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.
Marijuana potency
Average THC concentration of DEA specimens by year

Source: Changes in Cannabis Potency Over the Last 2 Decades (1995-2014): Analysis of Current Data in the United States
How is marijuana consumed?

- **Flower**
  - buds that are harvested and cured for sale

- **Concentrate**
  - product that refines marijuana flower into something more potent (example: oil)

- **Trim**
  - leftover leaves after harvest of buds. Used for making concentrates and infused products

- **Infused edibles**
  - product infused with marijuana intended for consumption

- **Infused nonedibles**
  - Product infused with marijuana such as ointments
Potential effects of marijuana
Driver impairment

- Slowed reaction time
- Difficulties in road tracking and lane-position variability
- Decreased / divided attention
- Impaired cognitive performance
- Impaired executive functions, including route planning, decision-making and risk-taking or a combination of both
Laws legalizing some uses of marijuana

November 2018

- recreational and medical
- medical
- limited medical
- no law
- law changes since Nov. 2018 election
Legal considerations related to marijuana

- Marijuana is classified as a Schedule 1 controlled substance and is illegal under federal law.
- In all U.S. states, it is illegal to drive impaired by marijuana:
  - 11 states have zero tolerance laws which makes it illegal to drive with any amount of marijuana in a person’s body.
  - 5 states make it illegal to drive with specified amounts of marijuana in a person’s body.
  - Only South Dakota has zero tolerance for drivers under age 21.
NHTSA: Drug and Alcohol Crash Risk - A 2016 Case-Control Study
Prevalence of marijuana-positive drivers in Virginia Beach study, by gender and age

- All
- Male
- Female

for 'crashed' and 'control' groups.
Percent change in crash risk associated with marijuana

- Unadjusted: 25%
- Adjusted for demographic variables: 0%
- Adjusted for demographic variables and alcohol: 0%
National Advanced Driving Simulator: the Effects of Cannabis and Alcohol on Driving Performance
Research on marijuana and driving performance
### Changes in driving performance relative to placebo condition

<table>
<thead>
<tr>
<th>measure</th>
<th>alcohol only (BAC = 0.05%)</th>
<th>marijuana only (THC = 5 ng/mL)</th>
<th>both</th>
</tr>
</thead>
<tbody>
<tr>
<td>lane weaving</td>
<td>+7%</td>
<td>+4%</td>
<td>+11%</td>
</tr>
<tr>
<td>lane departures</td>
<td>+35%</td>
<td>no change</td>
<td>+35%</td>
</tr>
<tr>
<td>lateral acceleration</td>
<td>+10%</td>
<td>no change</td>
<td>+10%</td>
</tr>
<tr>
<td>speeding</td>
<td>+171%</td>
<td>no change</td>
<td>+104%</td>
</tr>
<tr>
<td>below speed limit</td>
<td>no change</td>
<td>+40%</td>
<td>+40%</td>
</tr>
<tr>
<td>speed variation</td>
<td>+8%</td>
<td>no change</td>
<td>+8%</td>
</tr>
<tr>
<td>following distance</td>
<td>no change</td>
<td>+4%</td>
<td>+4%</td>
</tr>
</tbody>
</table>
HLDI evaluation of collision claim frequencies
Critical dates for Colorado, Washington and Oregon marijuana laws

<table>
<thead>
<tr>
<th></th>
<th>Colorado</th>
<th>Washington</th>
<th>Oregon</th>
</tr>
</thead>
<tbody>
<tr>
<td>vote</td>
<td>November 2012</td>
<td>November 2012</td>
<td>November 2014</td>
</tr>
<tr>
<td>retail sales</td>
<td>January 2014</td>
<td>July 2014</td>
<td>October 2015</td>
</tr>
</tbody>
</table>
Colorado marijuana law

study state
control states

Collision claim frequencies by month for vehicles up to 33 years old Colorado vs. surrounding states (NE, UT, WY)

retail sales began January 2014
Estimated effect of marijuana sales in Colorado
Collision claim frequencies for vehicles up to 33 years old
Calendar years 2012–17

data through October 2017
Estimated effect of marijuana sales in Washington

Collision claim frequencies for vehicles up to 33 years old

Calendar years 2012–17

data through October 2017
Estimated effect of marijuana sales in Oregon
Collision claim frequencies for vehicles up to 33 years old
Calendar years 2012–17

data through October 2017
Estimated effect of marijuana sales in Oregon
Collision claim frequencies for vehicles up to 33 years old
Calendar years 2012–17

vs. Idaho and Montana

data through

June  July  August  September  October
Combined evaluation of legal recreational-use states

