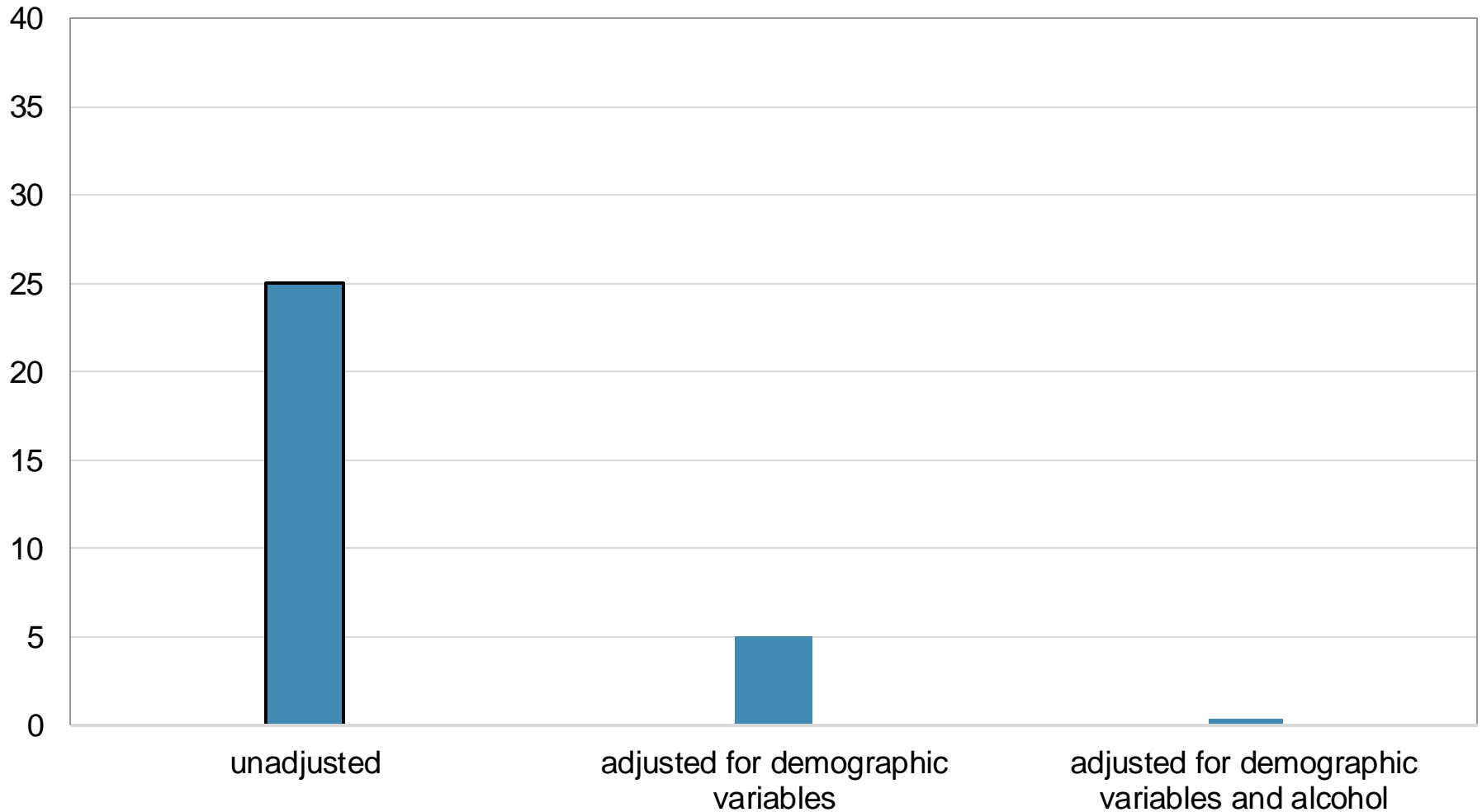
National Highway Traffic Safety Administration, 2015

- Comparison of 3,095 crash-involved versus 6,190 non-crash-involved drivers in Virginia Beach, Va.
- Two control drivers randomly selected from traffic stream one week after crash at the same time of day, location, and direction of travel as crash-involved drivers
- Data collection
  - Breath test for alcohol
  - Saliva test for over-the-counter, prescription, and illegal drugs

