COLORADO
Office of Behavioral Health
Department of Human Services

COLORADO IGNITION INTERLOCK EVALUATION REPORT

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The Traffic Injury Research Foundation USA, Inc.

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COLORADO IGNITION INTERLOCK EVALUATION FINAL REPORT

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Submitted to:

Persistent Drunk Driver Committee

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The Persistent Drunk Driver (PDD) Committee is comprised of the Colorado Department of Human Services - Office of Behavioral Health (OBH), the Colorado Judicial Department – Division of Probation Services (DPS), the Department of Revenue – Division of Motor Vehicle (DMV), and the Colorado Department of Transportation (CDOT). The committee is tasked with managing the Persistent Drunk Driver Cash Fund, which consists of monies collected as penalty surcharges to impaired driving offenders, to support programs that are intended to deter persistent impaired driving and educate the public, with particular emphasis on the education of young drivers, regarding the dangers of impaired driving. It is noted that while the statutory title of the committee specifies "drunk driving", the committee focuses on impaired driving caused by any chemical source.

The committee is thankful to the Department, Office, and Division leadership for their support of our evaluation efforts as we continue to explore ways to impact impaired driving in the State of Colorado. We are also appreciative of the insight and dedication of Dr. David S. Timken, PhD., Center for Impaired Driving Research and Evaluation.

EXECUTIVE SUMMARY

Driving under the influence of alcohol is a persistent traffic safety problem in Colorado, and elsewhere. Therefore, Colorado has implemented several evidence-based best practices aimed at addressing this problem. One of the countermeasures used in Colorado is an Ignition Interlock Device (IID) Program. Interlock programs have been proven to reduce alcohol impaired driving. More recently, studies have shown that interlocks can also reduce alcohol-related crashes and fatalities.

This report presents the findings from a study evaluating Colorado's interlock program. The purpose of this evaluation is to conduct baseline research to determine the impact of the interlock program on alcohol impaired driving. A comprehensive review of Colorado's interlock program, education and treatment programs, and probation services was conducted to determine the current impact and efficacy of these programs, individually and combined, in their goal to reduce impaired driving recidivism rates.

The primary questions selected for this baseline impaired driving interventions system evaluation included:

What is the impact of the IID program on impaired driving recidivism?

Does IID participation impact education and treatment compliance and completion rates?

Does IID participation impact probation compliance and completion rates?

Is there a cumulative impaired driving intervention programs impact?

While additional, more in-depth research is indicated, this study indicates that the current programs are effective, particularly when implemented in concert.

The study period for this evaluation project began on June 1, 2010 through to December 31, 2013. Data from the Colorado Division of Motor Vehicles (DMV), the Colorado Office of Behavioral Health (OBH), and the Colorado Division of Probation Services (DPS) were matched using a probabilistic data matching procedure to create a data set of offenders who are subject to the interlock program and different comparison groups not subject to the interlock program. The number of matched records in the final data set included:

- 85,106 DUI convictions;
- 35,292 IID program enrollees;
- 42,290 clients in education and treatment programs;
- 27,918 probationers.

The data analysis methods used to answer each of the research questions consisted of time-to-event and logistic regression analysis as well as simple univariate and bivariate statistics such as frequency tables, means and correlation measures. All analyses were completed using R and Stata® software packages and Microsoft Excel, as needed.

The main findings are that Colorado's program is both effective and efficacious. In particular, data analysis results revealed that:

- Colorado's IID program is effective. The recidivism analysis shows a longer-term recidivism rate of 14.7% for successful IID program participants vs. 21.3% recidivism for those who were not. This difference in recidivism is more pronounced when combining the effect of successful education and treatment program participation, and probation services. Recidivism rate difference increases; 13.12 % for those who complete all three programs vs 26.07% for those who fail to complete any of the three. The results show that the IID, education and treatment, and probation services programs combine to reduce the chances of recidivism by half.
- Colorado's IID program is efficacious. The installation results show significant growth from already relatively high installation rates, 41.5% during the overall study period ending in 2013, and increasing to 63.7% in 2016. IID program changes since 2014 continue to show that more growth is still possible, and necessary in light of the impact stated above.

Additional study considerations indicate that:

- The IID program benefits from its combination with education and treatment, and probation services. The synergy between the three programs is demonstrated in their combined impact on recidivism and on each other. On their own, they consistently lower the chances of long-term recidivism; education and/or treatment completion reduce longer term recidivism from 24.7% to 17.8%, and probation completion from 26.5% to 17%. The program synergies are significant; probation completion and IID enrollment increase chances of education and treatment completion by five and three times, respectively.
- Notable predictors of success, other than the synergistic impact of the three programs discussed above include; being in full- or part-time work, school, retired or actively seeking work, female, and being married. Negative factors include; high levels of BAC at time of arrest, test refusals and number of prior DUI offenses.

This study allows Colorado to start the process of reviewing current impaired driving interventions, assessing their efficacy, and making some determinations of next steps.

- This evaluation process and the reliability of the study results has been strengthened by the collaboration of the three stakeholder agencies, particularly because the availability of various data sets, over long periods of time helped build participants' history in each program.
- Even the observations regarding the limitations of both this system evaluations and the system efficacy are valuable tools that help us design and implement quality impaired driving interventions engaging all stakeholders.

As expected, there were limitations that impacted the resources available to dig deeper into the assembled data, collaboration with the agencies for follow up analyses, and the timing of the delivery of these results.

- These include a lack of accurate entry of data elements for deterministic linking across data sets, missing data for variables like sex and IID program completion status across the different data sets.
- The level of detail to determine success levels of the offender within each agency and the influence of the three agency programs upon each other was originally intended to help identify as many associated relationships between agencies regarding offender profiles and program successes as possible. However, only high-level correlations were accomplished in this study due to the limited availability of data in terms of individual offender violations within each agency.

While the results of this study demonstrate that the Colorado interlock program is successful in reaching its objectives, the findings also suggested that improvements are possible. Therefore, recommendations were formulated that can help improve the delivery of the interlock program. These include:

- Continue the delivery of the program and seek ways to increase the installation rate.
- Strengthen the linkages between the interlock program, education and treatment, and probation programs.
- Strengthen monitoring of interlock compliance to increase completion rates, particularly among first time participants.
- Consider removing the option to wait out the interlock period for first time offenders.
- Improve data collection for future evaluations.

In conclusion, the Colorado interlock program is effective in reducing alcohol impaired driving recidivism, but improvements are possible to further bolster the delivery of it.

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INTRODUCTION

Drunk-driving fatalities decreased 51 percent from 1982 to 2015, but it seems progress has been eroded in recent years *(The National Center for Statistics and Analysis, National highway Traffic Safety Administration)*. According to the Federal Bureau of Investigation (FBI) Uniform Crime Reports (UCR), there were 1,017,808 DWI arrests in 2016 *(The abbreviation DWI (driving while impaired or intoxicated) is used here when describing national impaired driving occurrences as reported by NHTSA. DWI is used as a descriptive label to create consistency here, even though Colorado uses the terms DUI (driving under the influence), and DWAI (driving while ability impaired))*. The National Highway Traffic Safety Administration (NHTSA) reported 10,497 alcohol-impaired driving fatalities in 2016, which accounted for 28% of total fatalities. This is a 1.7 percent increase from 2015, compared to an overall increase in fatalities of 5.6 percent (NHTSA 2017). This is the second year of increased fatalities since 2014, when there were 9,943 alcohol-impaired driving fatalities (see Vanlaar et al. 2017a). NHTSA also estimated that the relative risk of a crash for drivers with a Blood Alcohol Content (BAC) of .05 or greater is 6.75 times the risk for drivers with no alcohol in their system (DOT HS 812 117, February 2015).

Interlock programs have been proven to reduce impaired driving while the interlock is installed in the vehicle. Furthermore, interlocks are associated with a reduction in DWI deaths of up to 15% (Marques et al. 2010; McCartt et al. 2013; Kaufman & Wiebe 2016; Lucas et al. 2016; Vanlaar et al. 2017b; McGinty et al. 2017; Teoh et al. 2018) and reductions in DWI recidivism (Willis et al. 2004; Elder et al. 2011; McCartt et al. 2013). Increasing program participation is paramount to reduce impaired driving fatalities and injuries. A NHTSA study of 28 state interlock programs revealed that there were eight interlock program components that may increase interlock use (Casanova Powell et al. 2016). The feature that was found to have the highest correlation with increasing interlock use was implementing a strong interlock requirement and/or incentive in legislation or policy.

Driving under the influence (DUI) and driving while ability impaired (DWAI) are persistent traffic safety problems in Colorado and elsewhere. Colorado has implemented several evidence-based best practices aimed at addressing the impaired driving problem. The purpose of this evaluation is to conduct baseline research to determine individual and combined impacts of the Ignition Interlock Device (IID) on Colorado's efforts to reduce impaired driving recidivism rates. A comprehensive review of Colorado's Ignition Interlock Program, DUI education and treatment programs, and probation services was conducted to determine the current impact and efficacy of these programs in their goal to reduce impaired driving recidivism rates. This evaluation will also identify potential areas where these programs can improve to further decrease impaired driving related traffic injuries and fatalities and overall enhance public safety.

