coalition for cannabis
Policy, Education, and Regulation

Contextualizing the Problem

Driving Under the Influence of Cannabis and Other Drugs in America

Table of Contents

Position Statement

It is CPEAR's position that it is never safe to drive while under the intoxicating influence of cannabis. Those that do put the lives of themselves and others at risk, especially when combined with other intoxicating substances. Our laws should create a clear expectation that if you drive high, you will get a DUI – with no exceptions. Additionally, the federal government should be embracing and evolving the programs, technologies, and best practices that have been proven to combat driving while intoxicated on cannabis. This paper examines the root causes of driving under the influence of cannabis and provides the data-backed recommendations that the federal government should immediately adopt to best protect our streets.

Acknowledgment

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Executive Summary

Driving under the influence of cannabis (DUIC) and drugs (DUID) is extremely risky and dangerous to drivers, passengers, and pedestrians. Yet, according to the National Highway Traffic Safety Administration (NHTSA), the rate of driving under the influence has increased by 2.5 times over the past decade. Approximately 11 percent of the US adult population has driven under the influence, which equates to roughly 28 million individuals.

At the same time, peer-reviewed data shows cannabis legalization is not the main reason for the increase in cannabis-impaired driving. This report expands on the contours of this issue by outlining available data and its underlying implications, while putting forward reasonable solutions to reducing the prevalence of DUIC/DUID on the nation's roads.

Currently, Advanced Impaired Driving Enforcement trained officers and Drug Recognition Experts (DREs) represent the best approach for detecting DUIC and DUID. However, attention and investment in research, technology, and public messaging can make readily deployable solutions even more effective.

State jurisdictions require increased funding for research to identify valid, non-invasive, and single-trial impairment detection approaches for roadside testing. Roadside tests for impairment should account for the latent effects of cannabis use and invest in emerging technology that can distinguish between impairment and presence. Moreover, state jurisdictions need to inform their residents about misconceptions around the low-risk nature of driving under the influence with evidence-based messaging.

Driving under the influence of cannabis (DUIC) and drugs (DUID) is extremely risky and dangerous to drivers, passengers, and pedestrians.

- The use of cannabis or other drugs with psychoactive effects may impair judgement and decision-making and increases the odds of deciding to drive under the influence.

- DUIC and DUID increase the risk of a serious injury or death from a motor vehicle crash by at least two to three times.

The prevalence of cannabis and multi-substance impairment rose considerably over the last five years, leading to a rise in crashes resulting in serious injury or death.

- Factors for the increase in DUIC offenses include a lack of understanding of how cannabis impacts one's ability to safely drive a vehicle.

- Approximately 11% of the US adult population engaged in driving under the influence of cannabis within the last month, which equates to roughly 28 million individuals [1].

- The rate of driving under the influence of cannabis (DUIC) has grown by 2.5 times between the years of 2007 and 2018 [2].

Cannabis legalization is likely not the driver of elevated cannabis-impaired driving.

- While there is a need for more research and better data collection, studies showing an effect of legalization on DUIC find that the effect is either insignificant or declines a year after the legal market was implemented [3,4].

- Driving while impaired by cannabis represents real-time cognitive and motor deficits that increase the odds of motor vehicle crashes and deaths.

Evidence-based public messaging that increase perceived risk of driving while impaired is needed given growing scientific evidence that low risk perception is predictive of such behaviors.

- Much like with cannabis use prevalence, perceived risk of harm is a consistent and strong predictor of driving while impaired.

1 Perceived Safety of Cannabis Intoxication Predicts Frequency of Driving While Intoxicated - PMC (nih.gov)

2 Trends in Cannabis Involvement and Risk of Alcohol Involvement in Motor Vehicle Crash Fatalities in the United States, 2000–2018 | AJPH | Vol. 111 Issue 11 (aphapublications.org)

3 Cannabis use and driving under the influence: Behaviors and attitudes by state-level legal sale of recreational cannabis (cannabisproject.ca)

4 Cannabis legalization and driving under the influence of cannabis in a national U.S. Sample - ScienceDirect

- The average individual who engages in driving while impaired *believes* that it is safe to drive at an intoxication level of 6 on a scale of 10. There is no safe level for DUIC.

Advanced Impaired Driving Enforcement trained officers and Drug Recognition Experts (DREs) represent the most relevant approach at present for detecting DUIC and DUID, but increased funding is needed for research that identifies valid, non-invasive, and single-trial impairment detection approaches for roadside testing.

- Per se and zero tolerance laws assess THC presence instead of actual impairment, which sets the stage for unequitable and inaccurate enforcement of DUIC. Impairment needs to be based on the actual observed behaviors of the driver and a totality of the circumstances, not a quantitative result.

- Unlike blood alcohol concentration, there is no currently available validated technology that evaluates a standard measure of cannabis impairment in real time, though this is changing with the emergence of novel technologies.

Creative and integrated policy efforts at state and federal levels are needed to reduce DUIC and DUID.

Contextualizing the Problem – Driving Under the Influence of Cannabis and Other Drugs in America

Section Highlights

- Deaths from motor vehicle crashes and DUIC are consistently increasing.
- Any form of DUI dramatically increases impairment and odds of experiencing a serious injury or death from a motor vehicle crash.
- More drivers experienced serious crashes or deaths with cannabis (THC) in their system than any other drug in 2020.
- To date there has not been a clear effect of cannabis legalization on DUIC prevalence.
- Low perceived risk of harm is predictive of engaging in driving impaired by cannabis and can be improved through evidence-based public messaging.

How Pervasive Are Motor Vehicle Crashes in America?

The number of Americans dying from motor vehicle crashes increased by 30% from 2010 to 2021 [5,6]. This concerning trend represents an additional 28,000 deaths by motor vehicle crashes in the last decade [1]. Even when considering the decrease in number of miles driven during the COVID-19 pandemic in 2020, the number of deaths by motor vehicle crash per mile driven increased dramatically [1]. Additionally, the number of pedestrians killed in 2020 increased 46% from 2010. Almost every year since 2010 the number of pedestrian deaths has risen [7].

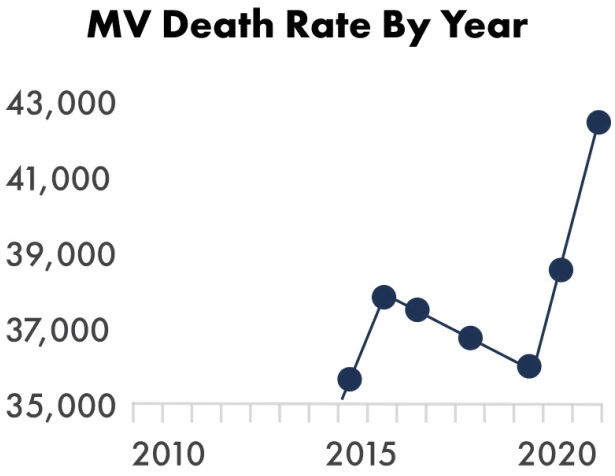


Figure 1. Motor Vehicle Crashes Annually

If current trends continue, there will be approximately 100,000 additional deaths from motor vehicle crashes in the 2020s compared to the 2010s.