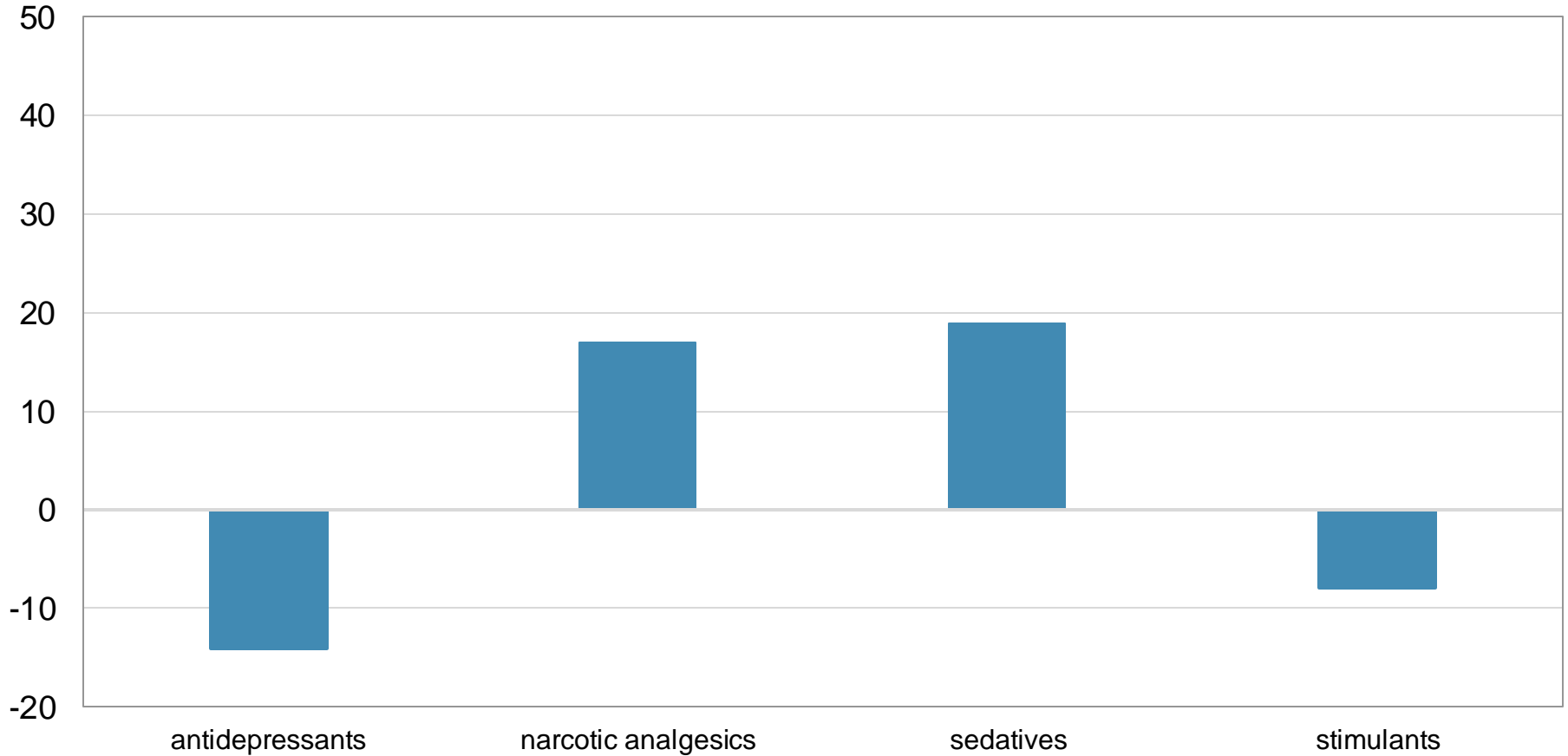
# Percent of drivers who were drug positive in Virginia Beach study by drug class