This research project seeks to quantify the effects that Colorado's impaired driving interventions have had on recidivism, both individually and in combination with one another. The IID program in Colorado is well established (beginning with a pilot in 1995) and received high marks in a NHTSA-sponsored evaluation of 28 states' ignition interlock programs (DOT HS 812 145, May 2015). The lowest rating was 3 out of 5 for having "moderate" penalties for failure to install an interlock as required. All other ratings were 4 or 5 out of 5 for program requirements, monitoring, uniformity,

coordination, education, resources, and data. This report also included a brief timeline of Colorado's IID-related laws and programs. This included the 1995 pilot, a probationary program started in 1996, the introduction in 2001 of a high-BAC/repeat offender increased IID restriction duration and expansion of the program to first-time offenders, and, in 2007, expansion to require all first-time offenders seeking early reinstatement to participate in IID along with further enhancements of the program requirements for repeat and high-BAC offenders.

BACKGROUND

Impaired Driving In Colorado

The National Safety Council Motor Vehicle Preliminary Fatality Estimates reports that motor-vehicle deaths in Colorado increased each year since 2014. An 11% increase from 2015 (545) to 2016 (605) and a 30% increase since 2014 (465). NHTSA FARS data reports an increase in total motor vehicle fatalities from 2014 (488) to 2015 (546) which is an 11.9% increase for Colorado. With regard to alcohol-impaired driving fatalities, NHTSA reports that for 2014, 160 fatalities resulted from crashes in which at least one driver had a BAC value of .08 or greater (DOT HS 812 231). This represents 33% of all traffic fatalities in Colorado that year. However, in 2015 NHTSA FARS data shows a 5.6% decrease in impaired driving fatalities from 2015 (160) to 2016 (151) (*The 2016 information is preliminary information and may be subject to change upon completion of the 2016 crash data. Further information can be located at: https://crashstats.nhtsa.dot.gov.)*. According to the Colorado Highway Safety Office, 77 people a day are arrested for an impaired driving charge.

The History of the Colorado Ignition Interlock Program

The first interlock law was drafted in 1995 and implemented in 1996. This was a pilot voluntary probationary license program that allowed drivers revoked for alcohol-related driving violations to petition the Colorado Department of Revenue, Division of Motor Vehicles (DMV) for an interlock restricted probationary driver license to be used during the term of the revocation. Repeat offenders under a license restraint/revocation or suspension due to an alcohol-related offense could apply for a probationary license. This interlock probationary license would allow interlock restricted driving during limited times and purposes for double the duration of the initial restraint. In 1996, after delays in interlock vendor contracting, the pilot program got underway.

Relevant to the Colorado ignition interlock program, in 1998 the Persistent Drunk Driver (PDD) Act was established. This act defined the PDD and created the PDD Cash Fund, which is funded by a surcharge imposed on convicted DWAI/DUI offenders. C.R.S. 42-1-102(68.5) defines a "Persistent drunk driver" as any person who:

- Has been convicted of or had his or her driver's license revoked for two or more alcohol-related driving violations;
- Continues to drive after a driver's license or driving privilege restraint has been imposed for one or more alcohol-related driving offenses; or
- Drives a motor vehicle while the amount of alcohol in such person's blood, as shown by analysis of the person's blood or breath, was 0.15 or more grams of alcohol per one hundred milliliters of blood or 0.15 or more grams of alcohol per two hundred ten liters of breath at the time of driving or within two hours after driving.

This act also required PDDs to complete Level II Alcohol Education and Treatment and to maintain an SR22 for no less than two years and often times for three years, as a mandatory term of reinstatement. PDD funds are subject to annual appropriation by the general assembly with the

scope of their use stipulated by statute. Overall, the primary purpose of the fund is to support programs that are intended to deter persistent drunk driving or educate the public, with particular emphasis on the education of young drivers about the dangers of persistent drunk driving. In recent years the scope of the fund was expanded to include assisting indigent DUI offenders with the cost for required treatment or intervention services.

As part of the legislative charge for the pilot project the University of Colorado Health Sciences Center conducted a study to evaluate the probationary license program and reported its findings during the 2000 legislative session. The study identified significant weaknesses within the program, including strict statutory eligibility limitations. Offenders were limited to time, place, and purpose delineated driving. Qualification of the probationary license with an interlock required doubling the restricted license period. Offender eligibility was discretionary by the individual hearing officer who was involved in reviewing offender records, qualifying, and monitoring offenders. The sanction for violations for the pilot program was removal from the program.

The DMV performed their own study analyzing motor vehicle records of the incarcerated population of alcohol offenders in Denver. This study showed alcohol events seemed to spawn other violations on the offender's records. These results were analyzed by the DMV with a team of judges and magistrates who decided to change their focus to first-time offenders. This first-time offender approach was initiated to tackle at the inception the problems that are created by the DUI and alcohol offense.

In 2001, as a direct result of this study, the legislature created an early reinstatement program that reinstated full driving privileges with an interlock restriction and is compliance and incentive based. Offenders are no longer under revocation or suspension during the interlock restriction, but evidence of continued drinking and driving attempts are sanctioned by extensions of the interlock requirement. All repeat alcohol offenders were required to participate.

The Colorado Task Force on Drunk and Impaired Driving (CTFDID) was established by the Colorado General Assembly in 2006. Senate Bill 192 was passed to create a committee of stakeholders and provide a platform for collaboration to identify impaired driving issues in the state and to provide potential strategies for effective solutions to the impaired driving problem in Colorado. The mission of the CTFDID is "to support the prevention, awareness, enforcement, and treatment of drunk and impaired driving in Colorado through strong partnerships with public, private and non-profit organizations." Members of the CTFDID are designated by statute and represent various state agencies, the law enforcement and legal community, safety advocates, private businesses, and citizens.

In 2007, the legislature made the program mandatory for high BAC (0.17) offenders, extended the mandatory participation for repeat and high BAC offenders to two years and introduced a highly incentivized first-offender program for those who have committed a per se violation (BAC .08-.149). If approved for early reinstatement, first offenders would reduce their hard revocation from nine months to one month and regain driving privileges with an eight-month interlock requirement. These per se violation first-offenders would also be eligible for an unrestricted driver license and removal of the interlock device after four months of clean interlock compliance. The

one-month hard revocation begins on the date of either the administrative license revocation (ALR) or the Department's receipt of a notice of conviction for Driving Under the Influence (DUI).

As of January 1, 2014, Colorado legislation reduced the high-BAC limit from .17 to .15. This legislation also defined the persistent drunk driver designation to include any person who refuses to cooperate in a chemical test requested by an officer. First-time offenders who refuse are now required to install an ignition interlock for a two-year term. This legislation also reduced the repeat offender early reinstatement with an interlock provision to one month. As of January 1, 2015, all interlocks require a camera and as of August 2015 all felony DUI offenders are required to install an interlock for the duration of their parole.

Colorado Ignition Interlock Program History

PROGRAM DESCRIPTION

The DMV administers the state's administrative interlock program. Courts are encouraged to use interlocks as a component of probation (*DMV does not monitor court-ordered interlock use outside of the administrative license revocation process. Courts and probation officers may monitor the offender's interlock performance directly using the offender-selected interlock vendor's proprietary computer system)*. Colorado state statute allows a judge to order an interlock as a condition of probation or bond for impaired driving offenses. Court convictions received by the department may carry additional reinstatement requirements when no Express Consent Per Se, or Refusal, is issued or received by the department. It is assumed the licensing agency will require the interlock device when a DUI offender is eligible or when it is mandatory by statute.

Program eligibility for all offenders is administered uniformly across Colorado and is determined by eligibility requirements defined in statute. Those seeking reinstatement of driving privileges with the interlock must meet all other reinstatement requirements associated with their license suspension or revocation in order to qualify. Eligible DUI offenders can have their full non-commercial driving privileges reinstated with an interlock restriction. Evidence of continued drinking and driving attempts are sanctioned by extensions of the interlock requirement.

Current Law

Overview

PDDs including all repeat offenders, high BAC (0.15) DUI offenders, and offenders who refuse chemical testing as required by Colorado's Express Consent law must participate in the interlock program for a two-year term. These offenders are eligible for reinstatement of the non-commercial driving privilege with an interlock-restricted driver license. Level II alcohol and drug education and therapy is a requirement for all offenders who meet the PDD criteria.

Low BAC first-time offenders (BAC .08-.149) can reduce their nine-month hard revocation to one-month hard revocation with an interlock device. The one-month hard revocation begins on the date of either the administrative license revocation (ALR) or the Department's receipt of a notice of conviction for Driving Under the Influence (DUI). Low BAC first-time offenders may wait out the full suspension period (9 months) with no driving and then apply for an unrestricted driver license.

Early reinstatement with an interlock-restricted driving privilege is limited to residents of Colorado who are 21 years of age or older at the time of the violation and have satisfied all reinstatement requirements. To be eligible for a reinstatement for an offence occurring after January 1, 2014 with a Per Se or DUI conviction, offenders must have served a one-month suspension prior to installing an interlock. In addition, those offenders who refuse a BAC test are required to have served two months' hard revocation for the alcohol-related restraint.