This alarming realization has many asking, why are these death rates increasing so rapidly and what can policymakers do to curb this trend? One of the largest addressable factors to motor vehicle crashes, injuries and deaths is drug-impaired driving or more commonly referred to as driving under the influence (DUI) or driving under the influence of drugs (DUID). It has been shown that over half of drivers involved in a serious motor vehicle crash tested positive for one or more substances that may have impaired their driving performanc [8]. Similarly, over half of pedestrians killed by a motor vehicle have alcohol or another substance in their system [9].

Any form of DUI dramatically increases the risk of experiencing a serious injury or death due to a motor vehicle crash [10].

This is because the use of alcohol, cannabis, or other substances alone or in combination before or while driving a motor vehicle have been scientifically shown to impair motor function (the control of body

5 Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories 2021 (dot.gov)

6 Traffic Safety Facts Annual Report Tables (nhtsa.gov)

7 Pedestrian Traffic Fatalities by State: 2020 Preliminary Data | GHSA

8 Drug-Impaired Driving | NHTSA

9 Pedestrian Deaths Soar in 2020 Despite Precipitous Drop in Driving During Pandemic | GHSA

10 Cannabis, alcohol and fatal road accidents | PLOS ONE

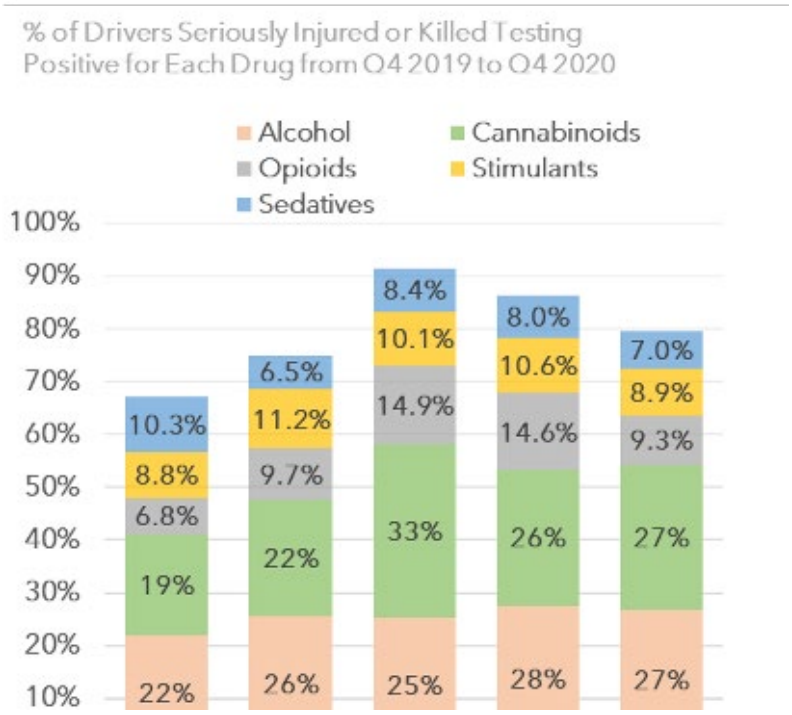
movement), vision, and awareness while driving [11,12]. Impairment from cannabis and other substances produce immense safety concerns such as drifting into other lanes, swerving, overcorrections, and issues maintaining attention on the road [13,14,15].

What is the Prevalence of Driving Under the Influence?

CANNABIS VS. OTHER SUBSTANCES Recent evidence suggests that the number of motor vehicle crashes thought to be related to the impairment from cannabis is increasing across time, matches the number of alcohol-impaired incidents, and is over three times more prevalent than opioid, sedative, and stimulant-involved crashes [16]. The number of crashes where drivers used both cannabis and alcohol together has also risen notably from 2010 to 2019 [10]. Combining alcohol and cannabis before or during driving tends to produce a multiplicative effect that further impairs cognitive skills and driving performance [17].

Figure 2. Serious Injuries or Deaths Associated

% of Drivers Seriously Injured or Killed Testing Positive for Each Drug from Q4 2019 to Q4 2020



11 The Effect of Cannabis Compared with Alcohol on Driving: American Journal on Addictions: Vol 18, No 3 (tandfonline.com)

12 Cannabis Effects on Driving Skills | Clinical Chemistry | Oxford Academic (oup.com)

13 Cannabis smoking impairs driving performance on the simulator and real driving: a randomized, double-blind, placebo-controlled, crossover trial - Micallef - 2018 - Fundamental & Clinical Pharmacology - Wiley Online Library

14 Effect of Cannabidiol and Δ9-Tetrahydrocannabinol on Driving Performance: A Randomized Clinical Trial | Adolescent Medicine | JAMA | JAMA Network

15 Drugged Driving DrugFacts | National Institute on Drug Abuse (NIDA) (nih.gov)

16 Fatality Analysis Reporting System (FARS) | NHTSA

17 Effects of combining alcohol and cannabis on driving, breath alcohol level, blood THC, cognition, and subjective effects: A narrative review. - PsycNET (apa.org)

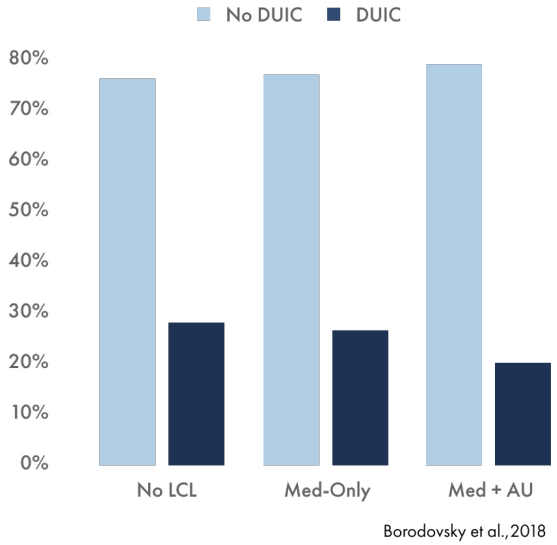
As shown in Figure 2, more drivers experienced serious crashes or deaths with cannabis (THC) in their system than any other drug in 2020. Paired with the fact that the rate of driving under the influence of cannabis (DUIC) has grown by 2.5 times between 2007 and 2018, and the rate for alcohol-impaired crashes has decreased over that same time period, it is clear that driving under the influence of cannabis specifically is a major problem that needs to be addressed [2]. DUIC is most common among individuals who use cannabis at least monthly and a conservative estimate at a population level suggests that 11% of all U.S. adults ages eighteen and older have engaged in DUIC in the past month.

