mn DEPARTMENT OF TRANSPORTATION

Transportation Research Synthesis

Minnesota Department of Transportation
Office of Research & Innovation
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TRS 2404   May 2024

EFFECTS OF LEGALIZATION OF MARIJUANA ON TRAFFIC SAFETY

Prepared by CTC & Associates LLC

The recent legalization of recreational marijuana use in Minnesota prompted MnDOT's Office of Traffic Engineering to request this Transportation Research Synthesis (TRS) to gather information about the impacts to traffic safety of such legislation in other states.

Using a survey of the states and district where recreational use of marijuana has been legal for some time or only recently legalized, this TRS examines any changes in traffic safety; the effects law enforcement agencies have identified after legalization; and the guidelines, procedures and experts law enforcement use to determine impairment of recreational marijuana users.

Findings from this TRS are expected to inform future actions by MnDOT and local agency staff, as well as the state and local policymakers and legislators seeking to assess the traffic safety impacts associated with legalizing recreational marijuana use.

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List of Abbreviations and Acronyms

ARIDE	Advanced roadside impaired driving enforcement
BAC	Blood alcohol concentration
BVMT	Billion vehicle miles traveled
CBD	Cannabidiol (active ingredient in cannabis)
CFC	Coded fatal crash (WTSC data)
CHP	California Highway Patrol
CI	Confidence interval
CIDW	Cannabis Impairment Detection Workshops
DD (also DID)	Difference-in-differences (modeling)
DECP	Drug Evaluation and Classification Program
DMV	Department of motor vehicles
DOT	Department of transportation
DRE	Drug recognition expert or drug recognition evaluator
DRUID	Driving under the influence of drugs, alcohol and medicines
DUI	Driving under the influence
DUID	Driving under the influence of drugs
DWI	Driving while intoxicated or impaired
FARS	Fatality Analysis Reporting System (NHTSA)
GHSA	Governors Highway Safety Association
HLDI	Highway Loss Data Institute
IACP	International Association of Chiefs of Police
IDTS	Impaired Driving and Traffic Safety (IACP conference)
IIHS	Insurance Institute for Highway Safety
MnDOT	Minnesota Department of Transportation
NHTSA	National Highway Traffic Safety Administration
NPV	Negative predictive value
OF	Oral fluid
OWI	Operating while intoxicated
PPV	Positive predictive value
RCL	Recreational cannabis laws
ROSITA	Roadside Testing Assessment
SFST	Standardized Field Sobriety Test
THC	Delta-9-tetrahydrocannabinol (major psychoactive component in marijuana)
TRB	Transportation Research Board
TRS	Transportation Research Synthesis
TWFE	Two-way-fixed-effects (modeling)
WTSC	Washington Traffic Safety Commission

Executive Summary

The legalization of recreational marijuana use in Minnesota in August 2023 prompted interest in the law's potential impacts on traffic safety. MnDOT's Office of Traffic Engineering requested this Transportation Research Synthesis (TRS) to learn from the experiences of other states with longer-standing laws legalizing the recreational use of marijuana, as well as those states like Minnesota, which very recently passed such legislation. This TRS is expected to inform future actions by MnDOT and local agency staff, and provide a useful perspective for Minnesota's policymakers and legislators as the state law is implemented.

This TRS report presents findings from a sampling of relevant literature across several disciplines, including traffic safety, public safety, law enforcement and legal issues. The context gained from a review of these resources is supplemented by findings from surveys of selected state transportation and public safety agencies with experience implementing longer-standing laws related to recreational use of marijuana or preparing to implement new legislation.

Findings from the Literature

A brief examination of the recent Minnesota law is followed by a summary of the impaired driving prohibitions of the 23 states that had legalized recreational use of marijuana at the time this TRS effort began. Dates of legalization range from 2012 (*Colorado* and *Washington*) to July 2023 (*Maryland*), with 12 of the 23 states passing such laws since 2020. (Since primary work on this TRS began, Ohio became the 24th state to legalize recreational use of marijuana, In November 2023.)

National and state research addresses road safety outcomes as a result of legalization, considering the impacts of traffic safety in light of population samples or other demographic factors. State research often uses National Highway Traffic Safety Administration's (NHTSA's) Fatality Analysis Reporting System data in project modeling, in addition to data from private industry, trauma centers and public records. Findings suggest that crashes with injuries and fatalities have increased since legalization of marijuana, though the extent of that increase varies. Related research noted that legislation related to the medical use of marijuana was associated with reductions in fatal motor-vehicle collisions, whereas recreational legalization was conversely associated with increases in fatal collisions.

The lack of data prior to the commercialization of marijuana in other states may preclude the translation of preliminary findings into definitive outcomes. Quality control of the data may also present challenges when attempting to determine the impacts of legalizing recreational marijuana use. Washington Traffic Safety Commission (WTSC) undertook an effort to address the possible overestimation of polydrug-positive drivers involved in fatal crashes, publishing its findings in an October 2023 WTSC report. (*Polydrug,* as defined by WTSC, "refers to people that are positive for two or more drugs, or a combination of one or more drugs and alcohol as confirmed by toxicology testing.")

Resources considering impairment policy and guidance are largely focused on the methods used to detect impairment. A NHTSA research project in progress, expected to conclude in May 2025, will address a gap in detection methods by identifying measures that law enforcement can use in the field to detect marijuana-impaired driving. Other resources address the use of *per se* limits for THC. (*Per se* laws are defined by the Governors Highway Safety Association as laws that "make it illegal to drive with amounts of specified drugs in

the body that exceed set limits." THC, or delta-9-tetrahydrocannabinol, is the major psychoactive component in marijuana.)

The literature examining roadside testing practices also considers the usability and reliability of six oral fluid drug screening devices: AquilaScan, Dräger DrugCheck and DrugTest, Randox Evidence MultiSTAT, Securetec DrugWipe and SoToxa. Additional publications and resources considering oral fluid screening note that while oral fluid collection is quick, easy and noninvasive, THC levels in biofluid were not reliable indicators of marijuana intoxication. As the authors of a 2021 NHTSA evaluation of on-site oral fluid drug screening devices noted, "Results in field use would still require confirmatory testing."

The literature search closes with an examination of the training that prepares the law enforcement officers tasked with enforcing the new law. Launched in 1987 with pilot programs in Arizona, Colorado, New York and Virginia, the Drug Evaluation and Classification Program (DECP) has been adopted by all 50 states and the District of Columbia, as well as multiple international locations. Law enforcement officers completing all phases of the DECP are known as a drug recognition expert or drug recognition evaluator (DRE). The International Association of Chiefs of Police (IACP) describes a DRE as "skilled in detecting and identifying persons under the influence of drugs and in identifying the category or categories of drugs causing the impairment." Supplementing findings from the literature addressing DREs and their practices are details of survey respondents' practices, described below, for the use and training of DREs.

Findings from the Surveys

Responses to two surveys distributed to representatives of state departments of transportation (DOTs) and public safety agencies provided details of the effects of legalizing recreational use of marijuana on traffic safety and the preparations and responses agencies have made to address the legislation. The surveys received 11 total responses. The pool of potential respondents and survey respondents for each survey are described below.

- **States with longer-term marijuana legalization**. Survey of the states/districts where recreational use of marijuana had been legal for one year or more at the time of the survey: Alaska, Arizona, California, Colorado, Connecticut, District of Columbia, Illinois, Maine, Massachusetts, Michigan, Montana, Nevada, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, Virginia and Washington.

  Survey respondents (with date of legalization):

  Public Safety Agencies
    o Division of Alaska State Troopers (February 2015)
    o Arizona Governor's Office of Highway Safety (November 2020)
    o Michigan State Police (December 2018)
    o New Jersey State Police (January 2021) (partial response)
    o Vermont Criminal Justice Council (July 2018)

  State DOTs
    o Illinois DOT (January 2020)
    o Rhode Island DOT (May 2022)

- **States anticipating impacts of recent marijuana legalization**. Survey of three states recently legalizing recreational marijuana use: Delaware, Maryland and Missouri.

Survey respondents (with date of legalization):

Public Safety Agencies
- o Delaware Office of Highway Safety (April 2023)
- o Maryland State Police (July 2013)
- o Missouri Safety Center (December 2022)

State DOTs
- o Missouri DOT (December 2022)

Findings from the two surveys are highlighted separately, with responses to the survey of states with longer-term marijuana legalization presented immediately below.

States with Longer-Term Marijuana Legalization

Five of the seven responding agencies reported increases in the number of fatal traffic crashes since legalization of marijuana, ranging from 16% to 22.3%. These results are contrasted with the number of injury crashes reported by respondents, which decreased by 7% (injury crashes only; does not include serious injuries) and 7.9% (serious injury crashes) for two of the four agencies with data to report.

More than half of the responding agencies highlighted a possible correlation of recreational marijuana use with speeding. Respondents also shared a range of challenges associated with enforcement of marijuana-related traffic laws that include issues with detection (for example, suspected impaired drivers refusing to submit to testing) and legal challenges that include a lack of updated enforcement laws, lack of training and adverse court rulings. A decrease in injury crashes, increased detection and support from critical stakeholders are among the positive outcomes respondents reported when enforcing recent marijuana legislation.

Respondents from the Arizona Governor's Office of Highway Safety and Illinois DOT described their agencies' roadside testing practices; neither agency conducted a roadside testing pilot. The most significant difference between the two testing programs is the use of oral fluid screening devices: The Arizona program uses SoToxa oral fluid screening devices, while Illinois DOT does not use any type of oral fluid roadside testing. The Illinois DOT respondent noted that the standardized field sobriety test (SFST) can identify impairment regardless of the substance involved, adding that the SFST battery of tests "offers a significantly higher level of evidence for confirming or refuting a driver's impairment. In contrast, oral fluid instruments lack precision, evidential reliability and approval from NHTSA." DREs participate in roadside testing for both state programs.

Law enforcement personnel making traffic stops involving drivers who may be under the influence of legalized recreational marijuana may have received different types and degrees of training. Three common types of training and preparation include:

- **Advanced roadside impaired driving enforcement (ARIDE)**. This training program is self-described to "serve as a bridge between" SFST and DRE training. It is not a substitute for DRE training and will not certify a participant as a DRE.

- **SFST**. This battery of tests includes horizontal gaze nystagmus (defined as *involuntary jerking of the eyes occurring as the eyes gaze to the side*); walk and turn; and one leg stand. The ARIDE Instructor Guide

notes that these tests are "designed to be administered and evaluated in a standardized manner to obtain validated indicators of impairment based on NHTSA-supported research."

- **DECP**. Coordinated by IACP and supported and funded by NHTSA, pilot DECPs were launched in 1987 and now operate in all 50 states and the District of Columbia. Law enforcement officers completing all phases of the DECP are known as a DRE. DRE certification requires completion of 72 hours of classroom training and field certifications, and passing a comprehensive final exam.

Respondents provide annual DRE trainings, sometimes up to three DRE schools each year, in addition to DRE conferences and annual recertification trainings. One responding agency focuses attention on the state's DRE instructors, offering additional training through attendance at IACP's annual Impaired Driving and Traffic Safety Conference, and participation in Indiana University's *Borkenstein Courses* and *Medical Foundations of Visual Systems Testing,* a course that provides "the medical and scientific foundations of the various components of the DRE protocol."

The survey sought additional details of each state's use of DREs to enforce marijuana-related laws. The number of DREs employed by each state varies widely among respondents, from 37 to 40 for the less populous states to 433 and 546 for states with much higher populations. All but one of the responding states identified a need for more DREs, with only one agency reporting a data-driven practice that applies a ratio to area population to identify the number of DREs needed.

All seven respondents highlighted the importance of a DRE serving as an expert witness during prosecutions and providing evidence of impairment. Respondents also reported challenges associated with the use of DREs in the areas of program administration, staffing and training.

Chief among respondents' lessons learned is addressing the challenges associated with application of *per se* limits in the laws governing recreational marijuana use. Respondents also offered these effective strategies or measures for other agencies enforcing marijuana-related laws:

- Deploy speed enforcement details.
- Develop a call-out system than ensures DRE access.
- Employ an appropriate number of DREs.
- Enhance forensic practices.
- Implement a system to manage DRE data.
- Improve public awareness through educational programs and events.
- Increase and enhance law enforcement training efforts.
- Promote comprehensive educational paid media.
- Support or provide judicial and prosecutor training.

States Anticipating Impacts of Recent Marijuana Legalization

A brief survey distributed to respondents in Delaware, Maryland and Missouri sought perspective from state transportation and public safety agencies preparing to respond to the recent legalization of recreational marijuana.

All but one of the four respondents expects an increase in both traffic-related serious injuries and fatalities as a result of the recent legalization of recreational marijuana use in their states.

Respondents from two of the three states surveyed offered details of a planned roadside testing pilot:

- *Maryland State Police* is in the early stages of establishing a roadside oral fluid program pilot using SoToxa testing devices. The testing program, which will be overseen by the chief toxicologist for the state of Maryland, will include preliminary and confirmatory testing. The agency expects to use one Maryland county for the pilot, with support from an unspecified number of DREs and ARIDE-trained officers.

- *Missouri DOT* received grant funding from NHTSA that was used to purchase 30 SoToxa testing devices; the agency purchased several more testing instruments with internal funds. The DOT distributed these testing instruments to agencies throughout the state along with "stats forms" for use in providing data to the Missouri DOT Office of Highway Safety. DREs will be available for an evaluation should one be needed.

Missouri Safety Center provides training for law enforcement around the state; Delaware Office of Highway Safety and Maryland State Police are overseeing ARIDE training to prepare officers to implement the new law. Maryland State Police also plan to offer cannabis detection impairment labs, also known as "green labs," and other classes geared toward workplace professionals.

Chapter 1 Introduction

An increasing number of states are legalizing the use of recreational marijuana, prompting many state and local transportation and public safety agencies to explore the outcomes of this legalization on traffic safety. In Minnesota, various state agencies and law enforcement have raised concerns about traffic safety relative to the recent legalization of recreational marijuana use in the state.

To address these concerns, MnDOT's Office of Traffic Engineering requested this Transportation Research Synthesis (TRS) to examine the impacts of legalization in other states. Of particular interest are any changes in traffic safety; the effects law enforcement agencies have identified after legalization; and the guidelines, procedures and experts law enforcement use to determine impairment of recreational marijuana users.

Three information-gathering efforts informed development of this TRS report:

- Review of completed and in-progress domestic research on the traffic safety effects of marijuana legalization.
- Survey of state transportation and public safety agencies where recreational use of marijuana is legal to examine the effects on traffic safety, experiences of law enforcement and lessons learned. The states and district receiving this survey were Alaska, Arizona, California, Colorado, Connecticut, District of Columbia, Illinois, Maine, Massachusetts, Michigan, Montana, Nevada, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, Virginia and Washington.
- Survey of state transportation and public safety agencies in Delaware, Maryland and Missouri, where recreational marijuana use was recently legalized, to investigate anticipatory impacts to traffic safety.

Staff at MnDOT and other agencies will use the results of these information-gathering efforts to further study and evaluate the impacts of legalization on traffic safety. Findings are expected to inform future actions by MnDOT and local agency staff, as well as state and local policymakers and legislators interested in assessing the traffic safety impacts associated with legalizing recreational marijuana use.

Report Organization

Chapter 2 presents findings from a literature search of domestic publications and resources related to the topic. Citations represent a sampling of literature across several disciplines, including traffic safety, public safety, law enforcement and legal issues. Chapter 3 presents findings from surveys seeking information from representatives of state transportation and public safety agencies. The full text of questions for both surveys appears in Appendix A.

Chapter 2 Literature Search

Results of a literature search of recent publicly available publications and resources are presented below in the following categories:

- Marijuana policy
- Impacts on traffic safety
- Impairment policy and guidance
- Roadside testing practices and screening devices
- Drug recognition expert/drug recognition evaluator (DRE) programs and training

Marijuana Policy

This section briefly examines recent Minnesota legislation and summarizes other states' legalization and policies related to recreational marijuana.

Minnesota

The citation below presents summary information from Minnesota legislation describing the proposed public safety pilot project for roadside testing.

Minnesota Office of Cannabis Management, State of Minnesota, undated.
https://www.cannabis.mn.gov/
This website for the new state agency established through legislation to "regulate cannabis (including for the adult-use market, the Medical Cannabis Program, and for lower-potency hemp edibles) and issue licenses and develop regulations outlining how and when businesses can participate in the industry" provides information for adult consumers and key points about the legislation. Also provided is a link to the full text of the legislation (Chapter 63, HF100). Below is an excerpt from the legislation that describes a required roadside testing pilot:

- **Article 4, Criminal Penalties, Sec. 49. DWI Controlled Substance Roadside Testing Instrument Pilot Project: Report Required**

    (a) The commissioner of public safety must design, plan, and implement a pilot project to study oral fluid roadside testing instruments to determine the presence of a controlled substance or intoxicating substance in individuals stopped or arrested for driving while impaired offenses. The pilot project must determine the practicality, accuracy, and efficacy of these testing instruments and determine and make recommendations on the best instrument or instruments to pursue in the future.

    (b) The pilot project must begin on September 1, 2023, and continue until August 31, 2024.

    (c) The commissioner must consult with law enforcement officials, prosecutors, criminal defense attorneys, and other interested and knowledgeable parties when designing, implementing, and evaluating the pilot project.