Laws

Current Colorado impaired driving laws, C.R.S. 42-2-126 (alcohol revocations), C.R.S. 42-2-132.5 (Interlock), 1 CCR 204-30, Rule 11 (Ignition interlock rule), are described below:

- Express Consent Law. By driving a motor vehicle on Colorado public roadways, drivers are expressly consenting to submit to chemical testing if a law enforcement officer has reasonable suspicion to believe the person may be driving under the influence or their ability to operate a motor vehicle is impaired because of alcohol, drugs, or both.
- HB 15-1043 – Concerning penalties for DUI offenders. This increases the penalty from a misdemeanor to a class 4 felony after three or more prior convictions of a DUI, DUI per se, or DWAI; vehicular homicide; vehicular assault; or any combination thereof (in a lifetime). The court must determine that all appropriate sanctions and options have been exhausted before sentencing to DOC. It also allows for a community corrections sentence for those with 3 offenses. If convicted of a felony DUI and sentenced to the DOC, the parolee will be required to use an interlock for the period of parole.
- Habitual Traffic Offenders. This is defined as an offender convicted of 3 "qualifying offenses" in 7 years (based on date of violation, not conviction). It requires a license revocation for 5 years. Early reinstatement may be allowed with an interlock requirement for a minimum of 1 year or the remainder of the restraint period if at least one contributing alcohol driving offense occurred on or after 07/01/2000; and at least one month of hard revocation was served.
  - Qualifying offenses
    - Driving under suspension or revocation
    - Driving while ability impaired (DWAI)
    - Driving under the influence (DUI)
    - Reckless driving
    - Vehicular assault
    - Vehicular homicide
- DMV per se requirements
  - 1st offender 0.08-0.149
    - May be eligible to reinstate early after serving a one-month hard revocation
    - 8-month interlock requirement (can remove the interlock device and apply for an unrestricted driver license early after 4 months with no ignition interlock device (IID) violations
  - 1st offender (0.150 or greater)
    - May be eligible to reinstate early after serving a one-month hard revocation
    - 2-year interlock requirement

- 1st Per Se if under a separate alcohol driving restraint
  - May be eligible to reinstate early after either an 8-month interlock requirement (2 years for PDD Designation) or the remainder of the longest restraint period and approved by the Department for early reinstatement.
- Repeat offender (2nd and subsequent)
  - 2-year interlock requirement from the date of reinstatement
  - May reinstate early after serving one month
- Refusal
  - 2-month revocation, 2-year interlock requirement
- Persistent Drunk Driver
  - Pursuant to C.R.S. 42-1-102 (68.5) a persistent drunk driver includes those offenders convicted of driving under restraint when that active restraint was an alcohol violation; a high BAC first offense (0.15 or greater), two or more prior impaired driving offenses; or refuses to take the test (for offenses on or after 01/01/14).
  - If a driver refused a chemical test prior to January 1, 2014 and was previously ineligible to reinstate early with an interlock, they may now either finish serving the remainder of their revocation and reinstate with full driving privileges, or serve at least two months and apply for early reinstatement with an interlock for one year. They are not eligible for Financial Assistance in this case.
  - If a driver has been designated as a persistent drunk driver due to high BAC, multiple alcohol violations, or refusals, the hard revocation period required prior to early reinstatement with an interlock has been reduced to one or two months, respectively.

Law Enforcement/Administrative License Revocation

Law enforcement works closely with the DMV on training and interlock content knowledge. The DMV provides notice of revocation forms to law enforcement. If an officer suspects a driver is impaired, the officer requests a blood or breath test. Test results exceeding per se limits or the refusal to test are reported on the Express Consent Affidavit and Notice of Revocation form, which is then forwarded to DMV with any required documentation. The form is data entered by DMV staff, which initiates the revocation process.

The DMV has a communication center that communicates with law enforcement 24 hours per day, 7 days per week, 365 days per year. Law enforcement officers may contact the communication center at any time to confirm driver status. Images of driver photos may be transferred to law enforcement by email upon request during active investigations. Colorado interlock restricted licenses are the only license in Colorado to show the word “restricted” at the top of the license to alert law enforcement that an interlock device is required in the vehicle.

An offender who is required to install an interlock device who is found driving without an interlock or violating a rolling retest can be cited for violating the license restriction. The violations should also be reported to the DMV using a DR 2057 Incident Report. Either a conviction on the charge or an incident report submitted to the DMV will trigger a license revocation, after which the driver will have a new interlock requirement going forward.

Offender Monitoring

Offenders are notified by the DMV Driver Control Section of their requirement to install an interlock device. If an offender claims they do not own or have access to a motor vehicle, they may submit a restricted license affidavit of non-ownership and are required to install an interlock device once a vehicle becomes available to the offender (42-2-132.5(1)).

Offenders may choose one of four interlock vendors, including Consumer Safety Technology (Intoxalock), Guardian Interlock Systems, #1A LifeSafer, and 1A SmartStart Inc. Vendor requirements are governed by contract with the State of Colorado, not regulation. The State of Colorado has contractual requirements for vendors including mandatory statewide service and a maximum interval of 60 days for device downloads. The vendor contract states that any offender can leave one vendor and go to another without charge or contractual obligation, as long as the offender is in compliance with the installation with another vendor. Offenders sign an Interlock Recipient Information Attestation Document acknowledging that their interlock information will be shared by the vendor and uploaded to the Online Interlock System (OIS) *(The Online Interlock System (OIS) was replaced by the new Driver Record Identification Vehicle Enterprise Solution (DRIVES) on February 01, 2017)*. to be monitored by the DMV Driver Control Section. DMV monitors interlock data during the period of administrative license revocation. Data beyond this time period as may be required by probation or court is not monitored nor required by DMV.

Once the interlock is installed, the OIS generates an interlock installation certificate for that offender. Before reinstating their driving privileges with interlock, the offender must complete a series of documents including: Restricted License Ignition Interlock Agreement Affidavit Form DR2058, Application for reinstatement form DR2870, Certificate for Required Alcohol and Drug Education document DR 2598 or DUI/DWAI Referral Summary (DRS) for a Level II Education and Therapy program showing completion of courses (i.e., discharge) or an Affidavit of Enrollment DR 2643, if applicable. The certificate or DRS requirement is determined by the associated BAC or the number of alcohol violations on the driver's record. The driver must pay a $95 reinstatement fee to the Department of Revenue. The offender must also provide proof of SR22 from their insurance company.

The DMV will notify the offender of acceptance by mail. The offender must contact a Driver's License office to schedule written and driving tests with the offender's interlock-equipped vehicle. Once the offender passes both tests, the offender is issued an interlock-restricted driver's license.

Offenders must schedule downloads of the device at least every 60 days. Once a download is completed, OIS generates a check-in certificate. Vendors are required to interpret log reports and send violations to the DMV Driver Control Section. The vendor is responsible for evaluating the data

to determine if circumvention was attempted or took place, as well as determining if the following events occurred:

- Ignition prevention because of excessive BAC
- Excessive BAC measured at the rolling retest
- Refusal on a rolling retest request
- Some other person starting or retesting the ignition interlock.

If the vendor determines that one of the events or circumvention was attempted or successful, notification is indicated by the OIS. Vendors must report to the DMV Driver Control Section a record of the following events:

- Lease signing
- Circumvention attempts
- Eligibility
- Data downloads
- Removals
- Installations
- Change of vehicle

Violation reports from the vendor (pass or fail) are uploaded on the FTP transfer weekly. This sets up triggers for each offender. If an offender accumulates failing flags in three of any 12 consecutive calendar months, their interlock requirement is extended for a year. A letter of notification of suspension is generated and mailed to the interlock restricted driver; the driver can avoid the suspension by extending the interlock contract for an additional year. The offender can request a hearing and the hearing officer will consider aggravating and mitigating factors prior to making a decision.

Once the offender completes the term required for the interlock restricted license, the offender may remove the interlock device. A removal notification is generated by the OIS. If a non-high BAC first offender has four consecutive months of compliance with no violations, a Notice of Eligibility for Unrestricted Driving Privileges letter is sent to the offender, notifying them they are eligible for an unrestricted license. If an offender removes the interlock before the interlock term is completed, a notice of suspension is generated and send to the offender.

Device Certification

Each vendor must have their device models certified by the Colorado Department of Public Health and Environment against the 2013 NHTSA model specifications. The State of Colorado has adopted the 2013 NHTSA model specifications and best practices and requires vendors to adhere to the same by contract. The set point of the interlock to report failure is 0.025 BAC. Camera devices are mandatory after January 1, 2015. Devices must be able to:

- Operate using an alcohol specific sensor technology;

- Employ a digital camera to photograph the person using the device, every time the device is used;
- Require rolling retests at random intervals; and
- Have the capability to prevent the normal operation of the vehicle by an offender who fails the retest at .025 BAC or above.

Online Interlock System (OIS)

The OIS uploads the offender signed lease and certification of installation once the vendor enters this information into the system; therefore, DMV's reliance on paperwork from the offender is reduced, as are DMV's time and cost for administering these records. All vendor data, including device downloads, calibrations, and removals are transferred through the OIS, which enables the DMV to monitor offenders more efficiently and timely. Offender personal identifiers, demographic information and interlock data is validated, batched and sent by the vendor to DMV's Driver Control Section overnight. The system reports daily installations and removals, weekly device data logs and reports violations and circumventions. The compliance information is accessed by staff for monitoring and setting up compliance actions. OIS determines offender financial assistance eligibility and verifies that offenders are installing at the proper time. The OIS identifies problems and notifies Interlock Reinstatements Unit of information to be corrected or addressed. The OIS minimizes errors and interaction problems. The Interlock Reinstatement Unit processes interlock reinstatements, interacts with interlock-restricted drivers, validates eligibility and removal dates in OIS for drivers so interlock vendors know when they can uninstall the device.

Colorado Interactive was the designated agent for the state portal authority, which developed and supported the OIS software. Colorado Interactive developed and maintained the system with fees that were charged to vendors per interlock installation. The OIS was replaced by the Driver License Record Identification Vehicle Enterprise Solution (DRIVES) on February 21, 2017. The DRIVES system is hosted by Fast Enterprises.