> *There are at least 28 million individuals who operate a vehicle under the influence of cannabis twice per month. As a result, there are approximately 56 million instances of DUIC per month [1,6].*

Notably, most population studies of DUIC simply ask whether individuals engaged in DUIC in the past month or the past year and do not ask about how many times they drove under the influence or, alternatively, how many days participants drove under the influence. The latter is important because those who do engage in DUIC tend to do so more than once per month and asking participants about the frequency of DUIC allows researchers to better capture the overall problem [12]. Local, state, and federal survey approaches should always assess the number of days or instances of DUI for cannabis and for other substances to accurately capture cannabis and polysubstance related patterns of DUI across time.

What is the Impact of Legal Cannabis Laws on DUIC Prevalence?

Figure 3. Past Month DUIC Prevalence by State with Legal Cannabis Laws



Borodovsky et al., 2018

With more and more states implementing legal medical and adult use cannabis markets, many assume that is the reason for the increase of serious motor vehicle crashes, injuries, and deaths. While there have been reported increases in DUIC cases over the years, growing evidence suggests that increased cannabis legalization does not correlate to an increase in those cases[12]. This conclusion is validated by a body of scientific evidence that produces mixed findings regarding the impact of cannabis laws on DUIC. For example, some large-scale survey studies,

including the study that produced the findings noted in Figure 3, show an association with cannabis legalization and lower DUIC prevalence [14] [18], whereas others show an increased frequency of DUIC[19,20]. Rather, there are likely other factors linked to the rising rates of DUIC in the U.S, such as decreasing perceived risk of harm associated with cannabis use. For example, in a recent study showing that adult use states showed the lowest DUIC rates, followed by medical-only states and then by states where any cannabis use (N=3) is illegal, the authors found that perceptions of risk associated with DUIC were also higher as a function of greater state legalization levels [1]. Further confusion is added to the question of whether legal cannabis laws influence DUIC rates because data on cannabis-impaired driving is extremely limited. Another relevant factor is that cannabis use is increasing in U.S. states regardless of its legal status, which could contribute to the elevated rates of DUIC, and which is congruent with existing findings showing limited evidence of a relationship between legal cannabis laws and higher DUIC. In addition to the need for more research on cannabis-impaired driving, research must be prioritized on examining whether specific provisions, policies, or regulations associated with state cannabis laws help mitigate DUIC and DUID risks.

What is the Most Evidence-Based Way to Prevent Driving Under the Influence of Cannabis?

More frequent cannabis use and lower perceived risk of harm associated with cannabis consistently predict who engages in DUIC [4]. As such, the rising prevalence of cannabis in those involved in crashes in the United States is most likely a result of the fact that 1 in 10 Americans who use cannabis almost daily do not perceive the risk of harms associated with cannabis use and operating a motor vehicle [21]. For example, on a scale of 0-10 of cannabis intoxication, where 0 represents being completely sober and 10 represents inebriated, the average individual who engages in DUIC believes that it is safe to drive at an intoxication level of 6 [4]. The same study found that the perceived safety of different DUIC levels strongly predicted how many days individuals would engage in DUIC in the past month, even after controlling for how many days they used cannabis[4].

Together, these findings highlight that interventions and public messaging campaigns that successfully convey to the public that DUIC is dangerous are extremely important for reducing the rates of motor

18 Cannabis use and driving under the influence: Behaviors and attitudes by state-level legal sale of recreational cannabis - PMC (nih.gov)

19 Cannabis Legalization and Detection of Tetrahydrocannabinol in Injured Drivers (nejm.org)

20 EARLY EVIDENCE ON RECREATIONAL MARIJUANA LEGALIZATION AND TRAFFIC FATALITIES - Hansen - 2020 - Economic Inquiry - Wiley Online Library

21 Cannabis legalization and driving under the influence of cannabis in a national U.S. Sample - ScienceDirect

vehicle crashes and deaths related to DUIC. For example, even if these efforts only have a 5% improvement in perceived risk of driving when impaired by cannabis, hundreds of lives could be saved in most U.S. states by preventing motor vehicle crashes due to impaired driving.

Current Day DUIC and DUID Enforcement Mechanisms

Section Highlights

- Advanced Roadside Impaired Driving Enforcement (ARIDE) and Drug Recognition Experts (DREs) are the most evidence-based and feasible approach to addressing DUIC and DUID, despite some limitations.
- State-level use of DREs as the ultimate determinant of impairment is a more accurate, effective, and likely equitable approach to DUIC and DUID enforcement.
- State and federal funds for the training, maintenance and evaluation of DRE programs need to be increased. Per se laws and zero tolerance policies are subject to challenge given the complexities of measuring THC impairment. Novel technologies emerging show initial promise for better DUIC enforcement and likely prevention.

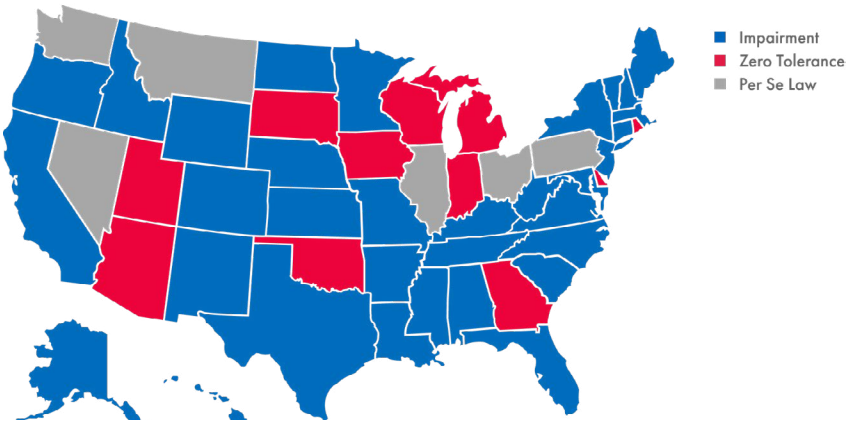
Roadside Impairment Detection

The most common way that the incidence and aftermath of driving under the influence of cannabis (DUIC) and driving under the influence of drugs (DUID) are detected is through enhancing roadside detection policies and practices. Generally, these practices involve a multi-step roadside process including the use of Standardized Field Sobriety Testing (SFST) and oral fluid collection as part of the process of determining probable cause for potential arrest [22]. Twenty-four states have statutes authorizing some form of oral fluid, saliva or other bodily substances or fluids testing, but only a handful conduct oral fluid testing in practice. In field studies with actual drivers suspected to be impaired and in highly controlled, double-blinded, placebo-controlled studies, different SFST tasks appear to demonstrate sensitivity although often only one of three show sensitivity [23,24]. However, SFST tasks are just one part of a much larger evidence gathering process conducted by officers who suspect potentially impaired drivers, and existing studies have rarely evaluated the *additional contribution* of the SFST to accurately assessing impairment within that larger process.