- Study states: WA, OR, NV, UT, CO
- Control states: MT, WY, ID

Study states and control states are highlighted in green and blue respectively.
Estimated effect of marijuana sales
Collision claim frequencies for vehicles up to 33 years old
Calendar years 2012–17

Data through October 2017

- Colorado: 10%
- Washington: 10%
- Oregon: 0%
- Combined: 10%
Estimated effect of marijuana sales
Collision claim frequencies for vehicles up to 33 years old
Calendar years 2012–17
IIHS evaluation of police-reported crash rates
Effect of recreational marijuana legalization
Change in police-reported crash rates from pre- to post-legalization for CO, WA, and OR

- Monthly crash rates calculated for January 2012-December 2016
- Study states compared with neighboring states
  - Statistical controls: temperature, precipitation, unemployment, proportion of young drivers, proportion of male drivers
Legalization associated with 5.2% increase in crash rates
Estimate pooled across study states

- Effect on police-reported crash rate consistent with effect on insurance claim frequency (+6.0%; HLDI, 2018)

- Increased crash rate may be related to lack of practical enforcement options: no conclusive test for marijuana impairment

- States considering legalization should weigh the potential impact of higher crash rates

![Graph showing change in crash rate relative to control states for Colorado, Washington, Oregon, and Combined.](image-url)
State tax revenue for marijuana
Marijuana tax summary

By state

- **Colorado**
  - Local tax: 2.5% to 2.8%
  - Special tax: 0%
  - State tax: 0%

- **Colorado (as of August 2017)**
  - Local tax: 2.5% to 2.8%
  - Special tax: 0%
  - State tax: 0%

- **Washington**
  - Local tax: 2.5% to 2.8%
  - Special tax: 0%
  - State tax: 0%

- **Oregon**
  - Local tax not to exceed 3%
  - Special tax: 0%
  - State tax: 0%

- **Nevada**
  - Local tax: 2.5% to 2.8%
  - Special tax: 0%
  - State tax: 0%
Colorado marijuana retail tax revenue
February 2014–March 2019
Washington marijuana retail tax revenue
July 2014–December 2018

- 6.5% state tax revenue
- 2.5% local sales tax revenue (2.8% starting July 2017)
Oregon marijuana retail tax revenue
February 2016–March 2019

- 17% state sales tax revenue
- up to 3% local sales tax revenue
Nevada marijuana retail tax revenue
July 2017–February 2019

10% state sales tax revenue
Use of Alcohol and Cannabis Among Adults Driving Children in Washington State
Method

- Drivers randomly sampled on roadways during Friday mornings and afternoons and Friday and Saturday nights within six counties in Washington State
- Surveys conducted in June 2014, November–December 2014, and June 2015
- Researchers collected breath, blood, and oral fluid samples
- Drivers completed questionnaire about risk perceptions related to cannabis use and driving
- Sample for this study included 2,056 drivers age 21 and older
Washington drivers testing positive for alcohol or cannabis (THC)

Percentage by child presence

- Alcohol positive
- THC positive

- Child in vehicle
- No child in vehicle
Washington drivers testing positive for alcohol or cannabis (THC)

Percentage by child presence and time of day

- Alcohol positive
- THC positive

<table>
<thead>
<tr>
<th>Daytime (Friday)</th>
<th>Nighttime weekend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child in vehicle</td>
<td>10</td>
</tr>
<tr>
<td>No child in vehicle</td>
<td>20</td>
</tr>
<tr>
<td>Child in vehicle</td>
<td>5</td>
</tr>
<tr>
<td>No child in vehicle</td>
<td>15</td>
</tr>
</tbody>
</table>

Legend:
- Red: child in vehicle
- Blue: no child in vehicle
Washington drivers testing positive for alcohol
Percentage by child presence and driver age

- child in vehicle
- no child in vehicle

[Bar chart showing percentage of drivers testing positive for alcohol by child presence and driver age.]
Washington drivers testing positive for cannabis (THC)
Percentage by child presence and driver age

![Bar chart showing the percentage of drivers testing positive for cannabis (THC) by child presence and driver age. The chart includes two bars for each age group: one for drivers with a child in the vehicle and one for drivers without a child. The bars are color-coded: red for drivers with a child and blue for drivers without a child.]