Financial Assistance Program

Colorado has a specific fund which, for the duration of this report, was also administered through the OIS. The Department of Revenue administers an account established to provide financial assistance for first offenders who cannot afford the Interlock. A recent provision included those designated as persistent drunk drivers completing their initial installation on or after January 1, 2014, who are unable to pay the full costs of the device. If an offender qualifies for assistance and funds are available, the Department may pay up to $400 of the total interlock expenses. Eligibility is determined at the time of interlock installation.

To apply offenders must meet the following criteria:

- First-time offenders with a violation date on or after January 1, 2009 or who have been designated as a persistent drunk driver completing the initial interlock installation on or after January 1, 2014.

- Lawfully present in the U.S. and a Colorado resident.
- An adult driver (21 years of age) at the time of the violation.
- The Federal Adjusted Gross Income (FAGI) on the State of Colorado tax file of the offender must fall within a predetermined percentage of the current year Poverty Guidelines established by Health and Human Services.

The initial determination for Financial Assistance is completed by the OIS during installation. The technician at the ignition interlock service center asks offenders if they would like to apply for financial assistance. If yes, then the system prompts them to provide the last four digits of their Social Security Number which authorizes a check against their Colorado tax file to determine eligibility based on income level and filing status. All eligibility requirements must be met to qualify for assistance. The OIS will note "the applicant is eligible for financial assistance" or "the applicant is not eligible for financial assistance." If an offender is declined but meets the eligibility requirements, the offender may file an appeal with the Department.

If an offender is approved for Financial Assistance by the OIS, the system provides a credit and the vendor reduces the installation cost by $50. A pro-rated per diem amount of financial assistance is calculated on interlock lease charges at each driver check in. Any subsequent suspension or revocation of driving privileges will terminate financial assistance. The OIS provides warning messaging information related to the offender's driving record, enhancing communication between the DMV and the driver. As noted above, this function is now done within the DRIVES system.

Consequences of Violations

Any Interlock-restricted driver who either drives a non-equipped vehicle or attempts to circumvent the proper functioning of the interlock device is subject to a license revocation with no driving for at least one year. The statute for violating an interlock restriction in Colorado is listed at C.R.S. 42-2-132.5(10). It is a class one traffic misdemeanor to either drive a non-interlock equipped vehicle or to circumvent the proper use of the interlock device. The statute requires the law enforcement officer to confiscate the license and file an incident report with the DMV. If convicted of this violation in court, the driver will lose their driving privileges pursuant to C.R.S. 42-2-132.5, (7). The driver may also lose driving privileges if an incident report is filed by a police officer per C.R.S. 42-2-132.5(7).

The Interlock device must be serviced monthly or at intervals no greater than 60 days by the licensed/authorized service center. An Interlock-restricted driver who fails to report for device servicing within the 60-day maximum intervals between downloads is subject to license suspension with no driving until that driver comes back into compliance. Any driver whose interlock lease is cancelled by the provider or before the driver's requirement is completed will be notified of a pending suspension should they not enter into a new lease. If the new lease is not supplied to the department within 10 days of receiving the notice, the driver is suspended until the driver enters into a new lease agreement. If the device prevents operation of the vehicle after detecting alcohol in three of any twelve consecutive months, the interlock restricted driver must keep the interlock device and be under the interlock restriction for an additional year, unless successfully appealed.

The license of drivers Designated as Habitual Traffic Offenders who are convicted of three "qualifying offenses" which occurred over a seven-year period of time (based on date of violation, not conviction) will be revoked for five years. "Qualifying offenses" include but are not limited to:

- Driving under suspension or revocation
- Driving while ability impaired (DWAI)
- Driving under the influence (DUI)
- Reckless driving
- Vehicular assault
- Vehicular homicide

Habitual Traffic Offenders may be eligible for early reinstatement with an interlock requirement for a minimum of 1 year or the remainder of the restraint period if:

- At least one contributing alcohol driving offense on or after July 1, 2000; AND
- Served at least one month of revocation and be approved for early reinstatement by the DMV.

PROBATION

Colorado statute allows a judge to order an interlock as a condition of probation for impaired driving offenses (C.R.S. 42-4-1307). Colorado Judicial Department, Division of Probation Services (DPS) is currently responsible for conducting DUI offender evaluations.

In 1979 Colorado passed legislation creating the Alcohol & Drug Driving Safety (ADDS) program in each of the state's 22 judicial districts. This created a standardized process for screening impaired driving offenders and referring DUI offenders to licensed DUI treatment programs. The screening of all DUI offenders following arrest can be done pre-or-post sentencing. This is usually a 50/50 split decided by the court, although it is more likely that post-sentencing evaluation is done for first time offenders. Being able to get to their probation officers without driving under restraint is an incentive for offenders to install an IID on their vehicles. Courtesy supervision is upheld with other districts.

DMV and judicial records do not coincide or match since the systems are separate and administrative action on the DMV side does not affect the outcomes in the criminal matter. All Colorado probation records are housed in one database except the Denver City and County Probation records. The Constitution of Denver set up the City and County of Denver as its own entity. Colorado has one repository for arrest records, which is the Colorado Bureau of Investigation (CBI). All municipal agencies report to CBI.

Current probation requirements are as follows:

- 1st offense Drunk Driving Conviction – Misdemeanor (possible class 4 felony if injury-related DUI)
  - 48 to 96 hours mandatory public service (community service)
  - possible period of probation for up to 2 years
- 2nd offense – Drunk Driving Conviction – Misdemeanor (possible class 4 felony if injury-related DUI)
  - 48 to 120 hours mandatory public service (community service)
  - a period of probation for at least 2 years
- 3rd offense (and subsequent) DUI – Drunk Driving Conviction – Misdemeanor (possible class 4 felony if injury related DUI)
  - 48 to 120 hours mandatory public service (community service)
  - a period of probation for at least 2 years

TREATMENT

Colorado Revised Statute (C.R.S. 42-2-132) requires completion of a Colorado Department of Human Services, Office of Behavioral Health (OBH) licensed Level I or Level II alcohol education and therapy program by impaired driving offenders. As previously mentioned, evaluations are carried out by DPS (C.R.S. 42-4-1301.3(3)(c)(IV). Education and therapy classes must begin after the date of the recent alcohol violation.

Following a DUI/DWAI conviction an offender completes an evaluation (differential screening) by a specially trained probation officer through the ADDS program. This screening process must include validated instrumentation, i.e., the ASUDS (adult substance use driving survey), along with a structured interview and other considerations including BAC, driving history, participation in prior education and/or treatment programs to make a recommendation to the judge on the most appropriate level of treatment.

The ASUDS is an 89-item psychometric-based, self-report, differential screening instrument, designed and normed for impaired driving offenders. It is appropriate for offenders sixteen years or older, and may be administered by self-report or interview format and should always include a structured interview. The ASUDS meets the needs of a self-report instrument that is an essential component of a convergent validation approach to the assessment of patterns and problems associated with AOD (alcohol and other drugs) use within impaired driving populations (Wanberg & Timken, 1998). This evaluation process is standardized in all 22 of the state's judicial districts and results in recommendations made to the court. After screening, DPS makes referrals based on the entire evaluation process, including the interview, consideration of collateral variables such as BAC and prior offenses, and the results of the ASUDS. Often, the client is ordered to complete the ADDS evaluation and recommended treatment. Unless there is objection to the recommendation, the court does not make further orders regarding treatment in these cases. Placement criteria are based on the latest edition of the American Society of Addiction Medicine (ASAM) criteria.

DUI/DWAI treatment services consist of DUI/DWAI specific education and therapy. Possible levels of care recommended can include weekly outpatient, intensive outpatient or intensive residential treatment. In accordance with 2 CCR 502-1 Behavioral Health Rules, OBH develops and enforces rules for licensed Level I and Level II DUI education and treatment programs and monitors the provider and offender outcomes. Only state licensed agencies can provide DUI/DWAI services.

The OBH Interlock Policy went into effect July 2013 and requires DUI-licensed programs to:

- Screen all their DUI clients for interlock requirements
- Include Interlock education in Level I and Level II Education
- Offer interlock counseling to eligible clients
- Train DUI counselors in Interlock Enhancement Counseling (IEC)

Education and Treatment levels are described as follows:

- Level I Education

- 12 hours of DUI education over a minimum 3-day period
- No more than 4 hours can be conducted in one calendar day.
- Typically conducted in a group or class.
- Not appropriate for someone who has had more than one impaired driving offense, or one offense with a high BAC or refusal.

> Level II Education

- 24 hours of DUI education over 12 weeks.
- Typically conducted in a group setting, class size is limited to not more than 12 regularly attending.
- Can be recommended by itself or may be followed by Level II Therapy.

Level II education and therapy is required for the following offenses (in addition, the DMV has a mandatory 2-year interlock requirement in these circumstances):

> Convicted of 2 alcohol violations that occurred within 5 years, OR

> Convicted of 3 or more alcohol violations in a lifetime, OR

> Revoked for having a BAC of 0.15 or greater (prior to Jan. 1, 2014, 0.17 or greater)

> Revoked for multiple BAC tests of 0.08 or more (Per Se)

> Revoked for refusal to take the test (on or after Jan. 1, 2014)

Level II therapy requirements are conducted as weekly outpatient treatment. Level II therapy is also offered in higher levels of care, which include enhanced outpatient (3-8 hours per week), intensive outpatient, and intensive residential treatment.

Level II Therapy for impaired driving offenses prior to Jan. 1, 2014:

> Track A, 42 hours over 21 weeks, usually for a first-time offender with a BAC below 0.17;

> Track B, 52 hours over 26 weeks, usually for a first-time offender with a BAC of 0.17 or above;

> Track C, 68 hours over 34 weeks, usually for someone with a prior DWAI/DUI, and a BAC below 0.17;

> Track D, 86 hours over 43 weeks, usually for someone with a prior DWAI/DUI, and a BAC of 0.17 or above.