Most U.S. state regulations fall under the following categories of impairment: general impairment detection, zero tolerance, or per se laws. Most states employ impairment laws (See Figure 4), which require evidence of cannabis-induced impairment, such as poor performance during testing performed by officers roadside trained in the standard field sobriety tests, or ARIDE-trained officers who employ additional tests that capture measures of altered time and space, concentration, and memory. Colorado has a reasonable inference law that states that in instances where THC is identified in a driver's blood in quantities of 5ng/ml or higher, it is permissible to assume the driver was under the influence. Reasonable inference laws differ from per se laws in that they allow drivers who are charged to introduce an affirmative defense to show

DUIC Impairment Laws by State

Figure 4. DUIC Policies Across America



22 22-1058_TS_Oral-Fluid-Drug-Screening-Handout_v1-04.11.22.pdf (aaa.biz)

23 A placebo-controlled study to assess Standardized Field Sobriety Tests performance during alcohol and cannabis intoxication in heavy cannabis users and accuracy of point of collection testing devices for detecting THC in oral fluid | SpringerLink

24 New Information on Validity of SFST in Detecting Drug Impairment.pdf (tndagc.org)

that despite having tested at or above the legal limit, they were not impaired. Colorado's law is generally grouped under a single "permissible inference" category when it comes to mapping out state cannabis-impaired driving laws, requiring the prosecution to prove that the driver was incapable of driving or affected by THC (similar to general impairment states), the 5 ng/ml threshold places Colorado in its own unique category.

When officers recognize the driver is potentially under the influence of a substance other than alcohol, they may call in a drug recognition expert (DRE) to provide additional assistance. DREs are police officers trained to recognize impairment in drivers under the influence of drugs other than alcohol. Considerable evidence suggests that roadside tests employed by DREs are much more accurate than other currently available methods, particularly those that leverage physiological measurement techniques such as pupil dilation and reactivity to light [25]. While most police officers in the United States are required to complete Standardized Field Sobriety Testing (SFST) to recognize alcohol impairment, The International Association of Chiefs of Police (IACP) along with the National Highway Traffic Safety Administration (NHTSA) of the U.S. Department of Transportation coordinates the International Drug Evaluation and Classification (DEC) Program. This program allows officers to build the skills necessary for detecting and identifying persons under the influence of drugs and in identifying the category of drugs causing the impairment [26].

Currently, Drug Recognition Experts (DREs) are the most evidence-based method that can be feasibly used to enforce DUIC on the roadside and should be utilized to the greatest extent possible [23,27,28] but there is only 1 DRE per 27 million miles.

Areas of Improvement for Enforcement

INCREASED PRESENCE ON THE ROADSIDE While DREs are by far the most evidence-based approach for detecting DUIC that can currently be implemented on roads and highways, there are several potential limitations of only leveraging DREs to detect DUIC and DUID.

25 Drug Recognition Expert (DRE) examination characteristics of cannabis impairment - ScienceDirect

26 Drug Recognition Expert Section (DRE) | International Association of Chiefs of Police (theiacp.org)

27 The Accuracy of Evaluations by Drug Recognition Experts in Canada: Canadian Society of Forensic Science Journal: Vol 42, No 1 (tandfonline.com)

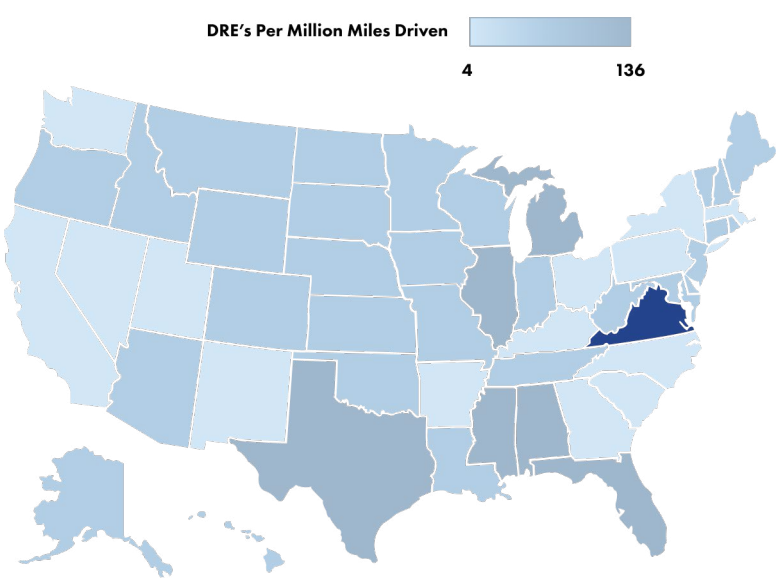
28 A placebo-controlled study to assess Standardized Field Sobriety Tests performance during alcohol and cannabis intoxication in heavy cannabis users and accuracy of point of collection testing devices for detecting THC in oral fluid | SpringerLink

First, training DREs and maintaining sufficient levels of DREs in states and localities is costly and time-consuming. Second, there are often a limited number of DRE instructors in each state [29], which stymies efforts to effectively increase the number of DREs as a means of reducing DUIC and DUID.

The deficit of DREs and DRE instructors is *problematic because several scientific studies have shown that the perceived probability of experiencing negative consequences of DUIC or DUID is much more important than the severity of consequences and is critical to discouraging DUIC* [30] .

However, as shown in Figure 5, on average there is only 1 DRE per 27 million miles at any given time in the U.S. states, which suggests that low perceived probabilities of being caught for DUIC by drivers are likely based in reality.