    (d) All oral fluid samples obtained for the purpose of this pilot project must be obtained by a certified drug recognition evaluator and may only be collected with the express voluntary consent of the person stopped or arrested for suspicion of driving while impaired. Results of

tests conducted under the pilot project are to be used for the purpose of analyzing the practicality, accuracy, and efficacy of the instrument. Results may not be used to decide whether an arrest should be made and are not admissible in any legal proceeding.

(e) By February 1, 2025, the commissioner must report to the chairs and ranking minority members of the legislative committees with jurisdiction over public safety on the results of the pilot project. At a minimum, the report must include information on how accurate the instruments were when tested against laboratory results, how often participants were found to have controlled substances or intoxicating substances in their systems, how often there was commingling of controlled substances or intoxicating substances with alcohol, the types of controlled substances or intoxicating substances found in participants' systems and which types were most common, and the number of participants in the project. In addition, the report must assess the practicality and reliability of using the instruments in the field and make recommendations on continuing the project permanently.

Multiple States

Table 1 compares various components of marijuana policies in states where recreational marijuana is legal. Resources that were used to compile information for the table complete this section.

Table 1. Recreational Marijuana Legalization and Policy by State

State/District	Recreational Use Legalized	Impaired Driving Prohibitions[1]
Alaska	February 2015	**Adult**: Prohibited; THC[2] limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Arizona	November 2020	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
California	November 2016	**Adult and Youth**: No specific prohibition.
Colorado	December 2012	**Adult**: Prohibited; 5 ng/mL limit (not *per se*). **Youth**: No specific prohibition.
Connecticut	July 2021	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Delaware	April 2023	N/A
District of Columbia	February 2015	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Illinois	January 2020	**Adult**: Prohibited; 5 ng/mL limit (*per se*) blood; 10 ng/mL limit (*per se*) other bodily substance. **Youth**: No specific prohibition.
Maine	January 2017	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Maryland	July 2023	N/A

State/District	Recreational Use Legalized	Impaired Driving Prohibitions[1]
Massachusetts	December 2016	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Michigan	December 2018	**Adult**: Adult: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Missouri	December 2022	**Adult and Youth**: No specific prohibition.
Montana	January 2021	**Adult**: Prohibited; 5 ng/mL limit (*per se*). **Youth**: No specific prohibition.
Nevada	January 2017	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
New Jersey	January 2021	**Adult and Youth**: No specific prohibition.
New Mexico	June 2021	**Adult and Youth**: No specific prohibition.
New York	March 2021	**Adult and Youth**: No specific prohibition.
Oregon	December 2014	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Rhode Island	May 2022	**Adult**: Prohibited; THC limit and evidentiary standard not specified. **Youth**: No specific prohibition.
Vermont	July 2018	**Adult and Youth**: No specific prohibition.
Virginia	July 2021	**Adult and Youth**: No specific prohibition.
Washington	December 2012	**Adult**: Prohibited; 5 ng/mL limit (*per se*). **Youth**: Prohibited; 0 ng/mL limit (*per se*).

N/A Not available.

1   Information appearing in this column of Table 1 is reproduced verbatim from the Alcohol Policy Information System, a project of the National Institute on Alcohol Abuse and Alcoholism.

2   THC (delta-9-tetrahydrocannabinol) is the major psychoactive component in marijuana.

(*Sources*: Alcohol Policy Information System (information current as of January 2023) and Insurance Institute for Highway Safety (information current as of February 2024)).

👉 Refer to page 25 for information about *per se* laws.

Related Resources

Marijuana Laws, Insurance Institute for Highway Safety, August 2023.
https://www.iihs.org/topics/alcohol-and-drugs/marijuana-laws-table
Dates when medical and/or recreational marijuana became legal are provided in this table along with age restrictions and possession limits.

Recreational Use of Cannabis: Volume 1, Alcohol Policy Information System, January 2022.
https://alcoholpolicy.niaaa.nih.gov/cannabis-policy-topics/recreational-use-of-cannabis-volume-1/104
This website presents "laws legalizing the cultivation, sale or use of cannabis for other than medical purposes, together with laws imposing various prohibitions and restrictions on such practices."

Recently Adopted Cannabis Legalization Laws, Alcohol Policy Information System, undated.
https://alcoholpolicy.niaaa.nih.gov/recently-adopted-cannabis-legalization-laws
Policy information is presented for three states that recently legalized the recreational use of marijuana: Delaware, Minnesota and Ohio.

Cannabis Overview, National Conference of State Legislatures, undated.
https://www.ncsl.org/civil-and-criminal-justice/cannabis-overview
Background information about marijuana legalization, decriminalization and record clearing is presented.

Impacts on Traffic Safety

National and state research citations in this section address road safety outcomes resulting from the legalization of marijuana.

National Research and Guidance

Resources in this section primarily reflect research conducted by the National Highway Traffic Safety Administration (NHTSA) and other NHTSA resources, including a webpage that provides access to the first large-scale U.S. study that included drugs other than alcohol in an assessment of crash risk. Injuries and fatalities involving drivers and other roadway users (such as bicyclists and pedestrians) are considered in the projects.

Researchers frequently note that study findings should be considered in light of the populations sampled or other demographic factors. A 10-part series of reports summarizes impaired driving fatality rates, legislation, the leading drug identified and other factors of states by NHTSA region. A National Transportation Safety Board report examines research on impaired driving research using drug reporting in NHTSA's Fatality Analysis Reporting System (FARS). In a 2019 report to Congress that looks specifically at marijuana use and highway safety, the author notes that "[t]o date, results from studies that have examined the association between marijuana use and crash risk have been inconsistent."

Alcohol, Other Drug and Multiple Drug Use Among Drivers, National Transportation Safety Board, December 2022.
https://www.ntsb.gov/safety/safety-studies/Documents/SRR2202.pdf
This report "examines the crash risk associated with different drugs, including alcohol, and the prevalence of their use among drivers; it also discusses countermeasures to reduce impairment-related crashes." Researchers performed a literature review of impaired driving research, "examined drug reporting in the National Highway Traffic Safety Administration's Fatality Analysis Reporting System, and performed an independent analysis of the presence of potentially impairing drugs in driver specimens submitted to four U.S. laboratories that met strict standards for collecting high-quality toxicology data." Below are some of the conclusions from the research:

- Cannabis and other potentially impairing drugs, especially in combination with and without alcohol, contribute to the problem of impaired driving crashes due to their prevalence and negative impacts on driving performance.

- Oral fluid is a valuable but underutilized biological specimen for the detection of drug use by drivers and can support the enforcement of impaired driving laws.

- Because there is no common standard of practice for the collection, testing and reporting of driver drug toxicology data in the United States, critical information that could improve understanding of drug trends and prevalence, assist with the evaluation of countermeasures, and better guide treatment options for driving-under-the-influence offenders is not being captured or analyzed.

- Improving drug-impaired driving laws and enforcement by authorizing the use of electronic warrants and oral fluid testing to expedite the collection of biological specimens and by using the NHTSA-developed Drug-Impaired Driving Criminal Justice Evaluation Tool to guide improvements to addressing drug-impaired driving [could reduce the incidence of drug-impaired driving]. Additionally, specifying a prescribed set of drugs that are impairing can limit enforcement efforts.

Related Resource:

Drug-Impaired Driving Criminal Justice Evaluation Tool, National Highway Traffic Safety Administration, 2022.
https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/drug-impaired_driving_criminal_justice_evaluation_tool-v1-tag.xlsx
From the website:

> The National Highway Traffic Safety Administration is engaged in numerous activities to reduce drug-impaired driving, including conducting research and developing tools, resources, and promising practices to assist states and local communities. To aid in evaluating efforts to address drug-impaired driving, NHTSA has developed the Drug-Impaired Driving Criminal Justice Evaluation Tool. The tool is designed to assist with identifying program strengths and opportunities for improvements.

As the 2022 National Transportation Safety Board publication cited above notes, "The worksheet topics include law enforcement, prosecution, judiciary, community supervision, toxicology, treatment, emergency medical services, data, legislation, and program and communications. After completing a self-evaluation using the Drug-Impaired Driving Criminal Justice Evaluation Tool, agencies may submit applications to NHTSA for financial support of projects designed to address challenges identified through the tool's use."

Alcohol and Drug Prevalence Among Seriously or Fatally Injured Road Users, F. D. Thomas, J. Darrah, L. Graham, A. Berning, R. Blomberg, K. Finstad, C. Griggs, M. Crandall, C. Schulman, R. Kozar, J. Lai, N. Mohr, J. Chenoweth, K. Cunningham, K. Babu, J. Dorfman, J. Van Heukelom, J. Ehsani, J. Fell, J. Whitehill, T. Brown and C. Moore, National Highway Traffic Safety Administration, December 2022.
https://www.nhtsa.gov/sites/nhtsa.gov/files/2022-12/Alcohol-Drug-Prevalence-Among-Road-Users-Report_112922-tag.pdf
From the abstract: The current study sought to [examine] drug prevalence among a large sample (N = 7,279) of seriously injured roadway users [drivers, pedestrians and bicyclists] presenting to seven selected trauma centers and fatally injured crash victims presenting directly to four medical examiners at selected sites. Overall, 55.8% of the injured or killed roadway users tested positive for one or more drugs (including alcohol) on this study's

toxicology panel. The most prevalent drug category detected was cannabinoids (active THC) with 25.1% positive, followed by alcohol (23.1%), stimulants (10.8%), and opioids (9.3%). Overall, 19.9% of the roadway users tested positive for two or more categories of drugs. For drivers specifically, the results showed associations of drug positivity with age, sex, time of crash and day of crash (weekday versus weekend). The results in this report provide a first look at drug prevalence among a large sample of seriously or fatally injured roadway users. This study's results can only be used to describe drug prevalence among the specific populations sampled and with full awareness of the study's limitations. The study results should not be used to imply impairment or increased risk associated with drug presence.

Impaired Driving State Landscape: Region 9, National Highway Traffic Safety Administration, June 2021.
https://www.nhtsa.gov/sites/nhtsa.gov/files/2021-07/Region%209_June%202021-tag.pdf
This is an example from a series of reports representing the 10 NHTSA regions of the country, with each report providing an overview of impaired driving fatality rates, legislation and prevention mechanisms of states within a region. Summary graphics identify the leading drug identified by DRE toxicology results for each state; and government and law enforcement professionals and programs actively combatting impaired driving (e.g., state judicial outreach liaisons, DREs, law enforcement liaisons and traffic safety resource prosecutors).

Marijuana Use and Highway Safety, David Randall Peterman, Congressional Research Service, May 2019.
https://crsreports.congress.gov/product/pdf/R/R45719
From the abstract:

> This report, prepared for members of the U.S. Congress, addresses various aspects of the issue of marijuana-impaired driving, including patterns of marijuana use, the relationship and detection of marijuana use and driver impairment, and related state law and law enforcement challenges. The report also references the congressionally required July 2017 report by the Department of Transportation's National Highway Traffic Safety Administration (NHTSA), *Marijuana-Impaired Driving: A Report to Congress*, as well as other studies and research.

The author notes that "[t]o date, results from studies that have examined the association between marijuana use and crash risk have been inconsistent."

Related Research:

> **Marijuana-Impaired Driving: A Report to Congress**, Richard Compton, National Highway Traffic Safety Administration, July 2017.
> https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/812440-marijuana-impaired-driving-report-to-congress.pdf
> *From the abstract*:
>
> > The report summarizes what is known about marijuana use and driving. The report describes the absorption, distribution and elimination of delta-9-tetrahydrocannabinal (THC), the primary psychoactive substance in marijuana, in the body. It contrasts this process with the absorption, distribution and elimination of alcohol in the body, as they are very different processes. The poor correlation of THC concentrations in the blood with impairment is discussed, along with the implication that setting *per se* levels is not meaningful. Some of the challenges of measuring driving impairment resulting from marijuana use are reviewed. State laws relating to marijuana and driving are presented. What is known about the prevalence of marijuana-impaired driving and the crash risk associated with

marijuana-impaired driving is reviewed. Finally, the report presents information on training for law enforcement to detect marijuana impairment in drivers, the feasibility of developing an impairment standard for driving under the influence of marijuana and recommendations for increasing data collection regarding the prevalence and effects of marijuana-impaired driving.

Below are recommendations from the study:

- Increase the use of effective and efficient methods for training law enforcement personnel, including DREs, to detect or measure the level of impairment of a motor vehicle operator who is under the influence of marijuana by the use of technology or otherwise.
- Continue research to enable development of an impairment standard for driving under the influence of marijuana, and in the meantime, maintain training and other support to enable law enforcement officers and prosecutors to pursue cases using available evidence.
- Encourage states to collect data regarding the prevalence of marijuana use by drivers and among those arrested for impaired driving.

Marijuana Impairs, National Highway Traffic Safety Administration, undated.
https://www.nhtsa.gov/risky-driving/drug-impaired-driving#the-issue-marijuana-impairs
This NHTSA website provides access to resources related to marijuana impairment and increased crash risk, including the agency's Drug and Alcohol Crash Risk study, "the first large-scale study in the United States to include drugs other than alcohol. This study estimated the odds of being involved in a crash if a driver was alcohol- and/or drug-positive."

Related Resource:

> **Drug and Alcohol Crash Risk: A Case-Control Study**, John H. Lacey, Tara Kelley-Baker, Amy Berning, Eduardo Romano, Anthony Ramirez, Julie Yao, Christine Moore, Katharine Brainard, Katherine Carr, Karen Pell and Richard Compton, National Highway Traffic Safety Administration, December 2016.
> https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/812355_drugalcoholcrashrisk.pdf
> *From the abstract*: This study used a "case-control" design to estimate the risk of crashes involving drivers using drugs, alcohol or both. Data was collected in Virginia Beach, Virginia, for 20 months. The study obtained biological measures on more than 3,000 crash drivers at the scenes of the crashes, and 6,000 control (comparison) drivers. … Data included 10,221 breath samples, 9,285 oral fluid samples and 1,764 blood samples. Oral fluid and blood samples were screened and confirmed for the presence of alcohol and drugs.
> ….
> Unadjusted drug odds ratio estimates indicated a significant increase in crash risk. For the active ingredient in marijuana, delta-9-tetrahydrocannabinol (THC), this yielded an unadjusted odds ratio of 1.25. However, after adjusting for gender, age, race/ethnicity and alcohol, there was no indication that any drug significantly contributed to crash risk. The adjusted odds ratios for THC were 1.00, 95% [confidence interval] [.83, 1.22], indicating no increased or decreased crash risk.

State Research and Resources

The majority of research in this section examines the effects of legalization on traffic safety in multiple states. Data used in project modeling was obtained from a variety of sources, most commonly FARS, but also private

industry, trauma centers and public records. Some studies also considered other variables in their examinations, including unemployment rate, speed limit laws, seat belt use rate, percent of miles driven on rural roads and cellphone use.

Findings largely suggest that crashes with injuries and fatalities have increased since legalization of marijuana, however, the extent of that increase varies. In Colorado, a Division of Criminal Justice report concluded that the lack of precommercialization data, the decreasing social stigma related to marijuana and challenges to law enforcement combine to make it difficult to translate these preliminary findings into definitive statements of outcomes.

In October 2023, to address the possible overestimation of poly-drug-positive drivers involved in fatal crashes, the Washington Traffic Safety Commission (WTSC) implemented retroactive updates to drug-positive driver data gathered since 2012. (*Poly-drug,* as defined by WTSC, "refers to people that are positive for two or more drugs, or a combination of one or more drugs and alcohol as confirmed by toxicology testing.") WTSC's report of these efforts provides details of the steps taken to "reduce the risk of overestimating poly-drug-positive drivers by conducting a systematic review of drug-positive driver data to remove non-impairing and unrelated drugs, non-active drug metabolites and unrelated substances."

Related research noted that medical legalization was associated with reductions in fatal motor-vehicle collisions, whereas recreational legalization was conversely associated with increases in fatal collisions. One study in particular found an increase in traffic fatalities after recreational cannabis laws was legalized in Colorado but not in Washington state. The density of recreational cannabis stores and other implementation practices, out-of-state cannabis tourism and local factors may explain the differing results. Finally, a National Conference of State Legislatures webpage features a map of marijuana-impaired driving laws by state.

Multiple States

"Revisiting the Effect of Recreational Marijuana on Traffic Fatalities," Kusum Adhikari, Alexander Maas and Andres Trujillo-Barrera, *International Journal of Drug Policy*, Vol. 115, May 2023.
Citation at https://www.sciencedirect.com/science/article/abs/pii/S095539592300049X?via%3Dihub
From the abstract: This study examines the effect of retail recreational marijuana legalization on traffic fatalities using the most current data available and recent advancements in difference-in-difference estimation methods proposed by Callaway and Sant'Anna (2021). A modified difference-in-difference (CS-DID) is used to estimate the effect of recreational marijuana legalization on traffic fatalities reported in the Fatality Analysis Reporting System (FARS). Difference-in-difference regression models are run at the state-year level, using data from 2007 through 2020, and compared to estimates using traditional two-way-fixed-effects (TWFE) models. Consistent with past studies, results from conventional TWFE suggest traffic fatalities increase at a rate of 1.2 per billion vehicle miles traveled (BVMT) after retail of recreational marijuana begins. However, using the CS-DID model, the authors find slightly larger average total treatment effects (approximately 2.2 fatalities per BVMT). Moreover, the size of the effect changes across time, where cohorts "treated" earlier have substantially higher increases than those who more recently legalized. Traffic fatalities increase by 2.2 per billion miles driven after retail legalization, which may account for as many as 1,400 traffic fatalities annually. States who legalized earlier experienced larger traffic fatality increases. TWFE methods are inadequate for policy evaluation and do not capture heterogeneous effects across time.