Level II Therapy requirements for impaired driving offenses on or after Jan. 1, 2014:

> Track A, 42 hours over 21 weeks, usually for a first-time offender with a BAC below 0.15;

> Track B, 52 hours over 26 weeks, usually for a first-time offender with a BAC of 0.15 or above or refusal;

> Track C, 68 hours over 34 weeks, usually for someone with a prior DWAI/DUI, and a BAC below 0.15;

- Track D, 86 hours over 43 weeks, usually for someone with a prior DWAI/DUI, and a BAC of 0.15 or above or refusal.

DMV Level II requirements always include both Level II Education and Level II Therapy.

Completion of a Level I alcohol education program is required when a minor driver has had their licensed/privilege revoked for one year for their first DUI, DWAI or 0.02 or more BAC conviction, for a violation that was received while under the age of 21. A minor driver may be required to complete Level II education or Level II education and therapy depending on the alcohol evaluator's recommendations.

A copy of the DRS discharge notice is required for driver license reinstatement.

A 2008 recidivism study by OBH showed 78.1% of offenders completed their assigned treatment. Some offenders have several entrance dates to restart treatment usually because of payment issues.

With authorization from the driver, DMV can access OBH's Treatment Management System (TMS) to go into the DUI/DWAI Reporting System to see that an offender has completed treatment. OBH transfers data daily from TMS to DMV. Treatment providers enter client data directly into the TMS DUI/DWAI reporting system regularly to reflect the client's treatment status. Treatment is paid primarily by the offender however; there is some money available through DPS to help clients who need it. There is no standardized fee structure for treatment; prices are set by individual agencies.

Interlock Enhancement Counseling (IEC)

The OBH and DMV are both actively involved in IEC (Timken, Nandi & Marques, 2012) development. IEC is based on earlier work in the area performed in both Canada and the United States (Marques, Tippets, Voas, Danseco & Beirness, 2000; Marques, Voas & Hodgins, 1998; Timken & Marques, 2001a; Timken & Marques, 2001b). These efforts were based on a composite approach of motivational enhancement, and anticipatory planning for life after the interlock. The Texas protocol by Timken and Marques in 2001 manualized the approach, utilized group and individual sessions, established structured sessions and had a training protocol with a quality assurance component. Relative to a contrast group, program participants had significantly fewer elevated interlock BAC tests that resulted in fewer failed starts, showed significant changes in the amount of alcohol consumed, showed a decrease in drinking consequences and higher degrees of personal satisfaction. However, an insufficient sample size precluded the researchers from making any conclusive statements regarding program impact upon actual recidivism (Marques, et al, 2007).

IEC can be taken along with traditional DUI treatment or can be used separately from treatment. Treatment agencies screen all DUI/DWAI offenders for interlock requirements. Offenders who have an interlock-restricted driver's license are encouraged to participate. Prior to starting the IEC program, an individual intake session is completed. During this time, the DUI/DWAI offender receives orientation to IEC, rules are explored, and a schedule established. If the offender meets admission criteria, releases of information required by law and rules are obtained and a differential assessment performed, if needed.

Generic admission criteria are: All legal and jurisdictional requirements must be met (requirements vary depending on jurisdiction), the offender must agree to have the differential assessment performed if required; the offender must sign the required releases of information, consent to treat and any other required forms; the offender must provide proof that the interlock(s) has been installed and the offender must agree to follow all program rules including completion of written exercises in the IEC Participants Workbook.

IEC is a comprehensive program based on motivational interviewing and a cognitive behavioral approach that differs from DUI education. IEC focuses on interlock performance and teaches offenders to identify high-risk events and change their anti-social behavior. Anti-social issues are addressed. The programs procedures are in the form of a manual to assure all topics, exercises and worksheets are being presented consistently, as well as helping providers demonstrate fidelity to the model. Two manuals were developed for the IEC program - a Provider's Guide and a Participant's Workbook.

The IEC protocol has both individual and group sessions. The total length of the program is 10 hours conducted over a five-month period. There are four 30-minute sessions. These are conducted once monthly for three months. The fourth and final session is conducted in month five. There are four, two-hour group sessions. Group sessions are conducted once monthly for four months. IEC could be considered to fulfill a portion of the offender's long term hourly treatment requirements. Session topics for both individual and group sessions are: Being Successful on the Interlock; Learning and Change; Managing High-Risk Situations and Maintaining Success While off the Interlock. Exercises and worksheets done both in and out of session are tied directly to the topics.

IEC completion criteria are: completion of ten hours of the program, completion of worksheets, no further DUI/DWAI arrests while in IEC; no driver license restraint actions related to interlock use, no failed starts including failed rolling re-tests and no evidence of tampering or circumvention.

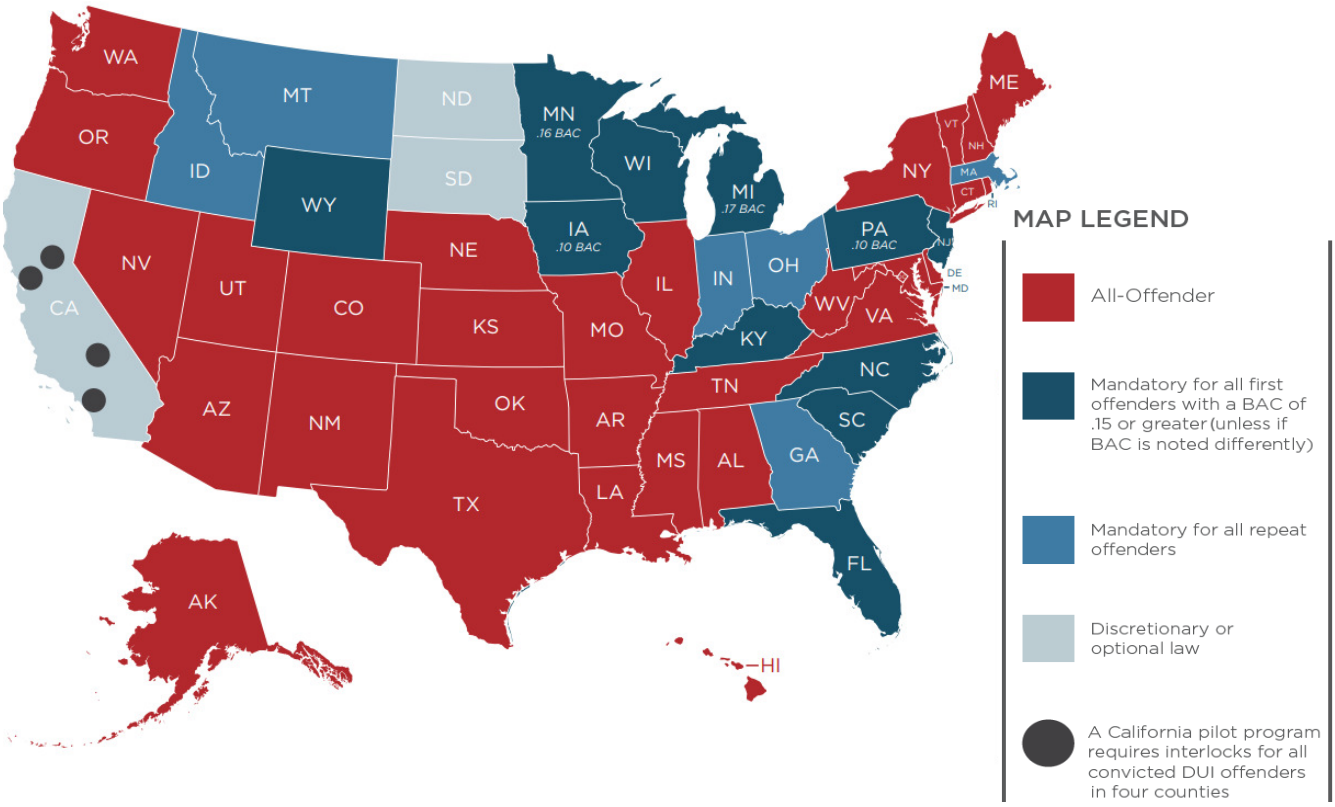
COLORADO COMPARISONS TO OTHER SIMILAR STATE INTERLOCK PROGRAMS

The Current State of Interlock Laws

All states and the District of Columbia have some form of interlock law that includes either judicial discretion or an administrative requirement or a hybrid of the two. There have been several interlock law changes over the past few years. To illustrate, in 2014, Alabama, Mississippi, and Missouri passed laws requiring all DWI offenders to install an interlock. Indiana passed legislation requiring ignition interlocks for repeat offenders, and to allow judges to order interlocks for first-time offenders. South Carolina passed Emma's Law, which requires all high-BAC (0.15) offenders to install an interlock. In 2015, Delaware, and Texas passed an all DUI offender law requiring an interlock. In addition, Kentucky strengthened its ignition interlock law, which required an interlock for repeat offenders, high-BAC (0.15) first offenders and offenders who refuse a chemical alcohol test. In 2016, Vermont and Washington D.C. passed an all offender interlock law, and Maryland passed "Noah's Law", an all offender law with a five-star rating from MADD (MADD 2017).

As of March 2018, 30 states, the District of Columbia and four California counties require all alcohol-impaired driving offenders, including first offenders, to install an interlock device either to regain licensing privileges or to reduce an imposed suspension period (see description of the current law in a previous section for more detail about the Colorado program). An additional 11 states require interlocks for offenders with a high-BAC (usually 0.15% or higher) and for repeat offenders. Six states require devices only for repeat offenders. Finally, three states do not have mandatory interlock requirements but allow for judicial discretion (Figure 1, Appendix A).