Figure 5. DREs Per Million Miles Driven



ADDRESSING HUMAN JUDGEMENT The DRE program utilizes a 12-step process to evaluate whether a driver is impaired. This protocol involves a broad series of steps including physiological tests, interviewing the driver, and divided attention tasks [31]. For example, some evidence suggests that DRE impairment detection approaches requiring physiological measurement tools (pupil dilation, light reactivity) are much more accurate than psychophysical ones (one leg stand) [23]. In addition to the fact that DREs are fairly accurate at detecting cannabis impairment, in general, any accuracy issues tend to lean towards false negatives instead of false positives. In other words, a disproportionate amount of potential DUIC instances where a DRE makes a judgment on impairment is inaccurate because they report the driver as not being impaired when they are impaired. Although it is ***never*** okay to use

29 2021SB-00888-R000226-Eucalitto, Garrett, Deputy Commissioner-CTDOT-TMY.PDF

30 Preventing cannabis users from driving under the influence of cannabis - ScienceDirect

31 12 Step Process | International Association of Chiefs of Police (theiacp.org)

cannabis and drive, an inflated rate of false positives, which inaccurately allege drivers of being impaired could potentially hinder the ability to prosecute DUIC cases that are accurate.

It is critical that law enforcement receive comprehensive training to prevent unequal treatment of individuals from underrepresented racial groups [32]. Although data on the effectiveness of trainings for police to avoid such biases is limited, there are growing efforts among law enforcement to complete trainings focused on providing trauma-informed care to those from underrepresented racial groups. Another potentially promising approach for reducing such biases includes providing brief trainings on components of Acceptance and Commitment Therapy, which is an effective alternative to Cognitive Behavioral Therapy that can help defuse implicit stereotypes and promote values-consistent actions by professionals [33]. Police agencies that prioritize involving citizens as a part of decision making often show higher social equity performance and, in turn, have higher trust from the public [34]. It is important that law enforcement agencies provide funding for such trainings as DREs will be needed for many years to come.

The Problems with Per Se and Zero Tolerance Laws

Per Se and Zero Tolerance laws differ greatly from impairment laws because they require proof that there was any form of Tetrahydrocannabinol (THC) in a driver's system either through blood or urine screening. Per se laws set a specific cutoff point that is predetermined to signify impairment (e.g., ≥5 µg/L blood THC), whereas zero tolerance laws determine DUIC simply based on whether there is any presence of THC above zero.

Further, THC can remain present in blood for close to 24 hours [35] , and potentially over a month in urine depending on frequency of use [36]. Given this, the presence of THC in a driver's system could be from previous use and not be indicative of current or even immediate past use or impairment. It is because of

32 Trauma Training for Criminal Justice Professionals | SAMHSA

33 ERIC - EJ807001 - The Impact of Acceptance and Commitment Training and Multicultural Training on the Stigmatizing Attitudes and Professional Burnout of Substance Abuse Counselors, Behavior Therapy, 2004 (ed.gov)

34 Improving Community Relations: How Police Strategies to Improve Accountability for Social Equity Affect Citizen Perceptions: Public Integrity: Vol 20, No 4 (tandfonline.com)

35 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3570572/

36 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2587336/

this that the justice system is seeing an emergence of cases appealing charges for impairment of THC under per se or zero tolerance laws, albeit mostly unsuccessful [37,38,39,40].

While it is ***never*** safe to drive under the influence of cannabis or other drugs, per se and zero tolerance laws are often inequitable. In a study conducted by the Stanford Open Policing Project, analysis of a data set including nearly 100 million traffic stops across the United States revealed that Black drivers were 20% more likely to be stopped than White drivers relative to their share of the residential population [41]. As a probable result of this, studies have found that Black and Latino drivers are overrepresented among DUI convictions relative to population size. Further, when comparing conviction rates for DUI with frequency of consumption behavior, there is an obvious racial bias against Blacks and Latinos [42]. In addition, if an individual crosses from a legal cannabis state without a zero-tolerance law into an illegal cannabis state with a zero-tolerance law, the cannabis they used yesterday may show up during testing even though the individual is in no way impaired. With equity being a core component of cannabis legalization, the vast likelihood of unjust enforcement of per se and zero tolerance laws should be considered.

THC as A Poor Indicator of Impairment

There is overwhelming scientific evidence that suggests that the amount of THC in a driver's system is a very poor indicator regarding whether a driver is impaired[19]. This contrasts significantly from blood alcohol levels and impairment in driving under the influence of alcohol that have evidence-based blood alcohol concentration limits[43,44]. However, state regulators in about one-third of U.S. states have passed per se or zero tolerance laws that only require the presence of THC to prosecute potential DUIC offenses.

37 Love v. State, 517 S.E.2d 53 (Ga. 1999).

38 Williams v. State, 50 P.3d 1116, 1118 (Nev. 2002)

39 State v. Williams, 93 P.3d 1258 (Nev. 2004)

40 City of Kent v. Cobb, 196 Wash. App. 1043 (Wa. 2016)

41 A large-scale analysis of racial disparities in police stops across the United States

42 https://onlinelibrary.wiley.com/doi/full/10.1111/1745-9133.12558

43 Lowering state legal blood alcohol limits to 0.08%: the effect on fatal motor vehicle crashes. (aphapublications.org)

44 A PRELIMINARY ASSESSMENT OF THE IMPACT OF LOWERING THE ILLEGAL PER SE LIMIT TO 0.08 IN FIVE STATES. NHTSA TECHNICAL REPORT | Semantic Scholar

In a recent study that administered different amounts of THC to participants before using a driving simulator, all participants showed THC levels above per se limits, however, less than half met validated criteria for impairment[45].

The amount of THC in one's system is a poor indicator of whether one is impaired for several reasons:

1. There are large differences in how individuals process and metabolize THC. One individual may show higher THC blood levels than another person, but in practice may be affected but not necessarily impaired[42].

2. THC blood levels in general are less related to impairment than blood alcohol levels are. This is likely due to the fact that there are metabolites of THC that can be stored in many parts of the body, like fatty tissues, where the impact of THC on functioning could be varied enough to cause large discrepancies in whether someone is impaired.

3. Growing evidence suggests that frequent cannabis use may create a tolerance to the presence of THC in one's system. This was clearly recognized in driving simulator studies, where cannabis is administered to those who use cannabis regularly and compared to those who use cannabis irregularly[42].

4. Per se laws imply to the public that driving with a THC level below a given threshold is safe, which often is unlikely to be the case. Factors such as not using cannabis regularly, how an individual's body metabolizes THC, and being accustomed to higher levels of THC all play a role in impairment (see [46] for a review).

In a recent study [46], all participants showed THC levels above per se limits, however, less than half met validated criteria for impairment.