"The Impact of Recreational Cannabis Markets on Motor Vehicle Accident, Suicide and Opioid Overdose Fatalities," Samantha Marinello and Lisa Powell, *Social Science and Medicine*, Vol. 320, March 2023. Citation at https://www.sciencedirect.com/science/article/abs/pii/S0277953623000357

From the abstract: Preliminary evidence suggests recreational markets may be associated with increased [cannabis] use among adults, which indicates there may be downstream health impacts on outcomes related to cannabis use. Three causes of death that are linked to cannabis use are motor vehicle accidents, suicide and opioid overdose. Drawing on data from U.S. death certificates from 2009 to 2019, the authors conducted a difference-in-differences analysis to estimate the impact of recreational markets on fatalities from motor vehicle accidents, suicide and opioid overdose in seven states: Colorado, Washington, Oregon, Alaska, Nevada, California and Massachusetts. States with comprehensive medical cannabis programs with similar pre-trends in deaths were used as comparisons. For each outcome, a pooled estimate was generated with a meta-analysis using random effects models. The results revealed substantial increases in crash fatalities in Colorado, Oregon, Alaska and California of 16%, 22%, 20% and 14%, respectively. Based on estimates from all seven states, recreational markets were associated with a 10% increase in motor vehicle accident deaths, on average.

"Changes in Traffic Crash Rates After Legalization of Marijuana: Results by Crash Severity," Charles Farmer, Samuel Monfort and Amber Woods, *Journal of Studies on Alcohol and Drugs*, Vol. 83, Issue 4, pages 494-501, 2022. Citation at https://www.jsad.com/doi/abs/10.15288/jsad.2022.83.494

From the abstract: This article reports on a study undertaken to estimate the effects of marijuana legalization and the subsequent onset of retail sales on injury and fatal traffic crash rates in the United States during the period 2009-2019. The authors focused on the effects of the state-by-state changes in marijuana laws on trends in their traffic crashes in the decade 2009 through 2019 for Colorado, Washington, Oregon, California and Nevada. The authors modeled state-by-state quarterly crash rates per mile of travel as a function of time, unemployment rate, maximum posted speed limit, seat belt use rate, alcohol use rate, percent of miles driven on rural roads and indicators of legalized recreational marijuana use and sales. Overall, legalization of recreational marijuana and the subsequent start of retail sales in these five states [were] associated with a 5.8% increase in crashes with injuries and a 4.1% increase in fatal crashes. The authors tease out the differences between simple legalization and the implementation of retail sales, as well as the slight differences across states. For example, the first three states to legalize marijuana experienced a greater injury rate increase compared with the two later states. The authors conclude by calling for a continuing monitoring of crash data and crash rates over time as more states legalize marijuana and the complicated variables in this research get more attention.

"**Association of Recreational Cannabis Laws in Colorado and Washington State with Changes in Traffic Fatalities, 2005-2017,"** Julian Santaella-Tenorio, Katherine Wheeler-Martin, Charles J. DiMaggio, Alvaro Castillo-Carniglia, Katherine M. Keyes, Deborah Hasin and Magdalena Cerdá, *JAMA Internal Medicine*, Vol. 180, No. 8, pages 1061-1068, 2020. https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/2767647

From the conclusions: This study found evidence of an increase in traffic fatalities after the implementation of RCLs [recreational cannabis laws] in Colorado but not in Washington [s]tate. Differences in how RCLs were implemented (e.g., density of recreational cannabis stores), out-of-state cannabis tourism and local factors may explain the different results. These findings highlight the importance of RCLs as a factor that may increase traffic fatalities and call for the identification of policies and enforcement strategies that can help prevent unintended consequences of cannabis legalization.

"Fatal Crashes in the 5 Years After Recreational Marijuana Legalization in Colorado and Washington," Jayson D. Aydelotte, Alexandra L. Mardock, Christine A. Mancheski, Shariq M. Quamar, Pedro G. Teixeira, Carlos V.R. Brown and Lawrence H. Brown, *Accident Analysis and Prevention*, Vol. 132, November 2019.
Citation at https://www.sciencedirect.com/science/article/abs/pii/S0001457519310267

From the abstract: Colorado and Washington legalized recreational marijuana in 2012, but the effects of legalization on motor vehicle crashes remain unknown. Using Fatality Analysis Reporting System data, the authors performed difference-in-differences (DD) analyses comparing changes in fatal crash rates in Washington, Colorado and nine control states with stable anti-marijuana laws or medical marijuana laws over the five years before and after recreational marijuana legalization. In separate analyses, the authors evaluated fatal crash rates before and after commercial marijuana dispensaries began operating in 2014. In the five years after legalization, fatal crash rates increased more in Colorado and Washington than would be expected had they continued to parallel crash rates in the control states (+1.2 crashes/billion vehicle miles traveled, CI [confidence interval]: -0.6 to 2.1, p = 0.087), but not significantly so. The effect was more pronounced and statistically significant after the opening of commercial dispensaries (+1.8 crashes/billion vehicle miles traveled, CI: +0.4 to +3.7, p = 0.020). These data provide evidence of the need for policy strategies to mitigate increasing crash risks as more states legalize recreational marijuana.

Effect of Recreational Marijuana Sales on Police-Reported Crashes in Colorado, Oregon and Washington, Samuel Monfort, Insurance Institute for Highway Safety, Highway Loss Data Institute, October 2018.
https://www.iihs.org/api/datastoredocument/bibliography/2173

From the abstract: The current study was based on the 2018 Highway Loss Data Institute research on the subject, which estimated that the legalization of retail sales was associated with a 6.0% increase in insurance collision claims compared with control states. The current study investigated police-reported crashes rather than insurance claims. Crash rates were computed for each month between January 2012 and December 2016 for the three study states as well as their neighboring states, which served as controls. Controlling for several demographic factors, the change in crash rate that occurred after recreational marijuana was legalized was compared with the change in crash rate in the control states over the same time frame. The legalization of retail sales in Colorado, Washington and Oregon was associated with a 5.2% higher rate of police-reported crashes compared with neighboring states that did not legalize retail sales. These results contribute to the growing body of research on the impact of recreational marijuana legalization.

Related Resource:

> **Crashes Rise in First States to Begin Legalized Retail Sales of Recreational Marijuana**, News Post, Insurance Institute for Highway Safety, Highway Loss Data Institute, October 18, 2018.
> https://www.iihs.org/news/detail/crashes-rise-in-first-states-to-begin-legalized-retail-sales-of-recreational-marijuana
> *From the article*: Crashes are up by as much as 6% in Colorado, Nevada, Oregon and Washington compared with neighboring states that haven't legalized marijuana for recreational use, new research from the Insurance Institute for Highway Safety (IIHS) and Highway Loss Data Institute (HLDI) shows.
> ….
> A separate IIHS study examined 2012-2016 police-reported crashes before and after retail sales began in Colorado, Oregon and Washington. IIHS estimates that the three states combined saw a 5.2% increase in the rate of crashes per million vehicle registrations, compared with neighboring states that didn't legalize marijuana sales.

Traffic Safety Impacts of Marijuana Legalization, Governors Highway Safety Association, October 2018.
https://www.ghsa.org/sites/default/files/2018-10/GHSA_SafetyImpacts_Final.pdf
The effects of marijuana use on driver behavior and information about crash rates in Colorado and Washington are included in this four-page brief. Highlights from the brief include:

- There are no firm conclusions on whether crash rates changed in either state.
- Fatal crashes involving marijuana increased in both Colorado and Washington.

"Investigation of Associations Between Marijuana Law Changes and Marijuana-Involved Fatal Traffic Crashes: A State-Level Analysis," Jaeyoung Lee, Ahmad Abdel-Aty and Juneyoung Park, *Journal of Transport and Health*, Vol. 10, pages 194-202, September 2018.
Citation at https://www.sciencedirect.com/science/article/abs/pii/S2214140517307132
From the abstract: In this study, associations of five types of marijuana law changes and marijuana-involved fatal crashes (i.e., a fatal crash involving a driver who tested positive for marijuana) in the United States are analyzed: (1) prohibition to medical legalization; (2) prohibition to decriminalization; (3) decriminalization to the combination of medical legalization and decriminalization; (4) medical legalization to full legalization; and (5) the combination of decriminalization and medical legalization to full legalization. The fatal crash data were collected from the Fatality Analysis Reporting System (FARS) database, archived by the National Highway Traffic Safety Administration (NHTSA). Using these five types of changes, the results showed that (1) Arizona and New Jersey experienced no significant changes. (2) Massachusetts experienced 174.5% relative increases after decriminalization. (3) The relative number increased by 75.3% in Connecticut after medical legalization when decriminalization was already in place. (4) A 31.2% relative increase in Washington was observed. (5) The relative number increased by 63.1% in Colorado. In conclusion, no significant changes in the number of marijuana-related crashes were observed after medical legalization only. Nevertheless, an increased number of marijuana-related crashes were observed after all other types of the marijuana law changes.

Drug-Impaired Driving: Marijuana and Opioids Raise Critical Issues for States, Governors Highway Safety Association, May 2018.
https://www.ghsa.org/sites/default/files/2018-05/GHSA_DrugImpairedDriving_FINAL.pdf
The challenges to addressing drug-impaired driving are noted in this report. Drugged driving data and a discussion of the effects of marijuana and opioids on driving ability and crash risk are presented. Oral fluid screening and other roadside testing measures are also discussed. *From page 14 of the report*:

Marijuana's effect on crash risk is far less clear. While there are many recent studies, methodological flaws are common. The studies are complicated by the difficulty in estimating a driver's THC at the time of a crash, by the lack of a relationship between THC level and impairment, and by tests that do not distinguish between THC and nonimpairing metabolites. The most supportable conclusions are that marijuana has caused or contributed to some crashes; that it can, but need not necessarily, increase crash risk in a driver; and that the best overall estimate of marijuana's effect on crash risk in general is an increase of 25%-35%, or a factor of 1.25 to 1.35.

Colorado

"Does Expanding Access to Cannabis Affect Traffic Crashes? County-Level Evidence from Recreational Marijuana Dispensary Sales in Colorado," Christian Gunadi, *Health Economics*, Vol. 31, Issue 10, pages 2244-2268, October 2022.

Citation at https://onlinelibrary.wiley.com/doi/10.1002/hec.4573

From the abstract: This study utilized a difference-in-differences model to explore the impact of recreational marijuana dispensary sales on traffic crashes across counties in Colorado. … The results of the analysis showed that there was a significant increase in marijuana-related hospital discharges after retail marijuana dispensaries entered Colorado. Nevertheless, an association between the entry of recreational marijuana dispensaries and a statistically significant rise in traffic crashes was not found. One possible explanation for this finding is the hypothesis that marijuana substitutes for other impairing substances, resulting in a negligible to modest net effect.

Impacts of Marijuana Legalization in Colorado: A Report Pursuant to C.R.S. 24-33.4-516, Jack Reed, Colorado Division of Criminal Justice, July 2021.

https://cdpsdocs.state.co.us/ors/docs/reports/2021_SB13-283_Rpt.pdf

This report presents the impacts of Amendment 64, which allowed for the retail sale and possession of marijuana in Colorado, particularly as they relate to law enforcement activities. *From the executive summary*:

> The information presented here should be interpreted with caution. The majority of the data sources vary considerably in terms of what exists historically and the reliability of some sources has improved over time. Consequently, it is difficult to draw conclusions about the potential effects of marijuana legalization and commercialization on public safety, public health, or youth outcomes, and this may always be the case due to the lack of historical data. Furthermore, the measurement of available data elements can be affected by [the] very context of marijuana legalization. For example, the decreasing social stigma regarding marijuana use could lead individuals to be more likely to report use on surveys and also to health workers in emergency departments and poison control centers, making marijuana use appear to increase when perhaps it has not. Additionally, law enforcement officials and prosecuting attorneys continue to struggle with enforcement of the complex and sometimes conflicting marijuana laws that remain. Finally, the lack of comparable [f]ederal data across many metrics makes it difficult to compare changes in Colorado to other jurisdictions which may have not legalized marijuana. In sum, then, the lack of precommercialization data, the decreasing social stigma and challenges to law enforcement combine to make it difficult to translate these preliminary findings into definitive statements of outcomes.
> ….

> **Traffic Safety**
> According to CDOT [Colorado Department of Transportation], the number of fatalities in which a driver tested positive for [d]elta-9 THC at or above the 5.0 ng/mL level increased from 52 (14% of all fatalities) in 2016 to 56 in 2019 (13% of all fatalities).
>
> - The number of fatalities with cannabinoid-only or cannabinoid-in-combination positive drivers increased 140%, from 55 in 2013 to 132 in 2019.
>
> - However, note that the detection of any cannabinoid in blood is not an indicator of impairment but only indicates presence in the system. Detection of [d]elta-9 THC, one of the primary psychoactive metabolites of marijuana, may be an indicator of impairment.

Montana

Key Information for DUIC Policy, N.J. Ward, J. Otto and K. Finley, Montana Department of Transportation, June 2019.
https://www.mdt.mt.gov/other/webdata/external/research/docs/research_proj/tsc/DUIC_POLICY/DUIC_FINAL_REPORT.pdf
From the abstract: To address the needs of traffic safety practitioners and policymakers, this synthesis report seeks to summarize key information about the role of cannabis in traffic safety in order to inform policy regarding cannabis legalization and traffic safety. Main conclusions include … (7) Impaired driving behaviors increase driver responsibility for motor vehicle crashes. (8) THC-positive drivers are twice as likely to be killed in a motor vehicle crash. (9) The fatal crash risk is much higher when THC is combined with alcohol.

Currently, there is some evidence that the legalization of recreational cannabis increases crashes. However, because it has been only recently that relatively few states have adopted this legislation, the amount of evidence is insufficient for a definitive conclusion. Thus, there is a need for more research to examine the effect of cannabis legalization on traffic safety. Such research will require longer post-legalization periods and more states that have enacted these legislative changes.

Washington

Drug-Positive Driver Data Update—Methods, Brief No. 15, Washington Traffic Safety Commission, October 2023.
https://wtsc.wa.gov/wp-content/uploads/dlm_uploads/2023/11/15_Drug-Data-Update_Oct-2023.pdf
From the brief: In October 2023, the Washington Traffic Safety Commission (WTSC) implemented new updates to drug-positive driver data in our Coded Fatal Crash (CFC) files. The WTSC retroactively implemented these updates to data since 2012. As a result of the new data updates, existing drug-positive driver data changed. These updates to the data were implemented to provide more accurate information pertaining to impairment. The methods and reasoning for these updates are described in the pages that follow. For a complete description of the new data updates, please see our full report: *Re-Evaluating the Prevalence of [Drugged and] Poly-Drug Driving in Washington [State]*.

Related Resource:

> **Re-Evaluating the Prevalence of Drugged and Poly-Drug Driving in Washington State: Understanding Drug Metabolites, Pharmaceutical and Over-the-Counter Drugs, and Other Non-Impairing Drugs and Substances**, Max Roberts, Staci Hoff and Shelly Baldwin, Washington Traffic Safety Commission, October 2023.
> https://wtsc.wa.gov/wp-content/uploads/dlm_uploads/2023/11/Poly-Drug-Report-2023_FINAL.pdf
> *From the report summary*: Over the past decade in Washington, the number of poly-drug-positive drivers involved in fatal crashes has steadily increased year-over-year. However, these poly-drug-positive cases can include non-impairing pharmaceutical medication, over-the-counter drugs, drug metabolites (both active and non-active), or other drugs and substances unrelated to the events of the fatal crash (such as drugs administered post-crash by emergency personnel). Therefore, the prevalence of poly-drug-positive drivers may be overestimated. The Washington Traffic Safety Commission (WTSC) aimed to reduce the risk of overestimating poly-drug-positive drivers by conducting a systematic review of drug-positive driver data to remove non-impairing and unrelated drugs, non-active drug metabolites, and unrelated substances. This

report details the steps taken by the WTSC to update drug-positive driver data to improve the quality of the data.

Effects of Marijuana Legalization on Law Enforcement and Crime, Mary Stohr, Dale Willits, David Makin, Craig Hemmens, Nicholas Lovrich, Duane Stanton and Mikala Meize, National Criminal Justice Reference Service, Office of Justice Programs, June 2020.
https://www.ojp.gov/pdffiles1/nij/grants/255060.pdf
Researchers used quantitative and qualitative approaches to examine the effects of recreational marijuana legalization on crime and law in Washington. *From the abstract*:

> We found that marijuana legalization has not had an overall consistently positive or negative effect on matters of public safety. Instead, legalization has resulted in a varied set of outcomes, including: concern about youth access to marijuana and increased drugged driving, a belief that there is increased cross border transference of legal marijuana to states that have not legalized, reports that training and funding for cannabis-related law enforcement activities have been deficient given the complex and enlarged role the police have been given, and the persistence of the complex black market. … The police were also greatly concerned about how to best handle the detection and documentation of marijuana-related impairment in both commercial vehicle operations and traffic incidents. The state has adopted the Target Zero goal of no traffic fatalities by 2030 and the legalization of marijuana and the privatization of liquor sales have combined to make accomplishment of this worthy goal extremely difficult.