# Percent change in crash risk associated with marijuana (THC)

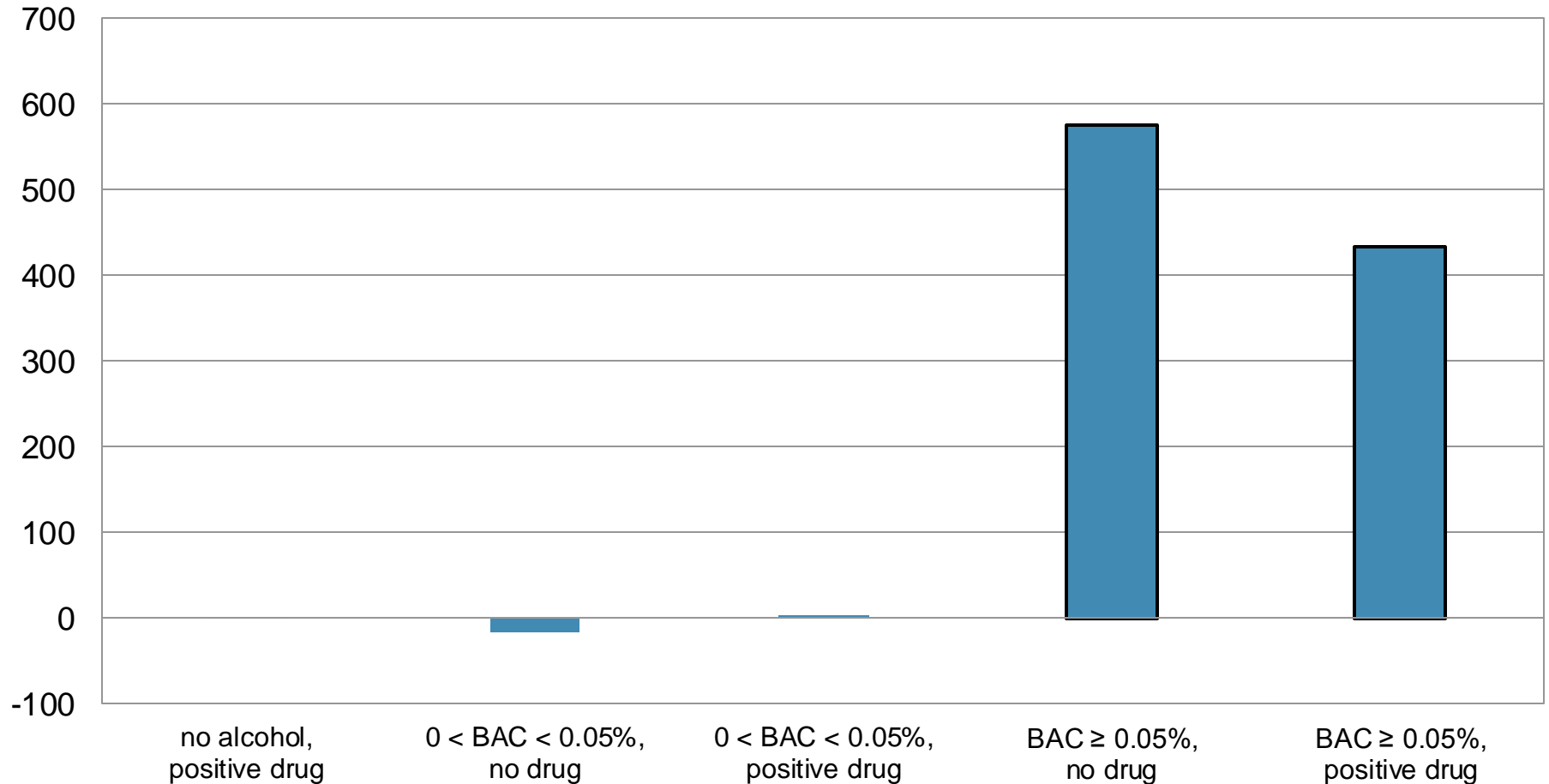


# Percent change in crash risk associated with other drugs, adjusted for driver