Figure 1: Laws mandating alcohol ignition interlock orders



Source: MADD (2018). 2018 Report to the Nation. Mothers Against Drunk Driving (madd.org)

Interlock Counts by State

TIRF USA conducted a national interlock survey in which state ignition interlock program managers, highway safety office directors, department of motor vehicle staff in all 50 states, and interlock manufacturers were contacted by email and phone in February and March 2018 to request interlock data (see Robertson et al. 2018 for the full report). Manufacturers were asked for 2016 and 2017 data. States were requested to provide data for 2016.

Three measures of installation were requested to use as indicators of growth, as well as to gauge workload associated with programs. Specific definitions of these measures were:

- Total Installs Number all (TINall): Total number of interlocks that were in a vehicle at any time between January 1 and December 31, including devices that may have been installed prior to January 1 but were still in the vehicle for any period of time during the year following January 1;
- Total Installs Number (TIN): Total number of newly installed interlocks from January 1 to December 31;

> Active Installs Number (AIN): Total number of interlocks that were in the vehicle of an active participant on either August 31 or December 31.

The state and manufacturer TINall, TIN and AIN are illustrated for each state in Table 1, as reported in the TIRF USA publication (Robertson, et al., 2018). Colorado numbers are highlighted in yellow.

Table 1: National interlock installations reported by manufacturers by state

Jurisdiction	TINall			TIN			AIN Dec. 31		
	2016	2017	% change	2016	2017	% change	2016	2017	% change
Alabama	1,071	1,359	26.9%	601	567	-5.7%	793	853	7.6%
Alaska	3,315	3,082	-7.0%	1,752	1,704	-2.7%	1,365	1,437	5.3%
Arizona	32,744	31,861	-2.7%	15,717	15,794	0.5%	16,099	16,303	1.3%
Arkansas	9,058	10,260	13.3%	5,406	5,930	9.7%	4,335	4,750	9.6%
California	36,643	35,442	-3.3%	19,147	18,414	-3.8%	17,181	16,873	-1.8%
Colorado	38,341	38,397	0.1%	13,743	14,104	2.6%	24,345	23,801	-2.2%
Connecticut	9,172	10,982	19.7%	5,261	5,246	-0.3%	5,807	6,002	3.4%
Delaware	1,216	1,252	3.0%	739	694	-6.1%	560	662	18.2%
Florida	22,341	21,956	-1.7%	12,028	11,468	-4.7%	10,591	10,258	-3.1%
Georgia	4,738	4,985	5.2%	2,797	2,811	0.5%	2,177	2,245	3.1%
Hawaii	3,036	3,013	-0.8%	1,588	1,630	2.6%	1,384	1,489	7.6%
Idaho	1,769	1,836	3.8%	821	847	3.2%	995	1,002	0.7%
Illinois	18,411	18,510	0.5%	11,058	10,216	-7.6%	8,361	8,673	3.7%
Indiana	2,969	3,282	10.5%	1,923	1,954	1.6%	1,349	1,482	9.9%
Iowa	11,036	10,961	-0.7%	5,663	5,687	0.4%	5,332	5,313	-0.4%
Kansas	18,309	17,931	-2.1%	8,135	7,189	-11.6%	10,748	9,985	-7.1%
Kentucky	1,020	1,594	56.3%	886	971	9.6%	641	834	30.1%
Louisiana	9,580	9,910	3.4%	4,512	4,970	10.2%	4,974	5,160	3.7%
Maine	1,127	1,133	0.5%	626	641	2.4%	512	544	6.3%
Maryland	15,331	17,988	17.3%	7,167	9,475	32.2%	8,469	10,603	25.2%
Massachusetts	8,102	8,454	4.3%	2,820	2,801	-0.7%	5,693	5,907	3.8%
Michigan	14,623	15,904	8.8%	5,759	5,607	-2.6%	10,261	10,682	4.1%
Minnesota	18,632	19,671	5.6%	7,936	8,093	2.0%	11,645	12,779	9.7%
Mississippi	3,524	3,003	-14.8%	2,465	1,974	-19.9%	1,039	977	-6.0%
Missouri	17,210	17,031	-1.0%	8,917	8,466	-5.1%	8,606	8,303	-3.5%
Montana	661	715	8.2%	386	367	-4.9%	348	375	7.8%
Nebraska	8,623	8,937	3.6%	4,539	4,725	4.1%	4,208	4,213	0.1%
Nevada	2,030	2,053	1.1%	868	753	-13.2%	1,306	1,185	-9.3%
New Hampshire	1,752	1,990	13.6%	889	886	-0.3%	1,115	1,205	8.1%
New Jersey	8,953	8,483	-5.2%	5,623	3,168	-43.7%	3,017	3,019	0.1%

Jurisdiction	TINall			TIN			AIN Dec. 31		
	2016	2017	% change	2016	2017	% change	2016	2017	% change
New Mexico	19,244	19,054	-1.0%	8,085	7,289	-9.8%	11,728	11,717	-0.1%
New York	15,928	15,984	0.4%	8,193	7,956	-2.9%	8,139	8,775	7.8%
North Carolina	20,934	20,849	-0.4%	9,784	9,328	-4.7%	11,584	11,509	-0.6%
North Dakota	1	8	700.0%	1	8	700.0%	2	3	50.0%
Ohio	5,040	5,495	9.0%	2,472	2,940	18.9%	2,592	2,969	14.5%
Oklahoma	13,999	15,219	8.7%	5,699	5,617	-1.4%	9,616	9,875	2.7%
Oregon	11,276	11,840	5.0%	5,669	6,245	10.2%	5,616	5,937	5.7%
Pennsylvania	10,608	12,792	20.6%	5,611	6,808	21.3%	6,054	8,135	34.4%
Rhode Island	1,685	1,797	6.6%	1,047	967	-7.6%	841	812	-3.4%
South Carolina	2,533	2,786	10.0%	1,352	1,199	-11.3%	1,588	1,583	-0.3%
South Dakota	129	131	1.6%	70	87	24.3%	46	67	45.7%
Tennessee	12,266	12,476	1.7%	6,434	6,399	-0.5%	6,112	6,702	9.7%
Texas	83,050	90,875	9.4%	36,556	37,477	2.5%	51,643	53,699	4.0%
Utah	3,334	3,288	-1.4%	1,350	1,332	-1.3%	1,951	1,972	1.1%
Vermont	1,249	1,503	20.3%	437	542	24.0%	972	1,136	16.9%
Virginia	18,729	17,754	-5.2%	10,053	9,759	-2.9%	8,216	8,078	-1.7%
Washington	35,663	36,183	1.5%	17,029	17,426	2.3%	18,802	19,603	4.3%
Washington, D. C.	22	28	27.3%	12	11	-8.3%	17	14	-17.6%
West Virginia	7,215	6,744	-6.5%	3,066	2,857	-6.8%	3,887	3,622	-6.8%
Wisconsin	24,281	24,579	1.2%	10,717	10,899	1.7%	13,753	14,168	3.0%
Wyoming	2,103	2,123	1.0%	931	894	-4.0%	1,242	1,186	-4.5%
Total	**614,626**	**633,483**	**3.1%**	**294,340**	**293,192**	**-0.4%**	**337,657**	**348,476**	**3.2%**

The National Interlock Survey by Robertson et. al (2018) also provided a picture of interlock installation rate among eligible offenders based on state administrator's data. This is a measure of the efficacy of a state's interlock program. Dependent upon legislation, the eligible population in a state for offenders who are required to install an interlock may be either those offenders arrested for DUI (if an administrative license suspension or revocation requires an interlock) or those convicted of DUI. For the latter, this may be further dependent upon what category of offense requires an interlock. Furthermore, some states may include administrative per se cases. In some states, some offenders may not be deemed eligible because of other driving or non-driving violations; for example, as a result of delinquent child support payments that are unrelated to DUI.

Information was collected in an effort to better re-define the eligible population per state. This included data on the number of arrests as well as convictions. Although DUI arrest and conviction data are not ideal to define the eligible population across all states, for the above-mentioned reasons, Robertson et al. (2018) explain that they are currently the best available source of information to estimate installation rates.

Table 2 presents impaired driving arrest and conviction data for 25 states in 2016 for which data was available. The percentage of convictions per arrests were calculated when possible, as well as the percentage of new interlocks installed per DUI arrests and per DUI convictions. Colorado has had a favorable installation rate compared to similar states. This rate will be refined in this study.