Cannabis Use Among Drivers in Fatal Crashes in Washington State Before and After Legalization, Research Brief, B. C. Tefft and L. S. Arnold, AAA Foundation for Traffic Safety, January 2020.
https://aaafoundation.org/wp-content/uploads/2020/01/19-0637_AAAFTS-WA-State-Cannabis-Use-Among-Drivers-in-Fatal-Crashes_r4.pdf
From the abstract: Washington State Initiative 502 (I-502), effective Dec. 6, 2012, legalized possession of small amounts of cannabis for recreational use by adults aged 21 years and older. It also included a prohibition against driving with 5 or more nanograms of delta-9-tetrahydrocannabinol (THC) per milliliter of blood, along with a zero tolerance prohibition for drivers younger than 21 years of age. … A previous study by the AAA Foundation for Traffic Safety examined data from drivers involved in fatal crashes in Washington [s]tate in years 2010 to 2014 and estimated that the proportion of drivers with detectable THC approximately doubled several months after I-502 became effective. The research reported here updates the previous study with three additional years of data, post-legalization. Multiple imputation was used to estimate the proportion of drivers who were THC-positive among those who were not tested for drugs or whose test results were unavailable. Results indicate that five years after I-502, the proportion of fatal-crash-involved drivers who are THC-positive has remained approximately double the level observed before I-502. An estimated 21% of all drivers involved in fatal crashes in Washington state in 2017 were THC-positive, higher than in any other year in the 10-year period examined.

Driver Toxicology Testing and the Involvement of Marijuana in Fatal Crashes, 2010-2014: A Descriptive Report, Darrin Grondel, Washington Traffic Safety Commission, February 2016.
http://wtsc.wa.gov/wp-content/uploads/dlm_uploads/2015/10/Driver-Toxicology-Testing-and-the-Involvement-of-Marijuana-in-Fatal-Crashes_REVFeb2016-1.pdf
This report examines crash data from marijuana-positive drivers. The study distinguishes between drivers who test positive for THC and those with residual marijuana (carboxy) in their system from earlier use. Key observations from the report include the following:

- In 2014, 84.3% of drivers positive for cannabinoids were positive for THC, compared to only 44.4% of cannabinoid-positive drivers in 2010. In 2014, among the 75 drivers involved in fatal crashes positive for THC, approximately half (38) exceeded the 5 ng/ml THC *per se* limit.
- The frequency of drivers in fatal crashes that tested positive for THC, alone or in combination with alcohol or other drugs, was highest in 2014 (75 drivers) compared to the previous four-year average (36 drivers).
- The most frequently reported driver error among drivers in fatal crashes with only THC was lane deviation (12.5%), followed by overcorrecting (8.9%).

Related Research

Drugged Driving: Marijuana-Impaired Driving, News Brief, National Conference of State Legislatures, November 2023.
https://www.ncsl.org/transportation/drugged-driving-marijuana-impaired-driving
The limitations of drug-detecting technology and the lack of an agreed-upon limit to determine impairment are noted as key issues in testing for drug impairment. This website includes a map indicating the marijuana-impaired driving law by state:

- Zero tolerance: Prohibits driving with any amount of THC and/or its metabolites in the body.
- *Per se*: Prohibits driving with a detectable amount of THC in the body that exceeds the legal limit.
- Driving under the influence of drugs: Requires the driver to be under the influence of or affected by THC.
- Permissable inference law: Applies if THC is identified in a driver's blood in quantities of 5 ng/ml or higher. If so, it is permissible to assume that the driver was under the influence.

"The Impact of Cannabis Decriminalization and Legalization on Road Safety Outcomes: A Systematic Review," Sarah Windle, Peter Socha, José Ignacio Nazif-Munoz, Sam Harper and Arijit Nandi, *American Journal of Preventive Medicine*, Vol. 63, Issue 6, pages 1037-1052, December 2022.
Citation at https://www.ajpmonline.org/article/S0749-3797(22)00409-3/fulltext
From the abstract: There is substantial debate concerning the impact of cannabis decriminalization and legalization on road safety outcomes. Seven databases were systematically searched: Embase, MEDLINE and PsycINFO through Ovid as well as Web of Science Core Collection, SafetyLit, Criminal Justice Database (ProQuest) and Transport Research International Documentation (from inception to June 16, 2021). Eligible primary studies examined group-level cannabis decriminalization or legalization and a road safety outcome in any population. … Studies found mixed impacts of legalization on attitudes, beliefs and self-reported driving under the influence. … Medical legalization was associated with reductions in fatal motor-vehicle collisions, whereas recreational legalization was conversely associated with increases in fatal collisions. Increased cannabis positivity may reflect changes in cannabis use; however, it does not in itself indicate increased impaired driving. Subgroups impacted by medical and recreational legalization, respectively, likely explain opposing findings for fatal collisions. More research is needed concerning cannabis decriminalization; the impacts of decriminalization and legalization on nonfatal injuries, alcohol and other drugs; and the mechanisms by which legalization impacts road safety outcomes.

"Trends in Cannabis Involvement and Risk of Alcohol Involvement in Motor Vehicle Crash Fatalities in the United States, 2000-2018," Marlene Lira, Timothy Heeren, Magdalena Buczek, Jason Blanchette, Rosanna Smart, Rosalie Liccardo Pacula and Timothy Naimi, *American Journal of Public Health*, Vol. 111, Issue 11, pages 1976-1985, November 2021.

Citation at http://dx.doi.org/10.2105/AJPH.2021.306466

From the abstract: The authors conducted a cross-sectional analysis of data from the Fatality Analysis Reporting System. Fatalities were coded as cannabis-involved if the driver tested positive for a cannabinoid and alcohol-involved based on the highest blood alcohol concentration (BAC) of the driver. The study assessed the role of cannabis as a risk factor for alcohol use. The authors report that, although trends in alcohol-involved fatalities have remained stable, the percentage of crash fatalities have increased from 9% in 2000 to 21.5% in 2018 (for cannabis alone) and 4.8% in 2000 to 10.3% in 2018 (cannabis and alcohol in combination). The authors note that these findings were very consistent across demographic and crash characteristics.

"The Association Between Marijuana and Motor Vehicle Crashes," Richard Fowles and Peter D. Loeb, *Journal of Transport and Health*, Vol. 21, June 2021.

Citation at https://www.sciencedirect.com/science/article/abs/pii/S2214140521000736

From the abstract: This article discusses the policy implications and public health effects of changes in marijuana laws and consumption in the United States on motor vehicle related fatalities. Most studies to date use classical regression methods to study these and are thus susceptible to both model and parameter uncertainty. This study examines the associations between marijuana and motor vehicle fatality rates taking these two issues of uncertainty into account using Bayesian sturdy-values, i.e., s-values. This study utilizes a new balanced panel data set across all states and Washington, D.C., for the period 2010 to 2016 in the context of linear models using Bayesian s-values. It addresses the association between marijuana and alcohol consumption along with the legal environment across states and through time on crash fatalities. … The s-value approach considers a vast number of model specifications and provides robust policy guidelines. A strong association between marijuana and alcohol use on motor vehicle crash rates is found. The statistical results are both substantial and robust, i.e., non-fragile. Other important variables include cellphone use, seat belt use, speed limit laws and fleet modernization. The results have found strong evidence of a life-taking relationship between marijuana use and vehicle crashes.

Impairment Policy and Guidance

The "pressing need to develop improved methods of detecting cannabis intoxication and impairment" is the focus of many citations within this section. A Transportation Research Board (TRB) *Research Circular* identifies eight research topics crucial to understanding drug-impaired driving, particularly marijuana-impaired driving. The research topics encompass several disciplines: from legislation and enforcement to toxicology, prosecution and public policy. Additional resources include an interactive map summarizing the drug-impaired driving laws of each U.S. state and issues using *per se* limits for THC. The authors of the latter resource present two case studies illustrating the inconsistencies between THC concentrations and the degree of impairment: In one case, impairment was "minimal in the presence of a positive THC result"; in the other, impairment was "profound in the presence of a negative THC result."

In support of the gap in detection methods, two research projects currently underway are attempting to identify measures that law enforcement can use in the field to detect marijuana-impaired driving. Research reported in

other transportation agency publications and industry resources also look at solutions and strategies to address impaired driving, particularly marijuana-impaired driving.

National Research and Guidance

Research in Progress: Develop and Test Drug Positive Driver Detection Cues, National Highway Traffic Safety Administration, start date: September 2021, expected completion date: May 2025.
Project description at https://trid.trb.org/view/1889973
From the project description: This study focuses on examining the feasibility of providing law enforcement officers with specific cues for detecting drivers positive for a potentially-impairing drug, other than alcohol, with a focus on driving under the influence of marijuana. To develop and test a set of cues to detect individuals driving under the influence of marijuana, this project will review previous drugs and driving performance research, [and] the NHTSA Drug Recognition Expert database, and conduct ride-along[s] with law enforcement officers to develop potential cues. The cues will be driving behavior-based but may also include cues related to after an officer has stopped a driver. The cues will be based on decision theory and the probability of cues being related to driving and behavior of marijuana-positive drivers. Once NHTSA approves a set of cues for field testing, the project will work with law enforcement agencies to use these cues while they are on patrol. Researchers, who are riding along with officers, will approach drivers after an enforcement stop and invite them to participate in the study, and to provide a biological sample via an on-site oral fluid test device to determine present use of marijuana. The study [will] determine the probability of separate cues and sets of cues to accurately predict marijuana use of drivers. The project will document the study in a final report and develop basic training materials for use by law enforcement.

"Drug-Impaired Driving: Research Needs," Robyn Robertson, Heather Woods-Fry, Ward Vanlaar, Thomas Brown and Christine Moore, *Transportation Research Circular E-C250*, Transportation Research Board, September 2019.
https://onlinepubs.trb.org/onlinepubs/circulars/ec250.pdf
From the abstract:

> This report describes eight priority research topics that span several disciplines and identifies the top research needs in each area that are crucial to increase the understanding of drug-impaired driving, particularly marijuana-impaired driving. … The eight priority topics include: pharmacokinetics of alcohol and marijuana; legislation and enforcement; prosecution and courts; toxicology; supervision; treatment; public policy; and public education and awareness. For each topic, current knowledge and important caveats are briefly summarized to provide context, and then key research questions are presented. The rationale for prioritizing each question is highlighted, and the topics and their associated research questions within each section are discussed relative to the chronological flow of a drug-impaired driving case through the criminal justice system.

Chapter 3, Legislation and Enforcement (beginning on page 10 of the circular, page 16 of the PDF), includes a discussion of the need to "evaluate the effectiveness of DRE programs and to optimize their implementation."

Marijuana Legalization and Impaired Driving: Solutions for Protecting Our Roadways, Caroline Boris, Alexandra Shirk and Jeffrey Short, American Transportation Research Institute, March 2019.
https://truckingresearch.org/2019/03/12/marijuana-legalization-and-impaired-driving-solutions-for-protecting-our-roadways/#.XIkKgyhKjcc

From the abstract: This report focuses on improving safety on U.S. highways through the identification of marijuana-impaired drivers. It begins with a discussion of legalization trends, tax revenue generated by [s]tate and tax revenue allocation, and the safety implications of drugged driving. Next, [s]tate driving under the influence laws are outlined and methods for identifying marijuana-impaired drivers are discussed including the use of field sobriety tests, advanced roadside impaired driving enforcement, drug recognition experts and marijuana testing methods. The pros and cons of various marijuana testing methods are compared. Finally, the conclusion recommends law enforcement training, educating the public, and funding safety programs through marijuana sales tax revenues.

It's High Time: A Common Sense Approach to Marijuana-Impaired Driving, Teri Moore and Adrian Moore, Reason Foundation, January 2019.
https://reason.org/wp-content/uploads/common-sense-approach-to-marijuana-impaired-driving.pdf

From the abstract:

> This report looks at how alcohol-impaired driving is assessed and whether cannabis-impairment can be identified in the same manner. It discusses metabolism of alcohol versus cannabis and the ramifications of *per se*-based arrests and zero tolerance policies on legal users of cannabis. In addition, it examines how law enforcement determines driving impairment and types of tests for drug-impaired drivers currently in use or in development. It recommends an approach similar to Canada's involving training drug recognition expert (DRE)-qualified officers to assess drivers along with the use of dashcams and bodycams. It also suggests that funding be prioritized toward toxicology laboratories to speed toxicology screens to corroborate the presence of cannabis.

Recommendations from this research include the following:

- Avoid *per se* standards and conduct THC detection screenings rather than assessing blood plasma levels, which don't correlate to impairment.

- Prioritize law enforcement training in ARIDE [advanced roadside impaired driving enforcement]/DRE and dashcams and bodycams for more accurate and corroborative identification and assessment of drug-impaired drivers, and to generate more useful data on marijuana-impaired drivers.

- Prioritize cutting down backlogs in toxicology laboratories so that justice for both impaired and unimpaired drivers is swift and fair. Rather than invasive testing of irrelevant blood plasma levels, use quicker and less expensive cannabis detection screenings.

- At the federal level, deschedule marijuana to encourage research into marijuana-impaired driving. Prioritize NHTSA and university research on marijuana use and driving, and development of reliable technology to aid in roadside impairment determination.

State Research and Resources

Research in Progress: DMV and CHP Partner with UC San Diego to Launch Groundbreaking Study to Improve Public Safety and Develop Best Practices to Detect Driving Impairment in Cannabis Users, California Department of Motor Vehicles, California Highway Patrol and University of California, San Diego, Center for Medicinal Cannabis Research, News Release, start date: August 2023, expected completion date: February 2025.
https://www.dmv.ca.gov/portal/news-and-media/dmv-and-chp-partner-with-uc-san-diego-to-launch-groundbreaking-study-to-improve-public-safety-and-develop-best-practices-to-detect-driving-impairment-in-cannabis-users/
From the news release: The California Department of Motor Vehicles [DMV], in partnership with the California Highway Patrol [CHP] and the University of California, San Diego, is seeking 300 volunteers from the Sacramento area to participate in a study to test various methods to detect cannabis-impaired driving. The U.S. Food and Drug Administration-approved research project is set to begin in August.

….

The current enforcement of cannabis (and other drug) impairment relies on behavioral methods of detecting impairment. These include the various cues that law enforcement officers are trained to look for, including erratic driving behaviors, field sobriety tests and an additional evaluation from a [d]rug [r]ecognition [e]xpert (DRE) to determine the substance(s) causing impairment.

The goal of this study, expected to last between nine and 18 months, is to determine how well these methods detect cannabis-impaired driving and to help identify new indicators of this kind of impairment.

Multiple States

Drug Impaired Driving, Governors Highway Safety Association, last updated January 2024; laws last reviewed March 2023.
https://www.ghsa.org/state-laws/issues/drug%20impaired%20driving
An interactive map presents the statewide laws related to drug-impaired driving. *From the webpage*:

In addition to general impairment laws, there are two basic laws that states tend to use when addressing drug-impaired driving:

- **Zero Tolerance** laws make it illegal to drive with any measurable amount of specified drugs in the body. These laws are best suited for illegal drugs: [I]f it is illegal to possess or use a drug, then it is reasonable to prohibit driving after the drug has been possessed and used.
    - o 16 states have zero tolerance laws in effect for one or more drugs.
- *Per Se* laws make it illegal to drive with amounts of specified drugs in the body that exceed set limits.
    - o [Five] states have *per se* laws in effect for one or more drugs.

Marijuana Drug-Impaired Driving Laws

18 states have zero tolerance or non-zero *per se* laws for marijuana.

- 10 states have zero tolerance for THC or a metabolite.
- 4 states have zero tolerance for THC but no restriction on metabolites.
- 4 states have specific *per se* limits for THC.
- 1 state (Colorado) has a permissible inference law for THC.

Note: GHSA [Governors Highway Safety Association] does not compile any additional data on drug-impaired driving laws other than what is presented here. A compilation of state marijuana laws is available via the Insurance Institute for Highway Safety, and information on marijuana-impaired driving laws is available from the National Alliance to Stop Impaired Driving.

State Strategies to Reduce Highway and Traffic Fatalities and Injuries: A Road Map for States, National Governors Association, February 2018.
https://www.nga.org/wp-content/uploads/2019/09/2018.NGA_.Traffic_Safety_Roadmap.web_.v7.pdf
The National Governors Association developed a framework to reduce traffic injuries and fatalities. The framework "highlights existing efforts in the states and serves as a policy development tool for governors and their senior leadership who seek to improve coordination and bolster existing efforts across state agencies, including departments of public safety, transportation, public health, and emergency medical and trauma services."

Strategies related to marijuana-impaired driving include the following:

- Develop standard detection-enforcement methods for law enforcement to identify drug impairment, including from prescription drugs and marijuana.
- Invest in and increase the capacity of state toxicology labs to address testing of marijuana and other substances.