45 The failings of per se limits to detect cannabis-induced driving impairment: Results from a simulated driving study (theiacp.org)

46 Strengths and limitations of two cannabis-impaired driving detection methods: a review of the litera (tandfonline.com)

Novel Impairment Detection Technology – Promising Science Based Solutions

Section Highlights

- Advances in eye-tracking and portable neuroimaging technologies are poised to provide a potential solution to the rapid, non-invasive, and accurate detection of roadside cannabis impairment as well as a lack of a 'baseline' for comparison.
- Despite the promise of these technologies, there are considerable barriers, including lack of research fundings and the challenges associated with detecting impairment from other substances in isolation or combination with cannabis.

Multiple emerging technologies, not currently available to law enforcement, show promise in improving the accuracy of DUIC impairment detection and efficiency. Generally, these instruments are designed to be operated by law enforcement officers easily, rapidly (e.g., 1-2 minutes), and non-invasively. Like DREs, these novel technologies are intended to assess real-time impairment from THC. Two instruments, eye-tracking and portable neuroimaging technologies, provide novel approaches for potentially improving the accuracy of detecting impairment due to DUIC. However, if an impairment detection technology relies on capturing how drivers perform on roadside DRE tests when not under the influence of THC, it becomes an impractical solution for implementing in roadside contexts as each individual person may have different baseline levels.

Because of potential varying skill sets for tasks among the population, any novel technology or instrument that claims to be a solution to DUIC impairment detection must be able to do so accurately for each driver in a single trial.

Eye-Tracking

One promising novel technology is the use of non-invasive eye-tracking devices to rapidly assess voluntary and involuntary eye movements. These eye movements characterize temporary neurological impairment due to recent THC use. Existing evidence from research on the efficacy of DREs already shows that involuntary pupil movements and other psychophysical tests used by some DREs are the most effective components of DRE approaches[23]. These devices use state-of-the-art cameras to capture milli-second level eye movements that have been shown to correlate with plasma blood levels of THC [47] and cognitive impairment [48] . A cutoff score would provide a score such that if a driver was over that number, it is highly likely (e.g., 80-90%+) that the individual is driving impaired.

47 Preliminary Eye-Tracking Data as a Nonintrusive Marker for Blood Δ-9-Tetrahydrocannabinol Concentration and Drugged Driving | Cannabis and Cannabinoid Research (liebertpub.com)

48 Long-term effects of cannabis on eye movement control in reading | SpringerLink

Functional Near-Infrared Spectroscopy

Another promising technology combines a popular brief cognitive function task and functional near-infrared spectroscopy (FNIS), which uses near-infrared light to measure real-time hemodynamic (blood) activity in the prefrontal cortex that is characteristic of temporary impairment [49]. A recent study using oral THC showed that the FNIS-enabled procedure was only six minutes in duration and was able to predict impairment from THC with 76% accuracy. While not perfect, this is very promising as DREs estimated impairment accuracy at 67%[50]. Interestingly, the false positive rate was lower for FNIS (10%) relative to DREs (35.9). Although studies using FNIS to assess acute impairment have been done in laboratory settings, portable and easy to use FNIS devices already exist and algorithms that predict whether the FNIS data signals impairment can be readily programmed such that law enforcement officers can receive real-time results on the scene. Given the high accuracy of FNIS, there is considerable promise for this approach to be implemented in real world settings.

Despite the promising potential technological advances in detecting cannabis-related impairment at the roadside, it is important to note that existing research has only provided promising evidence for detecting impairment that may be related to the presence of THC.

> *Often, impaired drivers are under the influence of multiple substances, therefore new impairment detection technologies will need to be able to detect cannabis impairment in those who also used other substances.*

Moreover, until such devices can accurately detect other illicit substances such as opioids, DREs will remain an absolute necessity.

49 Delta-9-tetrahydrocannabinol intoxication is associated with increased prefrontal activation as assessed with functional near-infrared spectroscopy: A report of a potential biomarker of intoxication - ScienceDirect

50 Identification of Δ9-tetrahydrocannabinol (THC) impairment using functional brain imaging | Neuropsychopharmacology (nature.com)

Data Monitoring of All Incidences of Driving While Intoxicated

Section Highlights

- Despite robust data on motor vehicle crashes through NHTSA and other federal sources, data on DUIC and DUID involved crashes and deaths are underreported because testing for cannabis and other drugs is often omitted when drivers test positive for sufficiently high blood alcohol levels.
- There is no federal or state surveillance data that records frequency of instances or days of DUIC or DUID, or that provides rapid public access to data.
- Both data gaps severely limit opportunities to detect notable increases in DUIC and DUID trends, and effectively remove the ability to evaluate the effectiveness of law enforcement, community-based, or other interventions designed to reduce DUIC and DUID.

Perhaps the best available data in the U.S. on cannabis-involved motor vehicle crashes and deaths is from the FARS, the Fatal Analysis Reporting System [51]. Specifically, the FARS provides data on the percentage of drivers who tested positive for substances such as alcohol and THC. However, this data is severely limited by the fact that drivers suspected as driving impaired are often first tested for blood alcohol levels greater than .08%, and if found to be positive, all other substances are not tested. Because the opportunity for THC to be assessed is a byproduct of whether a driver is found to have driven under the influence of alcohol, the degree to which THC is implicated in state and federal crashes is heavily skewed downwards.

Another limitation of FARS and other datasets is they are usually made available to the public one and a half to three years after the data were collected. Particularly in a dynamic landscape of cannabis legalization, such delays in access to data severely limit the capacity of government regulators, community agencies, and law enforcement to adjust and address changes in DUIC and DUID trends. Although there are some state-specific data collection approaches performed, challenges such as limited funding, poor data collection methods, and limited analytical research capacities prevent maximizing the utility of such data collections.

To address these data gaps in DUIC and DUID, federal research and implementation funding is needed above and beyond that of NHTSA. In particular, there is a need to advocate for funding from the National Institute on Drug Abuse (NIDA) and the Substance Abuse Mental Health Services Administration (SAMHSA) who are overwhelmingly the primary federal funders of research and implementation on substance use harm prevention and treatment in the U.S. Unfortunately, when searching NIDA's current grant portfolio for research grants with an explicit focus on DUIC or DUID, there are only 7 funded projects [52]. When combining the total funds for these 7 projects, the total is $2.4 million, which represents 1 in a 78,000th of NIDA's annual funding. Clearly, there is a need to advocate at the federal level for greater research on DUIC and DUID [51].

51 https://www.nhtsa.gov/research-data/fatality-analysis-reporting-system-fars

52 RePORT RePORTER (nih.gov)

Policy and Program Approaches Utilized to Reduce DUIC and DUID For All States

Section Highlights

- Conceptualizing DUIC and DUID offenses through a public health lens will reduce DUIC and DUID incidence.
- Programs that deemphasize severity of negative consequences for DUIC and that emphasize screening for Cannabis Use Disorder and referrals to treatment should be prioritized.
- Targeted trainings to criminal justice staff can help facilitate reducing DUIC and DUID through a public health approach.