Table 2: Percentage of interlocks installed (TIN manufacturer data) per DUI arrests and convictions (states administrators data) in 2016 by state

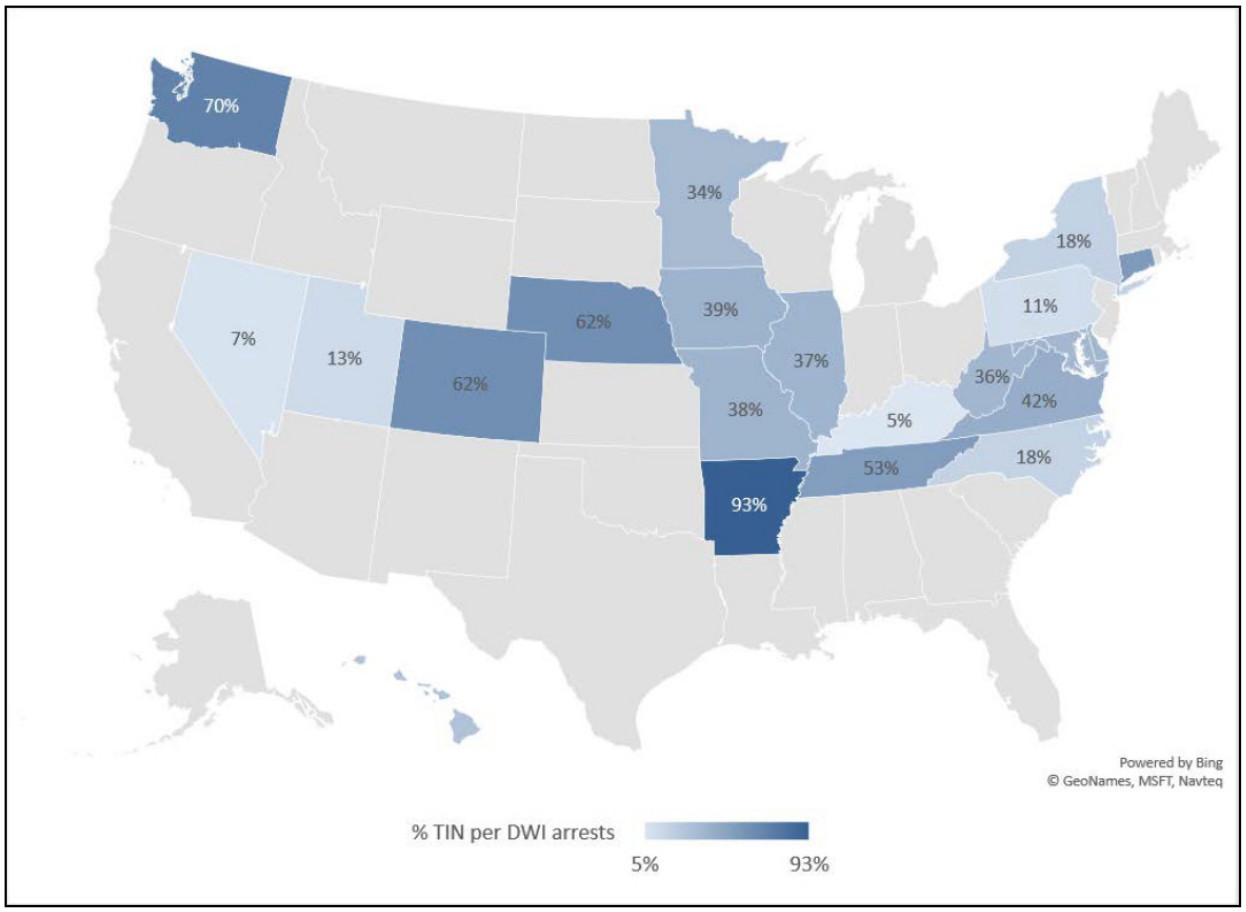
	DUI arrests	DUI convictions	% convictions per DWI arrests	% TIN per DUI arrests	% TIN per DUI convictions
Arkansas	5,837	5,376	92.1%	92.6%	100.6%
Colorado	22,218	21,561	97.0%	61.9%	63.7%
Connecticut	9,659	3,123	32.3%	54.5%	168.5%[1]
Delaware	2,061	2,220	107.7%	35.9%	33.3%
Hawaii	5,630			28.2%	
Illinois	29,528	2,701	9.1%	37.4%	409.4%
Iowa	14,721	10,286	69.9%	38.5%	55.1%
Kansas		5,278			154.1%
Kentucky	16,893	13,642	80.8%	5.2%	6.5%
Maryland	20,439	14,347	70.2%	35.1%	50.0%
Minnesota	23,392	18,524	79.2%	33.9%	42.8%
Missouri	23,658	16,186	68.4%	37.7%	55.1%
Nebraska	7,311	6,867	93.9%	62.1%	66.1%
Nevada	11,729	5,278	45.0%	7.4%	16.4%
New York	44,470	19,397	43.6%	18.4%	42.2%
North Carolina	54,603	31,920	58.5%	17.9%	30.7%
Ohio		36,301			6.8%
Pennsylvania	53,578	27,143	50.7%	10.5%	20.7%
Tennessee	12,201	8,116	66.5%	52.7%	79.3%
Utah[2]	10,755	8,161	75.9%	12.6%	16.5%
Vermont		1,440			30.3%
Virginia	23,916	19,503	81.5%	42.0%	51.5%
Washington	24,425	25,125	102.9%	69.7%	67.8%
West Virginia	8,579	6,666	77.7%	35.7%	46.0%
Wyoming		1,735			53.7%
Totals			**63.4%**	**31.8%**	**46.9%**

Note: 1. DUI arrests and convictions are not ideal to define the eligible population for an IID program in all states. As such, some of the percentages shown are larger than 100%. For example, Connecticut requires an IID for all offenders, including administrative per se cases (failure or refusal of chemical test at arrest); Illinois allows the reinstatement of driving privileges with an IID for an administrative license revocation upon a DWI arrest and prior to a DWI conviction.

2. Utah arrest data are for the fiscal year 2016 (July 1, 2015 through June 30, 2016)

Figure 2 shows a map representing the percentage of new interlocks installed per DUI arrests per state in 2016.

Figure 2: Map of percentage of new interlocks installed (TIN) per DUI arrest in 2016



Program Growth

Based on the different indicators from the most recent TIRF national interlock survey (Robertson et al. 2018), the Colorado program continues to grow. New installations (TIN) grew 2.6% from 13,743 in 2016 to 14,104 in 2017, while all installations (TINall) grew slightly at 0.1% from 38,341 in 2016 to 38,397 in 2017. The only indicator that does not show growth is the point-in-time number of active installations on December 31 (AIN), with a 2.2% decrease from 24,345 on December 31, 2016 to 23,801 on December 31, 2017. However, given that this is a point-in-time comparison, it provides a more limited perspective on growth compared to the TIN and TINall indicators.

METHODS

Data Collection

This study analyzed IID program enrollment dates and recidivism data from January 1, 2009 through December 31, 2013. This time segment was selected to provide baseline data to inform future research evaluations for 2009 pre and post law comparisons, as well as pre and post 2014 law comparisons. Data from January 1, 2009 through the most recent current available data was requested and used to determine recidivism rates for impaired driving offender interlock program participants, as well as impaired driving offenders who did not install an interlock.

It should be noted however, that although a five-year study period was intended, this was reduced to roughly 3.5 years (June 1, 2010 to December 31, 2013) to match the available period for which IID program success could be reliably established. This date coincides with the start of the OIS platform.

Potential research questions were distributed to all agencies at the start to inform data needs. Since data requests varied by availability of data for each agency, these are listed by agency below.

Colorado Division of Motor Vehicles (DMV)

Data was accessed via the Colorado Driver License, Record, Identification and Vehicle Enterprise Solution (Colorado DRIVES) system. The DMV sent data coding and definitions to the TIRF USA team. OIT data dictionary and codes were also sent to the TIRF USA team via an encrypted data storage device. The TIRF USA team reviewed the data dictionary and codes to develop a list of DRS data elements for the final data request document. DMV data was initially requested from the Office of Information Technology and OIS (managed by Colorado Interactive). However, after various rounds of data transmission and review, it was decided that the DRIVES project was the more complete and reliable data source.

The TIRF USA team received the DMV data deliveries from Colorado Interactive on March 28 through Nov. 21, 2017. The final dataset included the full driving history of DUI violators between 2009 and 2013; their arrest information and IIP enrollment details (see Appendix B). Previously received data from OIS, including detailed IIP participation events, were only used as supplemental information in the analysis due to format issues and missing data elements. It should be noted however even the DRIVES data set had limitations. In particular, completion information was missing for the majority of IID program participants. Completion information was therefore extracted from the OIS data. However, OIS data only coded actual event dates after May 2010, the month it came online. Therefore, program analysis was pushed back to June 2010, the period after which reliable event dates were available. This resulted in limiting the program interaction analysis from 5 years to 3 years and 7 months of data. These challenges are discussed further together with recommendations for future evaluations.

Colorado Office of Behavioral Health (OBH)

Data was accessed through both the Alcohol and Drug Driving Safety Coordinated Data System (ADDSCODS) and DUI/DWAI Reporting System (DRS) databases. Sample records and data dictionaries were given to the TIRF USA team to inform the data request. Data was provided in Excel spreadsheets.

The TIRF USA team received the first data delivery from OBH on February 3, 2017. Upon receiving the data, the team started examining and found some issues with the data. Discussions with OBH team resulted in two subsequent data deliveries on February 8, 2017 and March 31, 2017. The data elements used in the evaluation are presented in Appendix C.

Colorado Division of Probation Services (DPS)

The DPS provided Data from the Colorado Judicial Department's case management system called ICON/Eclipse. Data dictionaries were sent to the TIRF USA team to inform the data request. Data was provided in CSV format. The data elements used in the evaluation are presented in Appendix D. The TIRF USA team received the data February 13, 2017.

Data Transmission

Data from all agencies were transferred through encrypted data storage devices. A copy of VHB data privacy practices were sent for review. Only the lead analyst for the project worked with protected information from the TIRF USA team. All data were stored in an encrypted external hard drive that was disconnected and locked in a secure place. Backup copies of the data were secured in encrypted storage devices and none of the data was put on a network-based computer or data backup system. Confidentiality and data transfer documents were executed for all members of the TIRF USA team.