Colorado

"Do First Impressions Matter? Evaluating Officer Perception of Impairing Substances in Colorado State Patrol Traffic Citation Records," Allison Rosenthal, Cindy Stewart and Jack Reed, *TRB 102nd Annual Meeting*, Poster Session TRBAM-23-03420, January 2023.
Abstract available at https://annualmeeting.mytrb.org/OnlineProgram/Details/19332
From the abstract: This study sought to evaluate officer perception of impairing substances presented on traffic citation records using a data set of linked impaired driving court case filings and toxicology records. The authors analyzed 14,760 CSP [Colorado State Patrol] citations from 2018-2020 where impaired driving was suspected and used probabilistic data linking to match them to an impaired driving court case and toxicology record. After manual reviews were completed, 13,893 citation records (94%) linked to an impaired driving court case filing, and 9,333 citations had toxicology testing results (63%). Risk ratio calculations of screening panel type (alcohol vs. drug) and officer perception of alcohol, marijuana and other drug were performed. Sensitivity, specificity, positive predictive value (PPV) and negative predictive values (NPV) were calculated for officer perception of impairing substances compared to toxicology results. Citation records were most sensitive and accurate for alcohol positivity in toxicology records (between 90%-98%); marijuana alone (76%) and other drug alone (80%) had good sensitivity results despite the absence of roadside screening. The perception of polydrug impairment largely did not reflect drug positivity on toxicology reports. Limitations of this study include: not all citation records had drug and alcohol screening, and screening type was associated with officer perception of impairing substance, which might suggest confirmation bias. Additionally, drug positivity on toxicology reports does not infer drug impairment.

Colorado's Legalization of Marijuana and the Impact on Public Safety: A Practical Guide for Law Enforcement,
Police Foundation and Colorado Association of Chiefs of Police, May 2015.
https://www.policinginstitute.org/wp-content/uploads/2015/06/Legalized-Marijuana-Practical-Guide-for-Law-Enforcement_Rev6_18_15_LOW_0.pdf
Chapter 7 of this guide (page 31 of the guide, page 41 of the PDF) addresses field tests and law enforcement training to determine impairment.

Maryland

"Maryland Seeks to Deploy Data to Battle Impaired Driving," *AASHTO Journal*, June 2020.
https://aashtojournal.transportation.org/maryland-seeks-to-deploy-data-to-battle-impaired-driving/
A learning collaborative of state agencies in Maryland is seeking to identify more ways to use data to reduce injuries and fatalities related to impaired driving, as well as traffic crashes in general. The collaborative comprises representatives from Maryland DOT, State Police and Department of Health, as well as the state's information technology group and toxicology division. Goals of the collaborative include:

- Improvement and expansion of the state's data system to track impaired driving offenders from arrest to adjudication to treatment
- Increase of timeliness and accessibility of Maryland's crash data through dashboards to give highway safety partners access to timely standardized data
- An analysis of Maryland's impaired driving program to determine needs regarding manpower, training, technology, legislation and regulation
- Creation of a process to increase judicial acceptance of DRE evidence in the absence of blood test results
- Development of educational programs directed at judiciary, prosecutors and law enforcement

Roadside Testing Practices and Screening Devices

The usability and reliability of several oral fluid drug screening devices are reviewed in this section:

- AquilaScan Oral Fluids Testing Detection System
- Dräger DrugCheck 3000 (DDC3000)
- Dräger DrugTest 5000 (DDT5000)
- Randox Evidence MultiSTAT
- Securetec DrugWipe S 5-Panel (DrugWipe)
- SoToxa (formerly Alere DDS2 Mobile System)

Note: The publications cited below use "Dräger" and "Draeger" to refer to the same screening devices.

Additional publications and resources about oral fluid screening reiterate earlier findings, namely, that while oral fluid collection is quick, easy and noninvasive, THC levels in biofluid were not reliable indicators of marijuana intoxication. A New York study considers the inequity of these screening devices, noting that to ensure social equity and justice, lawmakers, policymakers and law enforcement must "establish and implement the necessary mechanisms to protect against unwarranted arrests and overprosecution."

Also featured is Alabama's permanent oral fluid drug testing program. The program provides roadside screening and evidentiary confirmation oral fluid drug testing at the state's department of forensic sciences. Three screening devices are used by this program: SoToxa, DDT5000 and Randox Evidence MultiSTAT.

National Research and Guidance

Use of Oral Fluid to Detect Drugged Drivers: A Toolkit, Christine Moore, Bill Lindsey, Curt E. Harper and Jennifer R. Knudsen, AAA, 2022.
https://www.soft-tox.org/assets/docs/FINAL-OF-Report-04.11.22.pdf
The audience for this toolkit is described in the document's background:

> The implementation of an oral fluid drug screening or testing program should be a collaborative process involving multiple stakeholders within the administrative and criminal justice systems. This ensures that different perspectives are taken into account and important considerations of each system facet are addressed. An isolated approach limits success and has the potential to lead to unnecessary challenges or issues that could otherwise be easily resolved. This toolkit was designed with a collaborative approach in mind and provides guidance and key considerations to each of the primary stakeholder groups who must be consulted when exploring the possible initiation of an oral fluid program. These stakeholders include law enforcement, toxicologists and prosecutors. In addition to this core group, we recommend that broader outreach and consultation involve a variety of stakeholders who are identified within the toolkit.

Evaluation of On-Site Oral Fluid Drug Screening Technology, David Buzby, Amanda L.A. Mohr, Barry K. Logan and Kevin L. Lothridge, National Highway Traffic Safety Administration, April 2021.
https://www.draeger.com/Content/Documents/Content/Research-Report-of-On-Site-Oral-Fluid-Drug-Screening-Technology-NHTSA.pdf
Five field oral fluid drug testing devices were evaluated in the laboratory for "accuracy, reliability [and] performance to manufacturer specification, susceptibility to interference, and resistance of the consumables to extremes of temperature and humidity": Dräger DrugTest 5000 (DDT5000), Dräger DrugCheck 3000 (DDC3000), Securetec DrugWipe S 5-Panel (DrugWipe), Alere DDS2 Mobile System (DDS2) and AquilaScan Oral Fluids Testing Detection System. *From the abstract*:

> The DDT5000 and the DDC3000 performances, in aggregate, demonstrated performance consistent with the requirements of the ROSITA [Roadside Testing Assessment] group. The DDS2 data, in aggregate, met the performance requirements for ROSITA; however, its THC assay did not. None of the individual assays on the DrugWipe or the AquilaScan met the performance requirement of ROSITA, nor did the performance of either device in aggregate. The DDT5000, DDC3000 and DDS2 met the performance requirements for DRUID [Driving Under the Influence of Drugs, Alcohol and Medicines].

Related Resource:

> **Evaluation of On-Site Oral Fluid Drug Screening Devices**, Traffic Tech: Technology Transfer Series, National Highway Traffic Safety Administration, April 2021.
> https://rosap.ntl.bts.gov/view/dot/54910
> Findings of the final report presented in the previous citation are summarized in this brief. *From the results*:
>
> > There was variability in performance across devices as well as variability across drugs for devices. Each device tested had pros and cons. Detailed descriptions of each device's performance and functionality

are provided in the final report. It should be noted that all the devices we tested are screening devices. Results in field use would still require confirmatory testing.

"Field Sobriety Tests and THC Levels Unreliable Indicators of Marijuana Intoxication," National Institute of Justice, April 5, 2021.
https://nij.ojp.gov/topics/articles/field-sobriety-tests-and-thc-levels-unreliable-indicators-marijuana-intoxication
From the article's conclusions: RTI [International] concluded that, for [its] dosing study, THC levels in biofluid were not reliable indicators of marijuana intoxication. Many of their study participants had significantly decreased cognitive and psychomotor functioning even when their blood, urine and oral fluid contained low levels of THC. The researchers also observed that standardized field sobriety tests commonly used to detect driving under the influence of drugs or alcohol were not effective in detecting marijuana intoxication.

Differences in Cannabis Impairment and Its Measurement Due to Route of Administration, Megan Grabenauer, National Criminal Justice Reference Service, Office of Justice Programs, March 2021.
https://www.ojp.gov/pdffiles1/nij/grants/255884.pdf
From the publication: The purpose of this project was to better define the pharmacokinetics and associated pharmacodynamics of cannabis administered via vaporization and oral consumption in order to evaluate methods of determining whether or not an individual under the influence of cannabis is impaired.

Cannabis Impairment Detection: Workshop Handbook, National Traffic Law Center, National District Attorneys Association, 2020.
https://www.responsibility.org/wp-content/uploads/2020/11/FAAR_4090-Cannabis-Impairment-Detection-Workshop-Handbook_V-3-002.pdf
From Chapter 1, Planning the Workshop: The primary goal of the workshop is to provide students with information and live examples of people impaired by cannabis. Cannabis Impairment Detection Workshops (CIDW) were originally, and for the most part still are, designed to instruct the advanced Driving While Intoxicated or Impaired (DWI) enforcement officer. Ideally, those law enforcement officers are certified to administer the National Highway Traffic Safety Administration's (NHTSA) Standardized Field Sobriety Test (SFST) battery. Other students may include law enforcement officers who have completed the Advanced Roadside Impaired Driving Enforcement (ARIDE) course, or the Drug Recognition Expert (DRE) Training and prosecutors assigned to impaired driving cases. With nearly 18,000 law enforcement agencies in the United States, it is understandable that some agencies will not have officers certified in SFST, ARIDE or DRE. In circumstances such as this, lesser trained individuals should not be prohibited from attending this training.

"Drug Recognition Expert (DRE) Examination Characteristics of Cannabis Impairment," Rebecca L. Hartman, Jack E. Richman, Charles E. Hayes and Marilyn A. Huestis, *Accident Analysis and Prevention*, Vol. 92, pages 219-229, 2016.
https://www.theiacp.org/sites/default/files/all/3-9/302-Marijuana-DRE-Evaluations-Study.pdf
From the abstract: Our objective was to determine the most reliable DECP [Drug Evaluation and Classification program] metrics for identifying cannabis-driving impairment.
….
Conclusions: Blood specimens should be collected as early as possible. The frequently debated 5 g/L blood THC *per se* cutoff showed limited relevance. Combined observations on psychophysical and eye exams produced the best cannabis-impairment indicators.

State Research

Multiple States

"States Explore Oral Fluid Testing to Combat Impaired Driving," Samantha Bloch, Brief, National Conference of State Legislatures, May 10, 2021.
https://www.ncsl.org/transportation/states-explore-oral-fluid-testing-to-combat-impaired-driving
Summary insights presented in this brief include:

- Using oral fluid as a preliminary screening device to detect drugs at the roadside "is rapid, simple and noninvasive," identifying select drugs in under 15 minutes.

- A significant advantage of using oral fluid in roadside drug screening is the ability to collect a specimen at roadside shortly after an individual is stopped. The main disadvantage: the possibility of erroneous results.

Alabama

Oral Fluid Drug Testing Program, Toxicology Oral Fluid Drug Testing Program, Alabama Department of Forensic Sciences, undated.
https://adfs.alabama.gov/services/tox/toxicology-oral-testing-program
Alabama is the "first state to offer a comprehensive [o]ral [f]luid [d]rug [t]esting program at the State Crime Laboratory level. It is twofold: (1) screening at the roadside and (2) evidentiary confirmation oral fluid drug testing at ADFS [Alabama Department of Forensic Sciences]." Details about three state-approved screening devices are provided on the webpage: SoToxa (formerly Alere DDS2), Draeger Drug Test 5000 and Randox Evidence MultiSTAT.

Michigan

Oral Fluid Roadside Analysis Pilot Program—Phase II, Michigan State Police, January 2021.
https://www.michigan.gov/-/media/Project/Websites/msp/reports/phase_ii_oral_fluid_report.pdf?rev=911dc2c7042d444eb8918395a2211915
Results from Phase II of the pilot are presented beginning on page 12 of the report; marijuana results begin on page 24 of the report. Overall, researchers noted that "[o]ral fluid testing does not equal the 'Gold Standard' but has been found to be accurate for purposes of preliminary roadside testing." The report concludes that the Abbott SoToxa, the roadside screening tool used in the pilot, is "easy to use, requires minimum training" and provides results within 5 minutes of sample collection. However, according to the report summary (page 35 of the report), "[i]t is important to point out that a [r]oadside [o]ral [f]luid test result regardless of positive or negative does not determine if a driver is impaired or not impaired."

Related Resources:

Oral Fluid Roadside Analysis Pilot Program—Phase I, Michigan State Police, February 2019.
https://www.michigan.gov/-/media/Project/Websites/msp/reports/Oral_Fluid_Report.pdf?rev=f3f046036bc34e87b8113bced08ea484
This report contains statistical data relating to the outcomes of the oral fluid test instrument, comparative voluntary oral fluid sample independent laboratory analyses and Michigan State Police Forensic Science

Division evidentiary blood analyses. The report also includes recommendations for Phase II of this program and summary details about convictions resulting from the roadside drug testing.

"Michigan State Police Roadside Drug Testing Pilot Program Concludes; Findings Set for January Release," Gus Burns, MLive, October 7, 2020.
https://www.mlive.com/public-interest/2020/10/michigan-state-police-roadside-drug-testing-pilot-program-concludes-findings-set-for-january-release.html
Summary details of the Michigan State Police roadside drug testing two-year pilot study described above are provided in this article, including participating law enforcement agencies, operational costs, and oral fluid collection and analysis. *From the article*:

> Results from the initial pilot program revealed roadside tests often produced positive results for drugs that were later found not to be present in the person's blood. This occurred in 11 of 74 positive tests for THC, the psychoactive compound in marijuana; one of three positive tests for methamphetamine; six of 16 positive tests for amphetamines; and two of seven positive tests for cocaine.

New York

"Oral Fluids and Breathalyzers Fail as Detection Tools for Cannabis-Related Driving Impairment," Ari P. Kirshenbaum, Mishka Woodley, Brendan S. Parent, Andy Kaplan, Chris Lewis and Brent A. Moore, NYSBA *Health Law Journal*, Vol. 26, No. 3, pages 56-62, 2021.
https://www.researchgate.net/publication/356908242_Oral_Fluids_and_Breathalyzers_Fail_as_Detection_Tools_for_Cannabis-Related_Driving_Impairment
From the abstract: [Oral solutions and breathalyzer tests] are among the most widely available and used means of roadside detection. However, current psychopharmacological science strongly suggests that these biomarker tests are neither consistent nor reliable when cannabis detection is at issue. These identified deficiencies in oral solution and breathalyzer testing mechanisms are especially problematic since different legal standards for enforcing against cannabis impairment while driving are employed across the United States. Many of these standards not only encourage but require the use of scientifically unsupported cannabis-impairment tests by law enforcement agencies for efficiency purposes. Continued use of these tests in conjunction with existing legal standards will likely lead to overprosecution, and do not appear best suited to protect public health or promote individual rights. Law and policymakers concede that technological advancements and research specific to roadside testing mechanisms is still limited and requires time and further collection of data. In [an] effort to address such concerns, some states are focused on expanded research and law enforcement training, such as New York. Inconsistent and unreliable roadside testing has grave implications for populations of individuals that some cannabis legalization provisions are intended to benefit. Thus, to ensure social equity and justice it is critical that lawmakers, policymakers and law enforcement professionals alike strategically establish and implement the necessary mechanisms to protect against unwarranted arrests and overprosecution.

Vermont

"Oral Fluid Testing for Impaired Driving Enforcement," John Flannigan, Stephen K. Talpins and Christine Moore, *The Police Chief*, January 2017.
https://shso.vermont.gov/sites/ghsp/files/documents/Oral%20Fluid%20Testing%20for%20Impaired%20Driving%20Enforcement.pdf
This article presents "the advantages and pitfalls of testing drivers for drugs using biological samples, specifically oral fluids …." *From the recommendations*:

On-site oral fluid testing devices are not perfect; however, they provide a viable and cost-effective way to identify drugged drivers proximate to the traffic stop. The authors recommend that officers screen all impaired drivers for drugs using on-site devices.

It is also recommended that jurisdictions consider replacing blood and urine testing with oral fluid laboratory tests for four reasons. First, [legal cases] make it difficult for officers to obtain blood (and possibly urine) samples without a warrant. However, those same cases suggest that oral fluid testing doesn't carry those legal challenges. Second, officers can collect evidentiary samples for submission to the laboratory at roadside, which minimizes the possibility that the DUI [driving under the influence] subjects will eliminate the drugs from their system. Third, positive oral fluid test results of a parent drug indicate recent usage only, potentially correlating to the duration of drug effect, and do not indicate use from days ago. Fourth, it appears that states may criminalize oral fluid test refusals, unlike blood tests, thus increasing test compliance rates.

Wisconsin

"Drugged Driving in Wisconsin: Oral Fluid Versus Blood," Lorrine Edwards, Katherine Smith and Theodore Savage, *Journal of Analytical Toxicology*, Vol. 41, No. 6, pages 523-529, July 2017.
https://academic.oup.com/jat/article/41/6/523/3964594
From the abstract: Oral fluid (OF) specimens of 104 subjects are collected using the Alere DDS2, then screened for six drug categories (amphetamine, benxodiazepines, cocaine, methamphetamine, opioids, and tetrahydrocannabinol (THC)) and compared to evidentiary blood specimens collected from subjects arrested for operating while intoxicated (OWI). The results show a positive drug screening result in 55% of the [OF] specimens and 48% of the blood specimens, with THC appearing most frequently in both OF and blood specimens. Alere DDS2 results are found to be generally consistent with the results of the evidentiary blood specimen screenings, and 40% of subjects with BAC over .10g/100 mL tested positive for one or more drug categories. The authors conclude that the Alere DDS2 device may serve to assist law enforcement with the identification of DUID [driving under the influence of drugs] and providing probable cause for DUID arrests.