demographic variables and alcohol





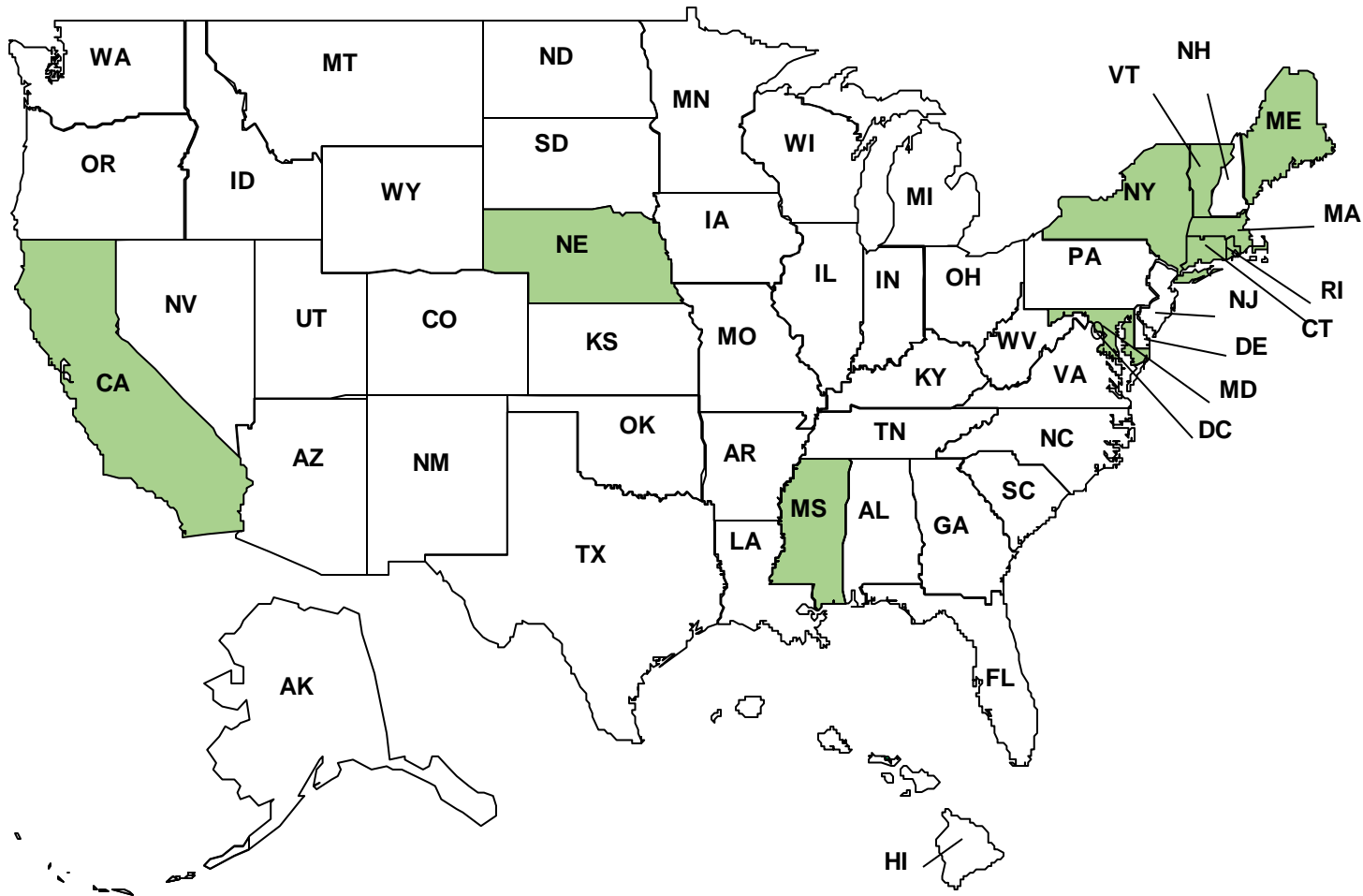
# Percent change in crash risk associated with alcohol and drugs, adjusted for demographic variables