Addressing the Cycle of DUIC and DUID Offenses Through a Public Health Lens

Most instances of DUIC and DUID are committed by those who meet criteria for cannabis use disorder (CUD) and/or another substance use disorder (SUD), and who serially engage in DUIC or DUID. For example, among those who use cannabis 20-30 days per month, 1 in every 3 engages in DUIC 20-30 days every month. Such individuals therefore exhibit DUIC hundreds of times per year and, represent a disproportionate number of DUIC instances, which if addressed can also result in large scale reductions in DUIC at a population level.. There are several barriers to efforts to reduce the incidence of DUIC and DUID among likely repeat offenders.

First, as shown by Figure 5, such individuals engage in DUIC or DUID in large part because they have developed CUD or SUD, which by definition are characteristic of a loss of control over one's substance use and an inability to value the delayed negative consequences of substance use [53]such as DUID. For example, about half of those with CUD engage in DUIC and vice versa [54], and more frequent and problematic cannabis use are associated with greater deficits in responding to delayed consequences [55]. As shown by Figure 5, the development of CUD or a SUD often represent the start of a maladaptive cycle that increases the risk of DUIC and DUID, supports a habitual pattern of repeat offending, and which rarely changes after involvement in the criminal justice system.

Several recent scientific studies have shown that there are effective approaches to reducing DUIC that can be feasibly implemented. Two notable examples are provided in the sections below.

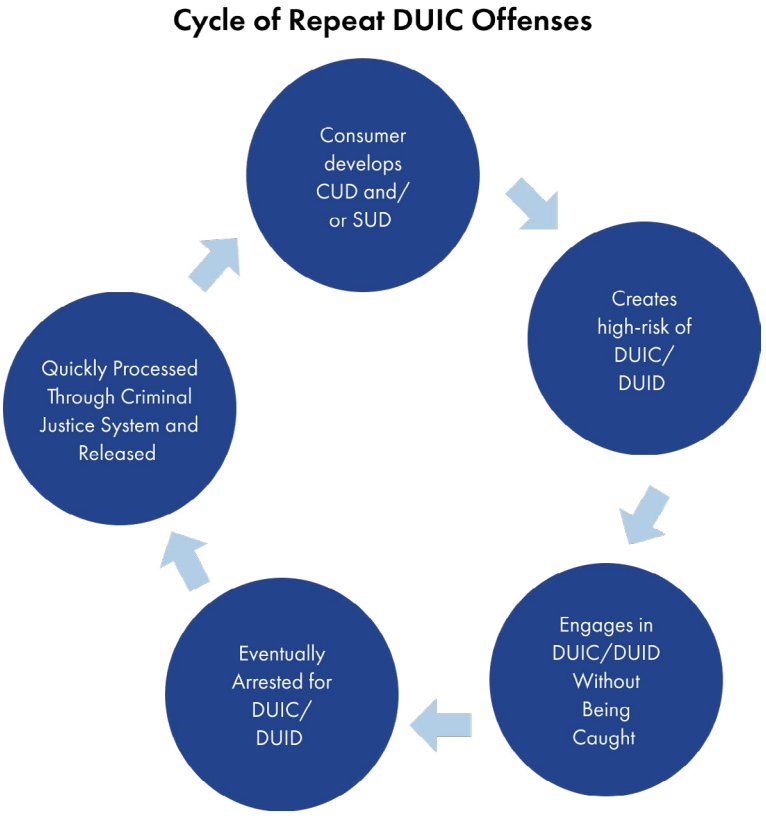
53 Cannabis Use Disorder and Its Treatment | SpringerLink

54 Impact of age at onset of cannabis use on cannabis dependence and driving under the influence in the United States - ScienceDirect

55 Greater delay discounting and cannabis coping motives are associated with more frequent cannabis use in a large sample of adult cannabis users - PMC (nih.gov)

Targeting DUID Recidivism with Swift and Certain Penalties

Figure 6. DUIC Cycle



Policies that are designed to target DUID recidivism without increasing the severity of consequences for DUID have shown strong initial promise. For example, the 24/7 Sobriety program has shown promising initial findings for reducing DUIC/DUID among those who were already arrested for drug impaired driving. The 24/7 Sobriety program is a county opt-in program that facilitates impairment testing twice daily for repeat DUID or DUI offenders. Those who test positive or skip tests receive low severity punishment, but consequences are delivered immediately and with high levels of certainty[56]. The program provides less severe punishment for any future impaired driving instances. However, it increases the probability of punishment and reduces the delay until the consequences are administered which has been shown to reduce county level drug-impaired driving by 9%[57]. Despite showing strong initial effectiveness for reducing DUID, the program does come with challenges such as needing to check oral fluid and urine twice daily, which would require the involvement of others such as Drug and Alcohol consortium staff, and must be cost-effective and easy to implement.

56 24/7 Sobriety Program | RAND

57 A Natural Experiment to Test the Effect of Sanction Certainty and Celerity on Substance-Impaired Driving: North Dakota's 24/7 Sobriety Program | SpringerLink

Training Law Enforcement and Criminal Justice Personnel to Administer Evidence Based Interventions

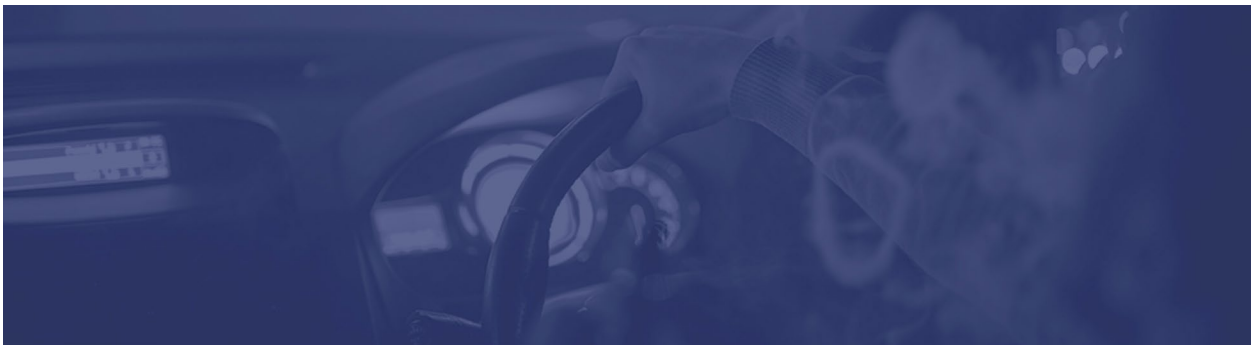
State and local efforts that train law enforcement and employees in the criminal justice system to administer screenings for CUD and other SUDs, and that help properly assess and transition repeat offenders to treatment services, can reduce the likelihood of future DUIC or DUID by reducing the frequency, amount, potency, and severity of cannabis and other substance use. Such approaches are unfortunately rarely incorporated for criminal justice or law enforcement staff involved in DUIC or DUID cases. An exception to this is driving while intoxicated (DWI) courts, which have been shown to help reduce recidivism. However, behavioral health cross-training programs have been helpful for training police and other law enforcement officers to more effectively interact and help those with SUDs and mental health problems [58]. Another opportunity can be gleaned from existing criminal justice environments training staff to implement motivational interviewing [59], which is a brief counseling approach that has been shown to help reduce cannabis and other substance use [60] and that is implemented by some agencies already [61]. Such programs are appealing to many, there is a great need for government funds to develop, implement, and maintain such programs.