Related Research

"The Failings of *Per Se* Limits to Detect Cannabis-Induced Driving Impairment: Results From a Simulated Driving Study," Thomas Arkell, Tory Spindle, Richard Kevin, Ryan Vandrey and Iain McGregor, *Traffic Injury Prevention*, Vol. 22, Issue 2, February 2021.
Citation at https://www.tandfonline.com/doi/abs/10.1080/15389588.2020.1851685?journalCode=gcpi20
From the abstract: Many jurisdictions use *per se* limits to define cannabis-impaired driving. Previous studies, however, suggest that THC concentrations in biological matrices do not reliably reflect cannabis dose and are poorly correlated with magnitude of driving impairment. The authors first review a range of concerns associated with *per se* limits for THC. The authors then use data from a recent clinical trial to test the validity of a range of extant blood and oral fluid THC *per se* limits in predicting driving impairment during a simulated driving task. Simulated driving performance was assessed in 14 infrequent cannabis users at two time points (30 min[utes] and 3.5 h[ours]) under three different conditions, namely controlled vaporization of 125 mg (i) THC-dominant (11% THC; <1% CBD), (ii) THC/CBD equivalent (11% THC; 11% CBD), and (iii) placebo (<1% THC and CBD) cannabis. Plasma and oral fluid samples were collected before each driving assessment. The authors examined whether *per se* limits of 1.4 and 7 ng/mL THC in plasma (meant to approximate 1 and 5 ng/mL whole blood) and 2 and 5 ng/mL THC in oral fluid reliably predicted impairment (defined as an increase in standard deviation of

lateral position (SDLP) of >2 cm relative to placebo). For all participants, plasma and oral fluid THC concentrations were over the *per se* limits used 30 min[utes] after vaporizing THC-dominant or THC/CBD equivalent cannabis. However, 46% of participants failed to meet SDLP criteria for driving impairment. At 3.5-h[our] post-vaporization, 57% of participants showed impairment, despite having low concentrations of THC in both blood (median = 1.0 ng/mL) and oral fluid (median = 1.0 ng/mL). The authors highlight two individual cases illustrating how (i) impairment can be minimal in the presence of a positive THC result, and (ii) impairment can be profound in the presence of a negative THC result. There appears to be a poor and inconsistent relationship between magnitude of impairment and THC concentrations in biological samples, meaning that *per se* limits cannot reliably discriminate between impaired from unimpaired drivers. There is a pressing need to develop improved methods of detecting cannabis intoxication and impairment.

Drug Recognition Expert/Drug Recognition Evaluator Programs and Training

Citations in this section provide an overview of the DECP, which offers DRE training and certification to law enforcement professionals and "educates prosecutors and toxicologists about the DRE process and drug categories." The DECP has been adopted by all 50 U.S. states and the District of Columbia, as well as multiple international locations. DRE resources and training information are included in this section along with a summary of selected state DRE program websites.

National Resources

Drug Recognition Experts (DREs), International Association of Chiefs of Police, undated.
https://www.theiacp.org/drug-recognition-experts-dres
From the website:

> A drug recognition expert or drug recognition evaluator (DRE) is a police officer trained to recognize impairment in drivers under the influence of drugs other than, or in addition to, alcohol. The International Association of Chiefs of Police (IACP) coordinates the International Drug Evaluation and Classification (DEC) Program with support from the National Highway Traffic Safety Administration (NHTSA) of the U.S. Department of Transportation. In addition to officers, who are certified as DREs, the DEC Program educates prosecutors and toxicologists on the DRE process and the drug categories.

Figure 1, available at https://www.theiacp.org/states-and-countries-with-dres, provides a state-by-state overview of the number of DREs in each state and the year the DECP was launched. (According to the graphic, data is current as of December 2023.)
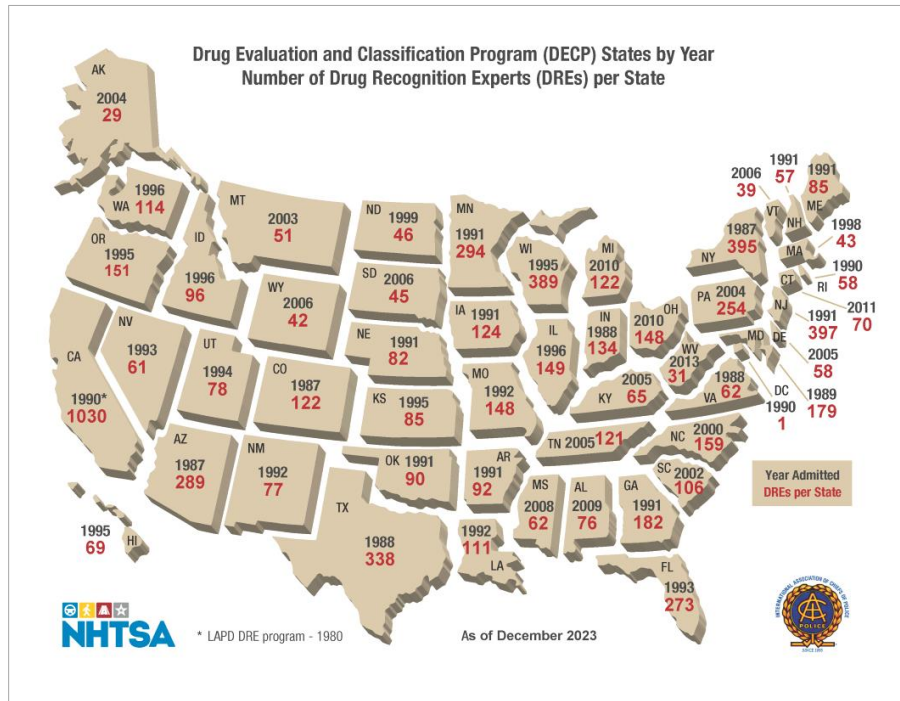
Figure 1. Drug Evaluation and Classification Program Participation by Year and Number of DREs

(*Source*: International Association of Chiefs of Police.)

Resources at this site present the 12-step protocol for assessing DUID suspects; the seven drug classifications; states and countries with DREs; and the DRE Marketing and Recruiting Toolkit, which describes the DRE training process and its prerequisites.

Related Resources:

DRE Marketing and Recruiting Toolkit, International Association of Chiefs of Police, August 2023.
https://www.theiacp.org/sites/default/files/2023-08/DRE_MarketingandRecruiting_Toolkit.pdf
This document "provides resources for new DREs and agencies establishing a DRE program." Topics include funding options for DECPs, DRE court decisions regarding impaired driving and the need for DREs, financial incentives for new DREs and DRE agencies, a model DRE policy, and best practices for setting up a new agency.

DRE Training, International Association of Chiefs of Police, undated.
https://www.theiacp.org/dre-training
From the website: The DEC Program trains law enforcement officers and other approved public safety officials as DREs through a three-phase training process:

1. DRE Pre-School (16 hours)
2. DRE School (56 hours)
3. DRE Field Certification (Approximately 40 to 60 hours)

The training relies heavily on Standardized Field Sobriety Tests (SFSTs), which provide the foundation for the DEC Program. Once trained and certified, DREs become highly effective officers skilled in the detection and identification of persons impaired by alcohol and/or drugs. DREs are trained to conduct a systematic and standardized 12-step evaluation consisting of physical, mental and medical components.

State Coordinators, International Association of Chiefs of Police, undated.
https://www.theiacp.org/state-coordinators
From the website: The DRE state coordinator is responsible for ensuring the International Standards of the Drug Evaluation and Classification Program are followed and oversees the training, certification procedures, and both certifies and recertifies drug recognition experts in their state.

Drug Evaluation and Classification Program, Advanced Roadside Impaired Driving Enforcement Resources, National Highway Traffic Safety Administration, undated.
https://www.nhtsa.gov/enforcement-justice-services/drug-evaluation-and-classification-program-advanced-roadside-impaired
The DECP is "recognized by all 50 states in the U.S., Canada and the United Kingdom." DRE, DECP and ARIDE participant and instructor manuals and presentations are accessible at this site.

Drug Recognition Expert Data System, National Highway Traffic Safety Administration, undated.
https://dredata.nhtsa.gov/login/auth
DREs use this data system to report drug-impaired driving evaluation and toxicology data.

IACP DEC Program Coordinators, International Association of Chiefs of Police, May 2, 2024.
https://www.theiacp.org/sites/default/files/DECP_Website_Docs/DRE_State_Coordinator_List.pdf
Contact information is provided for state DECP coordinators.

State Resources

Multiple States

Table 2 presents DRE program websites for selected states. Following the table is a more comprehensive review of Colorado resources.

Table 2. State Drug Recognition Expert Information Websites

State	Resource	Website
Alaska	Alaska Drug Evaluation and Classification Program	dot.alaska.gov/stwdplng/hwysafety/DRE.shtml
Arizona	DRE Program	gohs.az.gov/impaired-driver-training/dre-program
California	Drug Recognition Evaluator Program	www.chp.ca.gov/programs-services/for-law-enforcement/drug-recognition-evaluator-program
Colorado	Drug Recognition Experts Program	www.codot.gov/safety/dre (Scroll to "Drug Recognition Experts (DRE) Program.")
Connecticut	Drug Recognition Expert Training Application	portal.ct.gov/-/media/POST/Training-Documents/In-Service/2023/10---October/2023-CT-DRE-School-Application.pdf
Illinois	Impaired Driving Training Courses	www.uis.edu/sites/default/files/inline-images/IMPAIRED%20DRIVING%20TRAINING%20COURSES.pdf

State	Resource	Website
Maine	Drug Recognition Expert	www.maine.gov/dps/bhs/law-enforcement/drug-recognition-expert
Maryland	DRE Resource Site	mddre.maryland.gov/
Massachusetts	• Massachusetts Drug Recognition Expert Association • Highway Safety Training	massdre.org/ www.mass.gov/highway-safety-training
Michigan	Drug Recognition Expert Program	www.michigan.gov/msp/divisions/ohsp/law-enforcement-programs/dre-drug-recognition-expert-program
Minnesota	The International Standards of the Drug Evaluation and Classification Program	dps.mn.gov/divisions/msp/about/dre/Documents/drug-influence-report.pdf
Missouri	Drug Impaired Driving/DRE	mosafetycenter.com/grants/drug-impaired-driving-dre/
Montana	SFST, ARIDE and DRE: Training for Law Enforcement	www.mdt.mt.gov/visionzero/plans/pts-sfst.aspx
New Jersey	• DRE resources • New Jersey Drug Recognition Expert Guide	nj.gov/njsp/division/investigations/alcohol-drug-testing.shtml#dre (Scroll to "Drug Recognition Expert.") www.njsacop.org/content.asp?contentid=235
New Mexico	New Mexico DRE Program	nmdre.org/
New York	DRE Program Resources	trafficsafety.ny.gov/dre-program-resources
Oregon	Oregon Drug Evaluation and Classification Program (Application)	www.oregon.gov/osp/Docs/DECP-DRE-School-Application.020117.pdf
Vermont	Drug Recognition Expert Program	shso.vermont.gov/programs/dre
Virginia	Virginia Drug Evaluation and Classification Program (Application)	www.smartsafeandsober.org/forms/DRE%20Application%202020%20DMV.pdf
Washington	Breath Test Program: DRE Forms and Manuals	www.wsp.wa.gov/breathtest/dredocs.php

Colorado Resources

Drug Recognition Experts (DRE) Program, Safety, Colorado Department of Transportation, undated.
https://www.codot.gov/safety/dre
Details about the Colorado DOT DRE program and other efforts to address impaired driving are available on this webpage, including:

- **International Standards for Impaired Driving Programs (DRE, SFST, ARIDE)**, International Association of Chiefs of Police, September 2021.
  https://www.codot.gov/safety/dre/assets/international-standards-of-the-decp.pdf

- **Colorado Enhanced Standards for the Standardized Field Sobriety Testing (SFST), Advanced Roadside Impaired Driving Enforcement (ARIDE), and Drug Evaluation and Classification Programs (DRE)**, Colorado Department of Transportation, January 2022.
  https://www.codot.gov/safety/dre/assets/enhanced-colorado-dre-standards.pdf

- **DRE Face Sheet (Colorado Drug Influence Evaluation Facesheet)**, Colorado Department of Transportation, May 2012.
  https://www.codot.gov/safety/dre/assets/colorado-dre-facesheet

- **SFST, ARIDE and DRE Information Training Guide**, Colorado Department of Transportation, undated.
  https://www.codot.gov/safety/dre/sfst-aride-dre-info-training-grid

- **Colorado Impaired Driving Newsletter**, Colorado Department of Transportation, undated.
  https://mailchi.mp/state.co.us/colorado_impaireddrivingnews

Related Resource:

Safety, Colorado Department of Transportation, undated.
https://www.codot.gov/safety
Access to Colorado DOT's safety data, initiatives and other resources is available from this webpage.

Chapter 3 Survey Findings

Survey Approach

Two surveys gathered information for this TRS:

- **Survey 1**. This survey sought information from the states and district where recreational use of marijuana had been legal for one year or more at the time of the survey: Alaska, Arizona, California, Colorado, Connecticut, District of Columbia, Illinois, Maine, Massachusetts, Michigan, Montana, Nevada, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, Virginia and Washington.

- **Survey 2**. This survey sought information from three states recently legalizing recreational marijuana use to investigate anticipatory impacts to traffic safety: Delaware, Maryland and Missouri.

Two respondent groups received both surveys:

- State transportation agency members of the AASHTO Committee on Traffic Engineering
- Public safety agency contacts identified by the Technical Advisory Panel for this TRS

Survey questions are provided in Appendix A. The full text of survey responses, including contact information for respondents, has been provided to MnDOT in a supplement to this report.

The two surveys received a total of 11 responses, described below.

Survey 1: States with Longer-Term Marijuana Legalization (seven responses)

Public Safety Agencies

- Division of Alaska State Troopers
- Arizona Governor's Office of Highway Safety
- Michigan State Police
- New Jersey State Police (partial response)
- Vermont Criminal Justice Council

State DOTs

- Illinois DOT
- Rhode Island DOT

Survey 2: States Anticipating Impacts of Recent Marijuana Legalization (four responses)

Public Safety Agencies

- Delaware Office of Highway Safety
- Maryland State Police
- Missouri Safety Center

State DOTs

- Missouri DOT

Results from Survey 1 are presented immediately below, under **States with Longer-Term Marijuana Legalization**; Survey 2 findings are presented under **States Anticipating Impacts of Recent Marijuana Legalization,** beginning on page 52.

States with Longer-Term Marijuana Legalization

Introduction

In 2012, Colorado and Washington were the first states in the nation to legalize the use of recreational marijuana. Alaska's February 2015 legalization of recreational marijuana provides the longest period of post-legalization experience among the states participating in this TRS survey. (Alaska previously legalized medical use of marijuana in 1999.)

The other responding states legalized recreational use of marijuana within the past five to six years, beginning with Michigan and Vermont in 2018. Both states previously legalized medical use of marijuana, in 2008 and 2004, respectively. The other responding states legalized recreational use in the 2020s:

- *Arizona*: Medical use of marijuana legalized in 2010; recreational use legalized in November 2020.
- *Illinois*: Medical use of marijuana legalized in 2014; recreational use legalized in January 2020.
- *New Jersey*: Medical use of marijuana legalized in 2010; recreational use legalized in January 2021.
- *Rhode Island*: Medical use of marijuana legalized in 2006; recreational use legalized in May 2022.

For some responding states, the relatively short time since legalization of recreational marijuana may have limited the level of detail provided in survey responses.

Survey respondents submitted their responses during November and December 2023. Findings from the survey are presented below in these topic areas:

- Traffic crashes after legalization
- Impacts identified by law enforcement
- Roadside testing practices
- Training
- Drug recognition experts
- Effective strategies or measures
- Lessons learned and best practices

Traffic Crashes After Legalization

Five of the seven responding agencies reported an increase in the number of fatal traffic crashes since legalization of marijuana, with those increases ranging from 16% (*Michigan*) to 22.3% (*Illinois*). Vermont and Michigan also provided data on traffic fatalities, reporting increases of 12% and 15%, respectively. These results are contrasted with the number of injury crashes reported by respondents, which decreased for two of the four agencies with data to report—a decrease of 7% (*Michigan*, injury crashes only; does not include serious injury) and 7.9% (*Illinois*, serious injury crashes). The Alaska and Arizona respondents reported no change in the number of serious injury crashes. Table 3 summarizes respondent-provided data on traffic crashes after legalizing recreational marijuana use.

Table 3. Fatal Traffic and Serious Injury Cashes After Legalizing Marijuana

State	Month and Year Recreational Marijuana Use Legalized	Since Legalization, the Number of Fatal Traffic Crashes Has:	Since Legalization, the Number of Serious Injury Crashes Has:
Alaska	February 2015	Not changed.	Not changed.
Arizona	November 2020	Increased by approximately 18%.	Not changed.
Illinois	January 2020	Increased by 22.3%.	Decreased by 7.9%
Michigan	December 2018	Increased (comparing 2018 with 2022): • Fatalities: 15% • Fatal crashes: 16%	Decreased by 7% (injury crashes only; does not include serious injury).
New Jersey	January 2021	The change is not known.	The change is not known.
Rhode Island	May 2022	Increased.	The change is not known.
Vermont	July 2018	Increased (comparing 2018 with 2022): • Fatalities: 12% • Fatal crashes: 21%	The change is not known. *From the respondent*: Suspect an increase, but do not have the data at this time.