# State marijuana laws

# Laws decriminalizing marijuana use

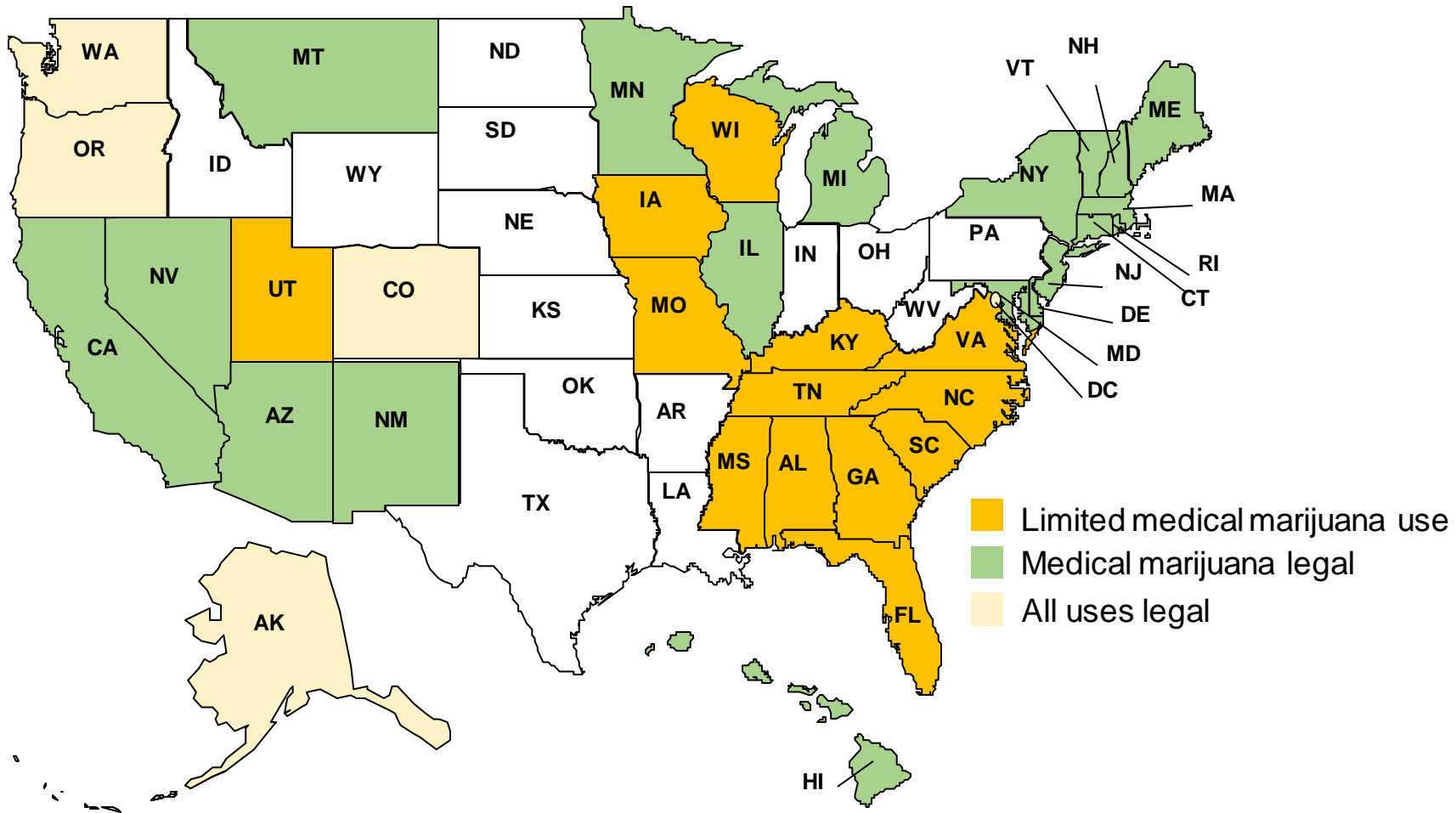
May 2015



Source: National Conference of State Legislature

# Laws legalizing some uses of marijuana

May 2015



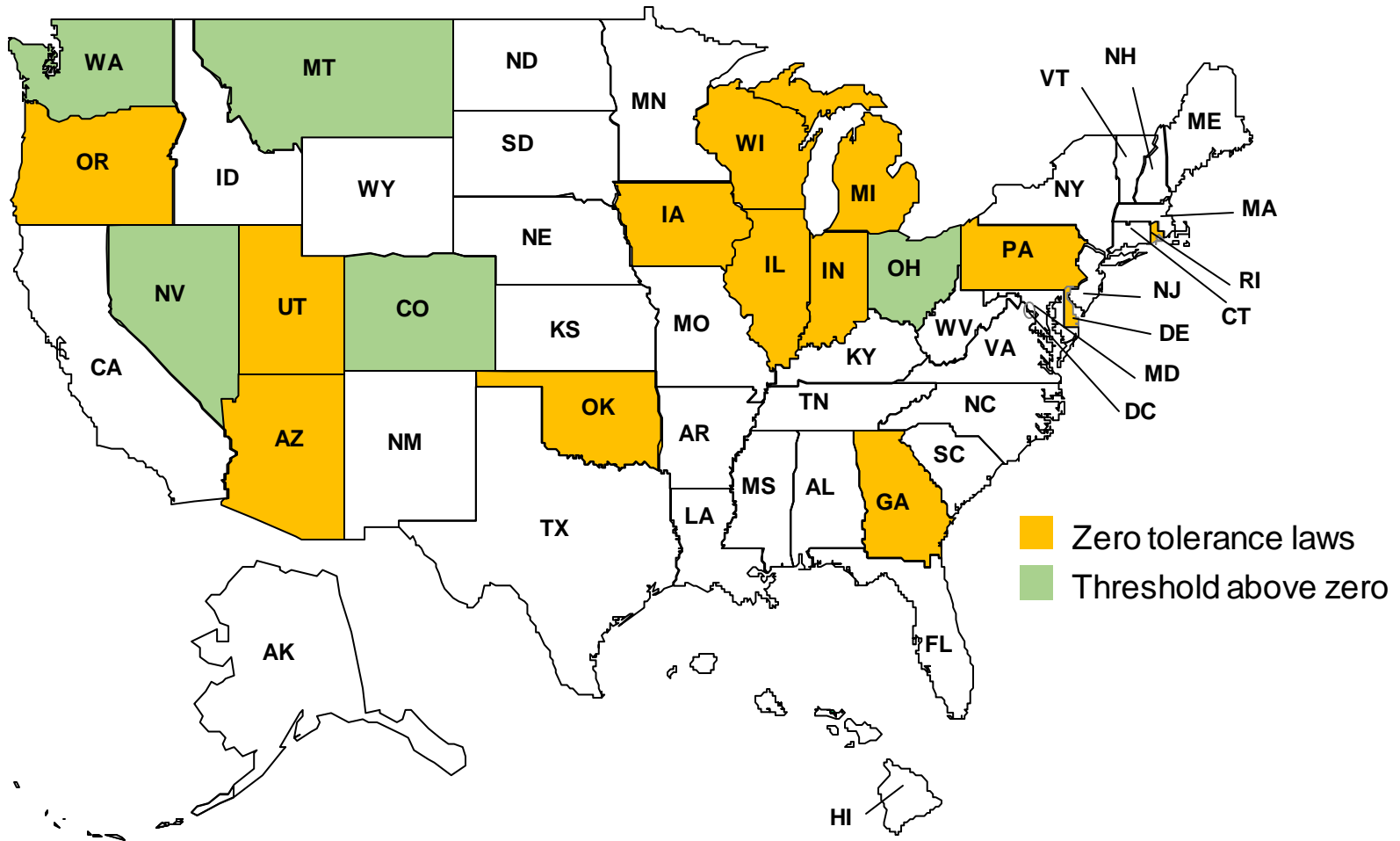
Source: National Conference of State Legislature

# Overview of drugged driving laws

- Every state prohibits driving under the influence of drugs (DUID)
- Definition of prohibited drugs varies, e.g., intoxicating substances, any controlled substance, any drug
- As with alcohol, drug testing occurs after arrest, after police officer establishes probable cause based on behavioral signs of impairment
- Laws specify whether to test with blood, urine, or saliva, or some combination
- States vary as to whether they test only for the psychoactive ingredient or also test for the metabolites
- In states with *per se* laws, it is a crime to drive with the presence of marijuana at or above the specified amount
- In states without *per se* laws, proof of impairment is based on evidence about test results and behavior indicating impairment

# Per se laws for driving while impaired by marijuana

May 2015



Source: National Conference of State Legislature

# Conclusions

- Laboratory studies show link between recent marijuana use and driving skills, especially at high dosages
- Marijuana is increasing in prevalence among drivers, but the strongest study of crash risk to date found no increase in crash risk associated with marijuana use after controlling for relevant covariates
- Crash risk associated with specific amounts of marijuana unknown
- Highway Loss Data Institute will be monitoring effects of laws liberalizing the use of marijuana on insurance collision claims



Insurance Institute for Highway Safety  
Highway Loss Data Institute

More information and links  
to our YouTube channel  
and Twitter feed at [iihs.org](http://iihs.org)

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