- Drivers aged 21-34:
  - With a child: 15%
  - Without a child: 20%
- Drivers aged 35-44:
  - With a child: 12%
  - Without a child: 18%
- Drivers aged 45-64:
  - With a child: 10%
  - Without a child: 15%
- Drivers aged 65+:
  - With a child: 7%
  - Without a child: 10%
Washington drivers testing positive for cannabis (THC)
Percentage by child presence and trip origin

![Bar chart showing percentage of drivers testing positive for cannabis (THC) by child presence and trip origin. The chart compares 'child in vehicle' (red) and 'no child in vehicle' (blue) across different trip origins: own home, other's home, restaurant/eating place, bar/tavern/club. The highest percentage is observed at the restaurant/eating place.]
Washington drivers testing positive for cannabis (THC)
Percentage by child presence and perceived likelihood of driving impairment by cannabis

- very likely
- likely
- somewhat likely
- not likely at all

child in vehicle
no child in vehicle
Alcohol madness
Percent of fatally injured passenger vehicle drivers with BACs of 0.08 g/dl or higher

By calendar year, 1982-2017
IIHS – HLDI supporting groups

AAA Carolinas
Acceptance Insurance
Alfa Insurance
Allstate Insurance Group
American Agricultural Insurance Company
American Family Mutual Insurance Company
American National
Ameriprise Auto & Home
Amica Mutual Insurance Company
Auto Club Enterprises
Auto Club Group
Auto-Owners Insurance
Bito Insurance Companies
California Casualty Group
Celina Insurance Group
Censtat Casualty Company
CHUBB
Colorado Farm Bureau Mutual Insurance Company
Commonwealth Casualty Company
Concord Group Insurance Companies
COUNTRY Financial
CSAA Insurance Group
Desjardins Insurance
ECM Insurance Company
Elephant Insurance Company
EMC Insurance Companies
Erie Insurance Group
Esurance
Farm Bureau Financial Services
Farm Bureau Insurance of Michigan
Farm Bureau Mutual Insurance Company of Idaho
Farmers Insurance Group
Farmers Mutual of Nebraska
Florida Farm Bureau Insurance Companies
Frankenmuth Insurance
Gainso Insurance
GEICO Corporation
The General Insurance
Georgia Farm Bureau Mutual Insurance Company
Goodwin Mutual Casualty Company
Grange Insurance
Grinnell Mutual
Hallmark Financial Services
Hanover Insurance Group
The Hartford
Haulers Insurance Company, Inc.
Horace Mann Insurance Companies
Imperial Fire & Casualty Insurance Company
Indiana Farm Bureau Insurance
Indiana Farmers Insurance
Infinity Property & Casualty
Kemper Corporation
Kentucky Farm Bureau Mutual Insurance Companies
Liberty Mutual Insurance Company
Louisiana Farm Bureau Mutual Insurance Company
The Main Street America Group
Mercury Insurance Group
MetLife Auto & Home
Mississippi Farm Bureau Casualty Insurance Company
MMG Insurance
Munich Reinsurance America, Inc.
Mutual Benefit Group
Mutual of Enumclaw Insurance Company
Nationwide
New Jersey Manufacturers Insurance Group
Nodak Mutual Insurance Company
Norfolk & Dedham Group
North Carolina Farm Bureau Mutual Insurance Company
Northern Neck Insurance Company
Ohio Mutual Insurance Group
Old American Indemnity Company
Oregon Mutual Insurance Company
Pekin Insurance
PEMCO Insurance
Plymouth Rock Assurance
Progressive Insurance
PURE Insurance
Qualitas Insurance Company
Redpoint County Mutual Insurance Company
The Responsive Auto Insurance Company
Rider Insurance
Rockingham Group
RSA Canada
Safe Auto Insurance Company
Safeco Insurance
Samsung Fire & Marine Insurance Company
SECURA Insurance
Selective Insurance Company of America
Sentry Insurance
Shelter Insurance Companies
Sompo America
South Carolina Farm Bureau Mutual Insurance Company
Southern Farm Bureau Casualty Insurance Company
State Farm Insurance Companies
Stillwater Insurance Group
Swiss Reinsurance Company Ltd
Tennessee Farmers Mutual Insurance Company
Texas Farm Bureau Insurance Companies
The Travelers Companies
United Educators
USAA
Utica National Insurance Group
Virginia Farm Bureau Mutual Insurance
West Bend Mutual Insurance Company
Western National Insurance Group
Westfield Insurance

Funding associations
American Property Casualty Insurance Association
National Association of Mutual Insurance Companies
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