Impacts Identified by Law Enforcement

Respondents provided anecdotal or other evidence law enforcement agencies have gathered since legalization of recreational marijuana, summarized below in three topic areas:

- Driver behavior
- New difficulties or challenges with enforcement
- Unexpected positive outcomes with enforcement

Driver Behavior

Understanding how driver behavior may change as a result of the legalization of recreational marijuana can help prepare law enforcement agencies tasked with enforcing a new law.

Four of the seven respondents highlighted a possible correlation of recreational marijuana use with speeding. The respondent from Arizona Governor's Office of Highway Safety reported that "drivers under the influence of cannabis are often stopped for speeding." Similarly, the Michigan State Police respondent reported "a huge increase in speed" across the motoring public. While increases in speed are also noted by Rhode Island DOT, the respondent commented that the COVID-19 pandemic may have played a role given the slight reduction in enforcement during that period. The Rhode Island DOT respondent also noted that "[c]annabis users think it is

legal to smoke and then drive because recreational use is legal for anyone over 21. Anecdotally, they think they drive better and at reduced speeds." In Vermont, speed-related issues and crashes have increased.

The Illinois DOT respondent reported on other driver behaviors, noting that "top DUI officers in Illinois have reported observing an increase in cannabis use among drivers, illicit transportation of cannabis and instances of polydrug use." The respondent commented further that such an increase "is highly relative in this context, given that cannabis use has been prevalent for decades, and adult use has only been legal since 2020," and the limited time for observation may not permit the identification of trends. The state's documented increase in cannabis-involved fatalities and fatal crashes over the last five years "raises the possibility that legalization has made the drug more accessible and created a false sense of harmlessness concerning cannabis-impaired driving."

New Difficulties or Challenges with Enforcement

Respondents shared a range of challenges associated with enforcement of marijuana-related traffic laws.

Detection

- Detection can be challenging, though most officers are trained in ARIDE. The state has experienced a decrease in overall enforcement since the COVID-19 pandemic with fewer officers on the road (*Vermont Criminal Justice Council*).
- With no breathalyzer for cannabis, no *per se* law and a 70% chemical test refusal rate in the state, suspected impaired drivers are not submitting to any test or evaluation (*Rhode Island DOT*).

Legal Challenges

- An adverse court of appeals ruling stated that there is no evidence that marijuana impairs the ability to drive (*Michigan State Police*).
- Challenges include prosecutor training, evidence-related issues (primarily toxicological concerns, both in testing and obtaining blood samples), judicial education (knowledge of laws and evaluation requirements for DUI offenders), and the "intricacies associated with THC concentrations relative to impairment" (*Illinois DOT*).
- Defense experts may challenge SFSTs in court by saying such tests were validated on alcohol-impaired subjects and not by subjects impaired by marijuana (*Arizona Governor's Office of Highway Safety*).
- Enforcement law has not changed, nor has implied consent changed to include a DRE evaluation or urine or blood sampling (*New Jersey State Police*).
- State statute does not include a *per se* nanogram limit, which results in prosecution-related issues (*Division of Alaska State Troopers*).

Training and Public Education

- The state is failing to provide adequate public education (*Illinois DOT*).
- Providing officer training (DRE, ARIDE, SFST) is challenging (*Illinois DOT*).

Unexpected Positive Outcomes with Enforcement

A decrease in injury crashes, increased detection and support from critical stakeholders are among the positive outcomes respondents reported when enforcing recent marijuana legislation.

Lower Crash Counts

- Total injury crashes are down (*Michigan State Police*).

Increased Detection

- Detection has increased, resulting in more DRE calls and drug impairment evaluations (*Vermont Criminal Justice Council*).

Enhanced Support from Authorities

- "Authorities perceive this issue as persistent and likely to exacerbate before improvements emerge. This recognition may spur the development of new and innovative strategies to address the challenge effectively. The act of bringing marijuana to the forefront suggests that the state is now better positioned to address a long-standing road safety challenge" (*Illinois DOT*).
- Many law enforcement agencies are relying on DREs for technical advice; most police chiefs support the DRE program and other impaired driving initiatives (*Rhode Island DOT*).

Roadside Testing Practices

Respondents from two states—Arizona and Illinois—described their agencies' roadside testing practices; neither state conducted a roadside testing pilot. The most significant difference between the two testing programs is the use of oral fluid screening devices: Arizona uses them; Illinois does not. Tables 4 and 5 provide descriptions of the roadside testing practices in Arizona and Illinois, respectively.

Table 4. Roadside Testing Practices in Arizona

Roadside Testing Practice	Description
Use of Oral Fluid Devices	SoToxa is the only roadside screening device used.
Characterizing Roadside Test Results	Test results from the SoToxa screening device are considered reliable and consistent.
DRE Participation in Testing	The state's DREs participate in roadside testing and report on the data collected during roadside testing in DRE evaluations that are processed through the Institute for Traffic Safety Management and Research, a "not-for-profit, university-based research center dedicated to improving highway safety" that is affiliated with the University at Albany's Rockefeller College of Public Affairs and Policy.
Collecting and Processing Results	Each law enforcement agency is responsible for collecting and reporting testing data. The respondent noted no challenges associated with isolating marijuana use under current screening and testing methods.

Table 5. Roadside Testing Practices in Illinois

Roadside Testing Practice	Description
Use of Oral Fluid Devices	The Illinois State Police has conducted tests on various oral fluid devices and determined them to be inadequate. Although Illinois law permits the use of oral fluid devices by law enforcement, as of now, Illinois DOT is not aware of any law enforcement agency in Illinois employing them in the field.
Characterizing Roadside Test Results	SFSTs can identify impairment regardless of the substance involved. The respondent noted that when conducted correctly, this testing protocol "offers a significantly higher level of evidence for confirming or refuting a driver's impairment. In contrast, oral fluid instruments lack precision, evidential reliability and approval from NHTSA."
DRE Participation in Testing	The state's DREs participate in roadside testing. Although the state highway safety office provides funding for DRE call-outs, securing funding and effectively allocating resources across jurisdictions can be challenging, as can ensuring sufficient coverage across a large state with an adequate number of DRE-trained officers.
Collecting and Processing Results	*From the respondent*: Collecting chemical evidence poses one of the most significant challenges in combating cannabis-impaired drivers. The obstacles are plentiful, ranging from Illinois law not aligning with scientific advancements to underresourced forensic toxicology labs. While Illinois is making strides in increasing its law enforcement forensic phlebotomists, progress remains slow. The expertise of forensic phlebotomists from Minnesota could prove to be a tremendous asset in addressing these challenges.

Training

Law enforcement personnel involved in traffic stops involving drivers who may be under the influence of legalized recreational marijuana may have received different types and degrees of training. Three common types of training and preparation are briefly described below:

- Advanced roadside impaired driving enforcement
- Standardized field sobriety test
- Drug Evaluation and Classification Program and drug recognition expert

Citations for the resources described in this section appear under **References** beginning on page 46.

Advanced Roadside Impaired Driving Enforcement

The February 2023 ARIDE Instructor Guide presents a training curriculum that "prepares police officers and other qualified persons to conduct various drug-impairment detection tests at roadside for use in drugged-driving investigations." The ARIDE 16-hour, stand-alone course is self-described to "serve as a bridge between" SFST and DRE training.

Typical participants are law enforcement officers with experience using SFSTs in the field; other participants such as prosecutors and toxicologists may audit the course. Completing the course is expected to increase familiarity with the DECP and "facilitate better communication and transfer of critical roadside indicators of impairment to the evaluating DRE officer for a more complete and accurate assessment of the impairment."

ARIDE training is not a substitute for DRE training and will not certify a participant as a DRE.

Standardized Field Sobriety Test

Described in the ARIDE Instructor Guide as "the cornerstone for impaired driving training and enforcement," the SFST protocol is also the foundation for ARIDE and DECP training. The SFST protocol includes:

- Horizontal gaze nystagmus (defined as "involuntary jerking of the eyes occurring as the eyes gaze to the side")
- Walk and turn
- One leg stand

As the ARIDE Instructor Guide notes, SFSTs are "part of the overall DWI detection process which includes three phases: (1) Vehicle in Motion; (2) Personal Contact; and (3) Pre-arrest Screening."

Drug Evaluation and Classification Program and Drug Recognition Expert

Coordinated by the IACP and supported and funded by NHTSA, pilot DECs were launched in 1987 in Arizona, Colorado, New York and Virginia. Today, DECPs exist in all 50 states and the District of Columbia.

Law enforcement officers completing all phases of the DECP are known as a DRE. DRE certification requires completion of 72 hours of classroom training and field certifications, and passing a comprehensive final exam. Retaining this certification requires the DRE officer to participate in continuing education, complete a recertification every two years and meet any other requirements established for the national DECP or specific state requirements.

DRE-certified officers follow a 12-step evaluation protocol and obtain other evidence as needed. As described by the IACP, the 12-step protocol is designed to determine:

- Whether or not the suspect is impaired; if so,
- Whether the impairment relates to drugs or a medical condition; and if drugs,
- What category or combination of categories of drugs is the likely cause of the impairment.

IACP identifies each element of the 12-step process to assess DUID suspects as follows:

1. Breath alcohol test
2. Interview of the arresting officer
3. Preliminary examination and first pulse
4. Eye examination
5. Divided attention psychophysical tests
6. Vital signs and second pulse
7. Dark room examinations
8. Examination for muscle tone
9. Check for injection sites and third pulse
10. Subject's statements and other observations (Miranda warning)
11. Analysis and opinions of the evaluator
12. Toxicological examination (chemical tests that provide additional evidence to support the DRE's opinion)

Respondents' Drug Recognition Expert Training

The Arizona Governor's Office of Highway Safety provides annual statewide DRE in-service trainings; Illinois DOT conducts up to three DRE schools annually. Vermont Criminal Justice Council provides two DRE recertification training days per year.

Michigan State Police hold a one-day DRE conference each year. Dr. Marilyn Huestis, chief of chemistry and drug metabolism at the National Institute on Drug Abuse within the National Institutes of Health, participated in a recent conference to provide training for the agency's lab and DREs.

Rhode Island DOT requires its DREs to complete eight hours of impaired driving in-service training every two years. As the respondent noted, "We take that responsibility very seriously and make every effort to give our DREs more and more tools to make their DRE jobs easier." The state's DREs are also notified weekly of additional training and webinars that are available through other sources.

Respondents' Other Training

Michigan State Police supports its DRE instructors with attendance at IACP's annual Impaired Driving and Traffic Safety (IDTS) Conference. Other training opportunities afforded Michigan's DRE instructors include:

- *Indiana University's Borkenstein Courses*. These courses were founded in 1958 by the inventor of the Breathalyzer, Indiana University Professor Robert F. Borkenstein. The course website describes its mission: *The mission of this course as envisioned by our Founder is to educate individuals involved in the implementation of scientific programs of testing and calibration for blood and breath alcohol programs.*

- *Medical Foundations of Visual Systems Testing*. This course provides "the medical and scientific foundations of the various components of the DRE protocol, including the eye tests, vital signs and psychophysical and divided attention tasks." As the university offering this course notes, "Many courts will not qualify a DRE as an expert unless he or she has received training from a medical professional."

Michigan's DRE instructors attending these educational events are expected to share the knowledge gained with other DREs in their area. Vermont Criminal Justice Council also sends several DREs to IACP's IDTS conference, Borkenstein courses, webinars and other trainings.

References

Advanced Roadside Impaired Driving Enforcement Instructor Guide, National Highway Traffic Safety Administration, International Association of Chiefs of Police and Transportation Safety Institute, February 2023.
https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-04/15941-2023_ARIDE_Instructor%20Guide-tag.pdf
Nine sessions are included in this curriculum:

- Introduction and overview "Drugs and Highway Safety"
- SFST review
- SFST proficiency examination
- Drugs in the human body
- Observation of the eyes and additional tests for drug impairment
- Seven drug categories
- The effects of drug combinations
- Pre- and post-arrest procedures
- Written examination and program conclusion

12 Step Process, International Association of Chiefs of Police and Transportation Safety Institute, undated.
https://www.theiacp.org/12-step-process
This webpage describes the standardized, systematic 12-step DRE evaluation for examining a DUID suspect.

The Borkenstein Courses, Center for Studies of Law in Action, Indiana University, undated.
https://bcahs.indiana.edu/about/history/index.html
This website describes course offerings that "provide students with the latest information in the field of chemical tests for breath alcohol and other drugs."

IACP Impaired Driving and Traffic Safety (IDTS) Conference, International Association of Chiefs of Police, undated.
https://www.theiacp.org/IDTSconference
This conference is described as "the largest training conference for drug recognition experts and traffic safety professionals. Conference attendees include DREs, law enforcement officers (state police, highway patrol, county, municipal, governmental, sheriffs, and other agencies), crash investigators, supervisors/administrators, prosecutors, toxicologists, laboratory personnel, traffic safety professionals, among others."

Medical Foundations of Visual Systems Testing, Institute of Police Technology and Management, University of North Florida, undated.
https://www.campusce.net/iptmtf/course/course.aspx?C=43
This 24-hour, in-person course is intended for officers who are certified DREs, prosecutors who handle DUI and drug cases, DUI instructors and SFST practitioners.

Drug Recognition Experts

A DRE is described by the IACP as "skilled in detecting and identifying persons under the influence of drugs and in identifying the category or categories of drugs causing the impairment." To obtain the DRE certification, an individual must successfully complete the training requirements associated with the DECP established by the IACP and NHTSA. The DECP has been adopted by all 50 U.S. states and the District of Columbia.

Described below are respondents' experiences with DREs—how many a state employs, how many are needed and how that determination is made, and the benefits and challenges of using DREs.

General Characteristics of Drug Recognition Expert Programs

Given the significant differences in total population among the responding states, the number of DREs that a state employs varies widely among respondents, from 37 to 40 (*Alaska* and *Vermont*, respectively) to 433 and 546 (*Arizona* and *New Jersey*, respectively).

All responding states but New Jersey identified a need for more DREs and provided an estimate of the DREs the state prefers to employ. The Rhode Island DOT respondent reported that, ideally, each law enforcement agency in the state would have one DRE available for every shift on every day, including weekends and holidays. For states indicating a preferred number of DREs, the increase in DRE staffing that preferred number would require ranged from 35% (*Alaska*) to 94% and 95% (*Rhode Island* and *Michigan*, respectively). Table 6 presents general characteristics of respondents' DRE programs.

Table 6. Characterization of Respondents' Drug Recognition Expert Programs

State	DRE Program Launch Year	# of DREs in State Employ[1]	Need for Additional DREs?	Preferred # of DREs in State Employ	Percentage Increase to Reach Preferred # of DREs
Alaska	2004	37	Yes	50	35%
Arizona	1987	433	Yes	600	39%
Illinois	1996	170	Yes	300 (next 5 years)	76%
Michigan	2010	128	Yes	200 to 250	95%
New Jersey	1991	546	No	N/A	N/A
Rhode Island	1990	62	Yes	120	94%
Vermont	2006	40	Yes	60	50%

N/A Not applicable.

1   Survey respondents provided the number of DREs in state employ that appears in Table 6. This data is inconsistent with the data appearing in Figure 1, Drug Evaluation and Classification Program Participation by Year and Number of DREs, sourced from IACP. In all cases, the respondent-provided number in Table 6 is higher than the number appearing in Figure 1.

Determining the Optimum Number of Drug Recognition Experts

Respondents' practices to determine the number of DREs needed for a particular state vary, with only one agency employing an exclusively data-driven practice: The Arizona Governor's Office of Highway Safety applies a ratio to area population to identify the number of DREs needed.

More generalized practices are applied by the Vermont Criminal Justice Council, which attempts a geographical distribution and considers demand when determining DRE placement. Currently, approximately 40% of DRE requests in Vermont go unanswered. The Division of Alaska State Troopers employs no formal process other than the performance measures identified in grant funding. Other examples include New Jersey State Police's regional allocation and Michigan State Police's desire to have at least one DRE in each of the state's 83 counties. While some of the more metropolitan counties in the state can have up to 20 DREs on staff, several counties in Michigan are currently without DREs and others are "not supportive" of the DRE program.

Each of Rhode Island's 39 cities and towns assesses its own needs. Rhode Island DOT relies on local police chiefs to assess the extent of the local impaired driving problem and identify the preferred approach to detection. The DOT can then provide funding for training. Rhode Island DOT does not attempt to make a statewide assessment of where drug-impaired driving is most prevalent.

Increasing the number of DREs is more than a law enforcement objective for Illinois DOT. The agency collaborates with the state's DECP coordinator to establish an "ambitious goal" based on the availability of interested and qualified officers and the state's capacity to conduct DRE schools. Illinois DOT also maintains a goal to train as many officers as possible each year in ARIDE.