58 Delivering Behavioral Health | Bureau of Justice Assistance (ojp.gov)

59 72_2_9_0.pdf (uscourts.gov)

60 Motivational Interviewing for Cannabis Use Disorders: A Systematic Review and Meta-Analysis - Abstract - European Addiction Research 2021, Vol. 27, No. 6 - Karger Publishers

61 https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.eiu.edu%2Fihec%2FMotivational%2520Interviewing%2520for%2520College%2520Police.pptx



Potential Policy and Program Solutions to Reduce DUIC and DUID For States with Legal Cannabis Laws

Section Highlights

- Innovative solutions such as requiring consumption sites to have a traffic safety plan and procedure, prohibiting parking lots and partnering with ride-share companies at cannabis consumption sites should be considered as a part of a larger DUIC/DUID prevention approach.

Traffic Safety Plans for Consumption Sites

A popular trend emerging from the cannabis legalization movement is cannabis consumption sites, locations where consumers over the age of twenty-one may enter a regulated and licensed establishment where it is permissible to consume cannabis onsite. These are often called consumption lounges. Of the eighteen states with adult use cannabis laws, seven include a license type for consumption sites (New York, New Jersey, Nevada, New Mexico, Illinois, Colorado, and California).

Much like alcohol consumption at bars, consuming cannabis at a consumption site poses a potential risk of cannabis-impaired driving. Because of this, statutes, local ordinances, and programmatic guidance can take measures to prevent impaired driving at the advent of this unique license type.

For example, including a traffic safety management plan as a part of the application requirements to become licensed as a consumption lounge may be effective in increasing oversight and responsibility within establishments. This plan may include things like training staff to detect signs of impairment, providing standard operating procedures or scripts in how to prevent a consumer from driving when impairment is detected, and placing signs throughout the establishment reminding consumers they may not drive after they have consumed cannabis. In places that allow public consumption of cannabis, public education campaigns should be prioritized and server training programs similar to those used for alcohol should be prioritized to reduce DUIC.

Discourage Driving and Encourage Rideshare Programs

Some city codes require mandatory parking minimums, where types of establishments are required to have a minimum amount of parking space per occupants or per square footage. In Los Angeles County, bars are required to have one parking spot per every three occupants despite the common goal of discouraging driving after drinking [62]. Prevention of DUIC is ***always*** better than enforcement. Because of the problems with DUIC enforcement discussed in this paper, there may be reasons for states and cities that have legalized a form of onsite consumption to include more stringent policies that promote prevention, particularly in high commerce urban areas. This could include prohibiting cannabis consumption establishments to have parking lots as a means of discouraging driving through limited parking options.

62 https://library.municode.com/ca/los_angeles_county/codes/code_of_ordinances?nodeId=TIT22PLZO_DIV6DEST_CH22.112PA_22.112.070REPASP

Additionally, cities and states across the country have encouraged partnerships or the use of rideshare programs such as Lyft or Uber at cannabis consumption lounges, cannabis events, and bars. Rideshare is often cited as a hopeful approach to addressing DUI in general [63]. One such example comes from the Washington Regional Alcohol Program SoberRide®, who has partnered with Lyft to provide free rides home on high-risk DUIC/DUID holidays for rides that cost up to $15 [64,65]. Scientific studies have shown that ride-share programs are associated with significantly reduced rates of DUI [66,67]. For example, a recent scientific study found that even a small increase in the rideshare trips per square mile at key locations in Chicago would decrease the odds of an alcohol-involved crash,[66] further reinforcing the potential utility of subsidizing rideshare programs during holidays in high-risk geographic areas or neighborhoods. Given that Lyft has already demonstrated potential interest in partnering with local government to provide ridesharing services on holidays, the logistics needed to launch such programs may be fairly easily implemented.

63 http://ndaa.org/wp-content/uploads/NDAA_Lyft_FinalReport.pdf

64 SoberRide – WRAP

65 Washington, D.C. - Lyft

66 Association of Rideshare Use With Alcohol-Associated Motor Vehicle Crash Trauma | Addiction Medicine | JAMA Surgery | JAMA Network

67 Rideshare Trips and Alcohol-Involved Motor Vehicle Crashes in Chicago: Journal of Studies on Alcohol and Drugs: Vol 82, No 6 (jsad.com)

Summary of Recommendations

Based on the evidence and findings presented in this white paper, we recommend the following actions:

Perceived Risk Recommendations

Research and impairment evidence-based public messaging systems to effectively discourage driving under the influence of cannabis and other drugs.

Roadside Testing Recommendations

- *Increase funding to research cannabis and multi-substance impairment.*
- *Fund research and development of innovative impairment detection technology to be used by law enforcement in roadside settings.*
- *Pilot-test the most effective impairment detection approaches for DUIC, such as rapid eye-tracking, alongside DREs to provide additional data and to maintain the use of DREs for other forms of DUID.*

Data Monitoring Recommendations

- *Increase state and federal funding specifically for surveillance development and maintenance of data on DUIC, DUID, motor vehicle accidents, and screening and treatment rates.*

Potential Policy and Program Recommendations

- *Increase funding to train and hire roadside law enforcement and DREs to perform evidence-based brief interventions. Increase screening for SUDs and mental health disorders using an instrument validated among DUI offenders, and warm handoffs from the criminal justice system to treatment services and relevant health professionals.*

- *Pilot-test the most effective impairment detection approaches for DUIC, such as rapid eye-tracking and functional near-infrared spectroscopy, alongside DREs and other technologies like oral fluid and blood testing to provide additional data and to maintain the use of DREs for other forms of DUID.*

- *Ensure that states and localities that permit cannabis consumption sites incorporate strategies to effectively prevent DUIC to include a traffic safety plan, public education and public/private rideshare campaigns.*