Drug Recognition Expert Program Benefits

All seven respondents highlighted the importance of a DRE serving as an expert witness during prosecutions and providing evidence of impairment. The respondent from the Arizona Governor's Office of Highway Safety noted that "prosecutors prefer to have a DRE on all drug-impaired DUI cases or they are reluctant to prosecute." Similarly, in Vermont, case law makes it difficult to bring a DUI drug case without an expert opinion.

Providing expert testimony is not the only benefit of DREs. As the Illinois DOT respondent noted, a DRE's training allows for "superior skills in evaluation" and provides the capability to "scientifically and extremely accurately [establish] a driver's drug impairment." The Rhode Island DOT respondent highlighted other benefits DREs bring to managing the traffic-related impacts of legalization of recreational marijuana, including:

- Using skills developed in DRE-related training to detect medical ailments that could possibly mirror behavior like those exhibited when under the influence of drugs
- Applying an advanced understanding of standardized testing, which is helpful to the prosecution of drug-impaired driving cases
- Serving as an opportunity for law enforcement to specialize in advanced impaired driving testing and field observations

Drug Recognition Expert Program Challenges

Respondents reported challenges associated with the use of DREs in the areas of program administration, staffing and training.

Program Administration

- Effectively managing the program (*Vermont Criminal Justice Council)*.
- Ensuring the agency making the arrest calls out the DRE (*Michigan State Police*).
- High refusal rate: Seventy percent of suspected impaired drivers are unwilling to comply with a request to participate in an evaluation (*Rhode Island DOT*).
- Time constraints for a drug-related DUI as compared to an alcohol-related DUI (*Division of Alaska State Troopers*).
- Underutilization of DREs by the state's court system (*Rhode Island DOT*).

The Michigan State Police respondent also noted the following with regard to the agency's DRE program:

Our DRE program is strong, but getting support from officers and agencies is sometimes difficult. "We have them on a felony. Why would we do the extra work for a misdemeanor?" seems to be the prevailing attitude.

Staffing and Training

- Educational opportunities are lacking for prosecutors (*New Jersey State Police*).
- Law enforcement agencies with personnel challenges have not fully utilized the DRE program (*Rhode Island DOT*).
- Officers undergoing training must possess a strong desire to become an expert DUI officer and be affiliated with an agency that actively supports and encourages their commitment to this specialized field (*Illinois DOT*).
- Training a law enforcement officer is a resource-intensive and costly endeavor (*Illinois DOT*).

Effective Strategies or Measures

Five of the seven respondents described their agencies' strategies or measures, in practice or recommended, to assess or address the effects of legalization of recreational marijuana on traffic safety.

Drug Recognition Experts

- Continue to evaluate impaired driving-related data and related information to evaluate appropriate DRE staffing levels and guide tactical deployment statewide (*Vermont Criminal Justice Council*).
- Develop a DRE call-out system that will provide all cities and towns with access to a DRE (*Rhode Island DOT*).
- Increased number of DREs prior to legalization and implemented the Arizona DRE Data Entry and Management System (*Arizona Governor's Office of Highway Safety*).

Forensic Practices

- Develop an e-warrant program for greater access to the court system to accelerate the process for drawing blood (*Rhode Island DOT*).
- Increase forensic toxicology efforts and resources *(Illinois DOT)*.

Law Enforcement Practices

- Deployed speed enforcement details on interstates (*Michigan State Police*).

Public Education

- Educate the public on the dangers of marijuana use and driving (A*rizona Governor's Office of Highway Safety*).
- Improve public awareness of drug-impaired driving and its associated dangers through:

  o Presence at schools and other community events.

  o Educational programs, such as Drug Impairment Training for Educational Professionals (training for school administrators and nurses).

  o Increased community drug educational events.

  o Other drug awareness programs (*Vermont Criminal Justice Council*).

- Promote comprehensive educational paid media efforts *(Illinois DOT)*.

Training

The training practices below are organized into two categories: actual and recommended.

Actual Practices

- Increased ARIDE trainings from 10 to 36 per year (*Michigan State Police*).
- Increased DRE school from one per year to two (*Michigan State Police*).
- Scheduled a DRE School at the request of cities and towns planning to add DREs as an initial commitment or to ensure around-the-clock DRE access that includes weekends and holidays (*Rhode Island DOT*).
- Scheduled additional ARIDE training classes throughout the calendar year (*Rhode Island DOT*).

- Continue to train law enforcement officers to assist them in detecting incidents of driving while impaired by drugs by:

    o Promoting and providing regional ARIDE classes.

    o Efficiently providing DRE training for all qualified officers who meet the program's certification standards.

    o Delivering ARIDE classes to all available officers.

    o Making ARIDE SFST refresher classes available to officers who need to update their skills (*Vermont Criminal Justice Council*).

- Provide the highest quality DRE-related training and management by:

    o Adhering to IACP and Vermont state standards and program best practices, and applying them systematically to ensure uniform conformity throughout the programs.

    o Supporting advanced training for prosecutors and laboratory staff to successfully prosecute drug-impaired driving cases.

    o Conducting at least two recertification trainings each year.

    o Continuing to develop DRE instructors.

    o Seeking out advanced training opportunities for active DREs and supporting staff to further their knowledge (*Vermont Criminal Justice Council*).

- Support or provide law enforcement, judicial and prosecutor training (*Illinois DOT*).

Lessons Learned and Best Practices

Chief among respondents' lessons learned is addressing the challenges associated with application of *per se* limits in the laws governing recreational marijuana use. *Per se* laws are described by the Governors Highway Safety Association as laws that "make it illegal to drive with amounts of specified drugs in the body that exceed set limits." At the time of publication of this TRS, 18 states have non-zero *per se* laws for marijuana.

As the respondent from the Arizona Governor's Office of Highway Safety noted, "THC concentrations are much higher than they were in the 1980s, and people can be impaired with all varying amounts of THC in their bodies. Agreeing on a number vs. signs of impairment/driving behavior is not a good idea." Similarly, the Michigan State Police respondent noted that setting a *per se* level of marijuana in blood "is not supported by science, and some of the most impaired people have low blood levels." The Illinois DOT respondent also expressed concern with regard to legal issues related to the "unscientific *per se* THC level."

Respondents' most problematic issues also included:

- Challenges associated with obtaining and testing chemical evidence (*Illinois DOT*).
- Lack of any enforcement changes since legalization (*Vermont Criminal Justice Council*).

Finally, the Rhode Island DOT respondent recommends that law enforcement agencies be present during initial discussions of potential legislation that will affect the safety of the motoring public. The respondent also

recommended establishment of a funding portal when a law is first implemented that can be used for training, equipment and reimbursement by law enforcement agencies and their partners. As the respondent noted, "The extra burden of administering an enforcement response to the law should not be the responsibility of the taxpayers or law enforcement agencies."

States Anticipating Impacts of Recent Marijuana Legalization

Introduction

A second survey distributed to the three states below sought perspective from agencies preparing to respond to the recent legalization of recreational marijuana:

- *Delaware*: Medical use of marijuana legalized in 2011; recreational use legalized in April 2023.
- *Maryland*: Medical use of marijuana legalized in 2011; recreational use legalized in July 2023.
- *Missouri*: Medical use of marijuana legalized in 2018; recreational use legalized in December 2022.

Representatives from three public safety agencies (Delaware Office of Highway Safety, Maryland State Police and Missouri Safety Center) and one state DOT (Missouri DOT) responded to a brief survey gauging anticipated impacts; these responses were submitted in November 2023. Findings from these agencies' responses are presented below in three topic areas:

- Anticipated traffic crashes after legalization
- Roadside testing practices
- Training

Anticipated Traffic Crashes After Legalization

Three respondents expect an increase in both traffic-related serious injuries and fatalities as a result of the recent legalization of recreational marijuana use in their states. The fourth respondent (*Maryland State Police*) noted that recreational cannabis was legalized during the summer of 2023 and its impacts are not currently known.

Roadside Testing Practices

Respondents from two of the three states surveyed—Maryland and Missouri—offered details of a planned roadside testing pilot. The Delaware Office of Highway Safety respondent was unable to provide pilot details other than that the agency does not plan to use DREs in roadside testing.

Described below are the practices expected to be employed in Maryland and Missouri roadside testing pilots.

Maryland

Maryland State Police is in the early stages of establishing a roadside oral fluid program pilot using SoToxa testing devices. The testing program, which will be overseen by the chief toxicologist for the state of Maryland, will include preliminary and confirmatory testing. The agency expects to use one Maryland county for the pilot, with support from an unspecified number of DREs and ARIDE-trained officers.

Maryland law requires the arresting officer to establish probable cause for an arrest based on impairment; a DRE must establish probable cause for drug impairment. In Maryland, only a DRE can ask for a blood sample to test for drugs. (Blood testing is the only test recognized by Maryland courts for drug impairment.) Among the three states surveyed, only Maryland plans to use DREs in roadside testing.

Missouri

Missouri DOT received grant funding from NHTSA that was used to purchase 30 SoToxa testing devices; the agency purchased several more testing instruments with internal funds. The DOT distributed these testing instruments to agencies throughout the state along with "stats forms" for use in providing data to the Missouri DOT Office of Highway Safety. DREs will be available for an evaluation should one be needed.

Missouri Safety Center, the other Missouri survey respondent, will not support a roadside testing pilot.

Training

Delaware Office of Highway Safety and Maryland State Police are overseeing ARIDE training to prepare officers to implement the new law. In Delaware, while ARIDE- and DRE-trained officers will participate in enforcing the new law, only ARIDE officers will be used at the roadside.

Maryland plans to provide additional training:

- Cannabis detection impairment labs, also known as "green labs." (See the **Note** below for information about green labs.)
- Cannabis 101 classes that are similar to green labs but include the Chesapeake Region Safety Council to obtain buy-in from workplace professionals.

Note: A description of green labs is provided in a 2020 publication of the National Traffic Law Center, a program of the National District Attorneys Association. *From the introduction of* Cannabis Impairment Detection: Workshop Handbook (see page 3 of the handbook, page 6 of the PDF):

> For decades, law enforcement agencies have educated their officers to observe and detect alcohol impairment with the use of "wet labs"—an event where volunteers are dosed with alcohol and observed performing psychophysical and mental tests. Until recently, no similar training event was available to observe cannabis impairment in volunteer cannabis dosed subjects, i.e., "green labs." However, as state laws have begun to change regarding the legality and use of cannabis, several agencies have begun to utilize "green labs" to train their officers to detect cannabis impairment.

Missouri Safety Center provides training for law enforcement around the state, and the respondent noted that the agency has "brought back a short class on drugs that impair [in] anticipation of agencies wanting the training for [their] officers." At the time of the survey response, only one Missouri agency had requested departmental training and only one DRE initiated departmental training in marijuana impairment.

Appendix A: Survey Questions

Two surveys were distributed to different pools of respondents based on the recency of legislation addressing recreational use of marijuana:

- **Survey 1: States with Longer-Term Marijuana Legalization**

    This survey of state transportation and public safety agencies where recreational use of marijuana is legal examined the effects on traffic safety, experiences of law enforcement and lessons learned. The states and district receiving this survey were Alaska, Arizona, California, Colorado, Connecticut, District of Columbia, Illinois, Maine, Massachusetts, Michigan, Montana, Nevada, New Jersey, New Mexico, New York, Oregon, Rhode Island, Vermont, Virginia and Washington.

- **Survey 2: States Anticipating Impacts of Recent Marijuana Legalization**

    This survey of state transportation and public safety agencies in Delaware, Maryland and Missouri, where recreational marijuana use was recently legalized, investigated anticipatory impacts to traffic safety.

Survey 1: States with Longer-Term Marijuana Legalization

Effects of Legalization

1. Since legalization, has the number of fatal traffic crashes:
    - Increased.
    - Decreased.
    - Not changed.
    - The change is not known.
1A. If the number of fatal traffic crashes has increased or decreased, please provide the data to support your response (e.g., percent increase or decrease in crashes).
2. Since legalization, has the number of serious injury crashes:
    - Increased.
    - Decreased.
    - Not changed.
    - The change is not known.
2A. If the number of serious injury crashes has increased or decreased, please provide the data to support your response (e.g., percent increase or decrease in crashes).
3. Please provide anecdotal or other evidence law enforcement agencies have identified since legalization of recreational marijuana with regard to the following:
    - Driver behavior, including driver detection cues:
    - New difficulties or challenges with enforcement:
    - Unexpected positive outcomes with enforcement:
    - Other effects on traffic safety:

(Required) 4. Does your agency maintain a roadside testing program to determine impairment resulting from marijuana use?
    - Yes (Skipped the respondent to **Roadside Testing Practices**.)
    - No (Skipped the respondent to **Drug Recognition Expert (DRE) Program**.)

Roadside Testing Practices

1. What roadside screening device is used to determine impairment? Please select all that apply.

   - AquilaScan Oral Fluids Testing Detection System
   - Dräger DrugCheck 3000 (DDC3000)
   - Dräger DrugTest 5000 (DDT5000)
   - Randox Evidence MultiSTAT
   - Securetec DrugWipe S 5-Panel (DrugWipe)
   - SoToxa (formerly Alere DDS2 Mobile System)
   - None
   - Other (Please describe.)

2. If more than one screening device is used, which is preferred and why?

3. Are test results reliable and consistent?

   - Yes
   - No (Please describe any deficiencies in test results.)

4. Do drug recognition experts (DREs) participate in roadside testing?

   - Yes
   - No

5. Does the testing program have sufficient and timely access to DREs?

   - Not applicable
   - Yes
   - No (Please describe any challenges associated with access to DREs for the testing program.)

6. How and when is the data collected during roadside testing reported?

7. Who is responsible for reporting this data?

8. Has your agency experienced challenges with regard to isolating marijuana use under current screening and testing methods?

   - No
   - Yes (Please describe the challenges associated with isolating marijuana use in impaired driving screening and testing.)

(Required) 9. Did your agency conduct a pilot to prepare for roadside testing to determine impairment resulting from marijuana use?

   - Yes (Skipped the respondent to **Roadside Testing Pilot**.)
   - No (Skipped the respondent to **Drug Recognition Expert (DRE) Program**.)

Roadside Testing Pilot

1. Please describe your agency's pilot program by providing the details requested below.

   - Length of the program (Please provide the start and end dates. If dates are unavailable, please provide the approximate length of the program.)
   - Approximate number of tests administered
   - Program participants (Please identify the number of law enforcement agencies and the number of counties or regions participating.)
   - Cost of operations

2. How many drug recognition experts (DREs) participated?

3. What screening device or process was used to determine impairment?

4. What were the top three takeaways from the pilot study?

- Takeaway 1:
- Takeaway 2:
- Takeaway 3:

Drug Recognition Expert (DRE) Program

1. When did your state launch its DRE program?
2. How many DREs does your state employ?
3. Is there a need for additional DREs?

- No
- Yes (Please indicate the number of DREs your state would like to employ.)

Note: The questions below relate to the use of DREs to determine impairment resulting from marijuana use.

4. Please describe the processes, procedures or guidelines used by law enforcement to determine the number of DREs needed.
5. What are the benefits of using DREs?
6. What are the challenges of using DREs?
7. Has law enforcement developed or used any training for DREs?

- No
- Yes (Please provide details of this training.)

Assessment

1. Please provide the top three strategies or measures that your agency has implemented to assess and/or address the impacts on traffic safety since the legalization of recreational marijuana.

- Strategy or Measure 1:
- Strategy or Measure 2:
- Strategy or Measure 3:

2. Please describe any other lessons learned or best practices that might help other states that recently legalized recreational marijuana.

Wrap-Up

1. Does your agency have documentation you can share that addresses agency procedures, guidelines, data analysis or other issues related to the impacts on traffic safety of legalizing the use of recreational marijuana?

- No
- Yes (Please provide links to electronic documents or send any files not available online to chris.kline@ctcandassociates.com.)

2. Please use this space to provide any comments or additional information about your previous responses.

Survey 2: States Anticipating Impacts of Recent Marijuana Legalization

1. Please identify the impacts to traffic safety that your agency anticipates as a result of legalized recreational marijuana use in your state. Please select all that apply.

   - Limited or no impacts anticipated
   - Increase in traffic-related injuries
   - Increase in traffic-related fatalities
   - Decrease in traffic-related injuries
   - Decrease in traffic-related fatalities
   - Other (Please describe.)

2. Does your agency anticipate running a roadside testing pilot program?

   - No
   - Yes (Please describe the planned pilot.)

3. If you do plan to conduct roadside testing, what roadside screening devices do you plan to use?

4. Does your agency use or anticipate using drug recognition experts (DREs) in roadside testing?

   - We don't plan to conduct roadside testing.
   - We don't use or plan to use DREs in roadside testing.
   - Yes, we will use DREs in roadside testing. (Please estimate the number of DREs currently participating or anticipated to participate in roadside testing.)

5. Is your agency conducting additional officer training?

   - No
   - Yes (Please describe this training.)

6. Does your agency plan to develop any guidelines or procedures that law enforcement agencies can use to determine impairment of a recreational marijuana user?

   - No
   - Yes (Please describe the plans for these guidelines or procedures.)

Wrap-Up

1. Does your agency have documentation you can share about plans or preparations to respond to the new legislation?

   - No
   - Yes (Please provide links to electronic documents or send any files not available online to chris.kline@ctcandassociates.com.)

2. Please use this space to provide any comments or additional information about your previous responses.