Data Matching

The most common method of matching data is deterministic data linkage. This method is accurate, straightforward and easy to use. It relies on matching the same set of identifiers in two or more data files. However, the data for this evaluation came from different agencies and due to the variations in names and other personal identifiers, exact matching of the data was not possible. Initial examination of the data indicated that some data elements could be potentially used for this deterministic data matching. The team tested the data using a combination of court case number, first and last names, date of birth but the results were poor. Only a small proportion of the data resulted in a match. Further examination of the data revealed that typing errors and different spellings of name were the main reason for the poor results. For example, a person whose first name is Joseph and who also uses a shortened version of his name Joe in another data file will not result in a match even though every other piece of information suggests that this is the same person.

For this reason, the TIRF USA team proposed and tested another approach to data linkage called probabilistic data matching. As its name suggests, this method relies on estimating the probability of two records being the same. With the above example, two records of which first names are Joseph and Joe can be matched with a high level of confidence if these two records have the exact same last name, date of birth, and county name, despite the fact that the first names are not exactly the same. The team developed the algorithm to undertake this task. The number of matched records for the June 2010 to December 2013 period using the probabilistic matching method includes:

- 85,106 DUI convictions
- 35,292 IID program enrollees
- 42,290 clients in education and treatment programs
- 27,918 probationers

Inter-Program Data Set

To assess how the IID program interacts with education, treatment, and probation, a smaller data set was compiled consisting of individuals that appear in the IID, OBH and probation records. In total 17,094 individuals were matched between the three data sets. This data set was used to determine program interplay and factors affecting recidivism and program completions.

Due to the nature of IID clients requiring education and/or treatment and probation, the outcome comparison is therefore more focused on high BAC and repeat offenders.

Analysis Methods

The data analysis methods used to answer each of the research questions as thoroughly as possible within the limits of the available data are presented below. All analyses were completed using R, Stata® software packages and Microsoft Excel (as needed).

Frequency, Range, Mean, and Standard Deviation

Each analysis includes basic tabulation of frequency counts and percentages where appropriate. Cross-tabulations (multi-level data tables) also include row and column percentages as appropriate. For some of the analyses, measures of central tendency (mean and median) are useful for describing a typical program participant's experiences or demographics. Range (high-low) and standard deviation inform variability within a group (program participants, non-participants, for example). Data for all figures presented in the findings were obtained through Stata and then entered into Microsoft Excel to generate the graphics.

Correlation and Other Measures of Association

Pearson's R correlation coefficients and chi-squared statistics were used as indicators of strength of statistical association among two or more variables. The correlation coefficient measures how

much of variance in one variable is predicted by the variance in another variable. This does not imply causation, but gauges the level of association among variables. The chi-squared statistic was used to assess the relationships among two or more variables with multiple response levels. It is ideally suited for cross-tabular data of frequency counts. For example, chi-squared is useful in assessing the relationships among demographic variables to test, for example, whether the distribution of age and sex for program participants and non-participants are similar or if they differ.

Time-To-Event Analysis

Time-to-event analysis technique (also known as survival analysis) was used to analyze data with binary outcomes and time to the occurrence of that outcome. It is widely used in clinical trial studies, drug studies and patient survival. This technique was adopted for analyzing recidivism. In the case of recidivism, the outcome is characterized by two key elements – a driver recidivates and how long before that happens. Kaplan-Meier curves and Cox-proportional hazard models were used to describe the data and predict the outcomes as well as the elements that affect those outcomes. The model's predictions are based on driver characteristics and conditions such as participation in the various elements of the interlock programs, age, sex, BAC level at the time of arrest, number of prior violations, etc. The models were tested for goodness of fit to the data to determine which variables have a significant effect on the outcome measures (recidivism) and which do not. A 95 percent confidence level was used throughout the model development process.

Logistic Regression Analysis

Logistic regression is a technique used for analyzing dataset with binary outcomes (e.g., program success vs. program failure). A logistic model establishes the relationships between a binary variable of interest (dependent variable) and a set of explanatory variables. In this study, logistic analyses were used to examine the relationship between treatment and probation program success and various contributing factors (e.g. age, sex, BAC level at the time of arrest, number of prior violations etc.). The estimated model parameters reveal the statistical relationship between each of these contributing factors and the probability of program success. The models were developed and tested for goodness of fit to the data to determine which variables have a significant effect on the outcome measures (treatment or probation completion) and which do not. A 95 percent confidence level was used throughout the model development process.

RESEARCH QUESTIONS AND RESULTS

Upon completion of the review of the data sets received, a set of revised research questions was sent to the project steering group for comment including the data matching and statistical analysis methods. The final set of research questions are reflected in the succeeding results discussion.

Snapshot of 2010 (June)-2013 Program Data

The first analysis conducted was to produce annual snapshots for the 3.5 years of data included in the sample. This analysis provides information on basic program participation levels and number of successful completions in each year and total over the assessment period. Data is provided as both raw counts and converted to percentages. The analytic results also show differences between completion rates by age, optional vs. mandatory and arrest BAC level of drivers.

1. **What is the participation rate?**

The overall program participation rate for the study period is 41.5% (Table 3). It is worth noting participation rate has significantly increased to 63.7% in 2016 as shown in Table 2 above (based on manufacturer's data; %TIN per DUI conviction).

Table 3: IID program participation rates

Program Element	Arrest Year				Total
	2010*	2011	2012	2013	
Number of DUI arrests	14,491	24,527	23,981	22,107	85,106
Number of people enrolled in IID	5,861	10,015	9,966	9,450	35,292
Overall enrollment rates	40.4%	40.8%	41.6%	42.7%	**41.5%**

Note: *Partial year data from June to December.

Table 4 below looks at the participation rate by IID requirement. As anticipated, the enrollment rate for repeat and high-BAC offenders (mandatory) are significantly higher at 54.8%.

Table 4: IID program participation rates, optional vs. mandatory

Program Element	Arrest Year				Total
	2010*	2011	2012	2013	
Optional IID Enrollment	7,957	13,462	12,938	12,428	46,785
Enrolled in IID	2,361	3,962	3,894	4,087	14,304
% Enrolled	29.7%	29.4%	30.1%	32.9%	**30.6%**
Mandatory IID Enrollment	6,534	11,065	11,043	9,679	38,321
Enrolled in IID	3,500	6,053	6,072	5,363	20,988
% Enrolled	53.6%	54.7%	55.0%	55.4%	**54.8%**

*Note: *Partial year data from June to December.*

2. Who participates and who does not?

Table 5 below provides a brief description (in percentages) of the demographic characteristics of the study group in terms of age and BAC level at time of arrest.

Table 5: Demographic characteristics of the study groups, interlock participants and all DUI offenders, in percentages (2010-2013)

	IID Enrollees	All DUI
Age Group		
under 21	4.7%	8.6%
21-24	19.0%	18.8%
25-34	33.6%	33.5%
35-49	28.4%	26.6%
50-64	12.9%	11.3%
65 and older	1.4%	1.2%
BAC Level		
Under 0.08	0.2%	1.5%
0.08 up to 0.14	21.9%	22.2%
0.14 up to 0.17	14.5%	14.4%
0.17 or higher	46.4%	33.6%
Refusal	16.9%	28.4%

Note: 1) Comparison by sex was not possible due missing data. A proxy of this measure can be observed in the treatment and probation data; 75% male and 25% female.

2) Year 2010 has partial data from June to December.

3. Who is successful?

The overall program completion rate for the study period is 54.9%. The table below shows the completion rates by enrollment type, age group and arrest BAC.

Table 6: IID program completion rates, optional vs. mandatory (2010*-2013)

	Optional IID	Mandatory IID	Combined
Completion Rate	**56.1%**	**54%**	**54.9%**
Age Group			
under 21	19.4%	40.3%	31.7%
21-24	54.0%	51.8%	52.7%
25-34	56.0%	52.7%	54.1%
35-49	60.2%	55.6%	57.4%
50-64	64.5%	60.3%	61.9%
65 and older	65.3%	64.3%	64.7%
BAC Level			
Under 0.08	15.5%	33.3%	16.2%
0.08 up to 0.14	62.3%	55.5%	60.9%

	Optional IID	Mandatory IID	Combined
0.14 up to 0.17	62.5%	55.4%	60.7%
0.17 or higher	N/A	55.8%	55.8%
Refusal	42.2%	34.5%	40.0%

*Note: *Partial year data from June to December.*

The completion rate for under 21's and BAC<0.08 are noticeably lower particularly for the optional IID group. This should be read with caution as it may be influenced by the very small number of enrolled drivers in this category. This may also be partially explained by the tendency to go back and wait out the relatively shorter hard suspension period.

Program Impact on Recidivism

4. Has the IID program produced the anticipated changes in recidivism?

The IID program's impact on recidivism relies on comparisons between drivers who enrolled and completed the IID program versus those who did not as well as those drivers who enrolled but failed the program (see the methodology section for a description of how the inter-program data set was defined and selected). The reader is reminded that the IID program participants included in this comparison are predominantly repeat or high-BAC offenders as they come from the inter-program data set (i.e., common sample with the education and/or treatment and probation programs). In terms of IID enrollment, the 17,094 inter-program data sets are composed of:

- 9,066 people enrolled in IID
- 8,028 people not enrolled in IID
- 4,604 people who completed IID

To compare recidivism among program participants and comparable non-participants, the research team adopted a time-to-event analysis technique (also known as survival analysis). Survival analysis is designed to analyze data in which the outcomes are an event of interest and the time to that event. In this study, the event of interest is recidivism (any arrest for DUI-related offense) of a driver and time to that arrest.

The first analysis looked at two groups of drivers:

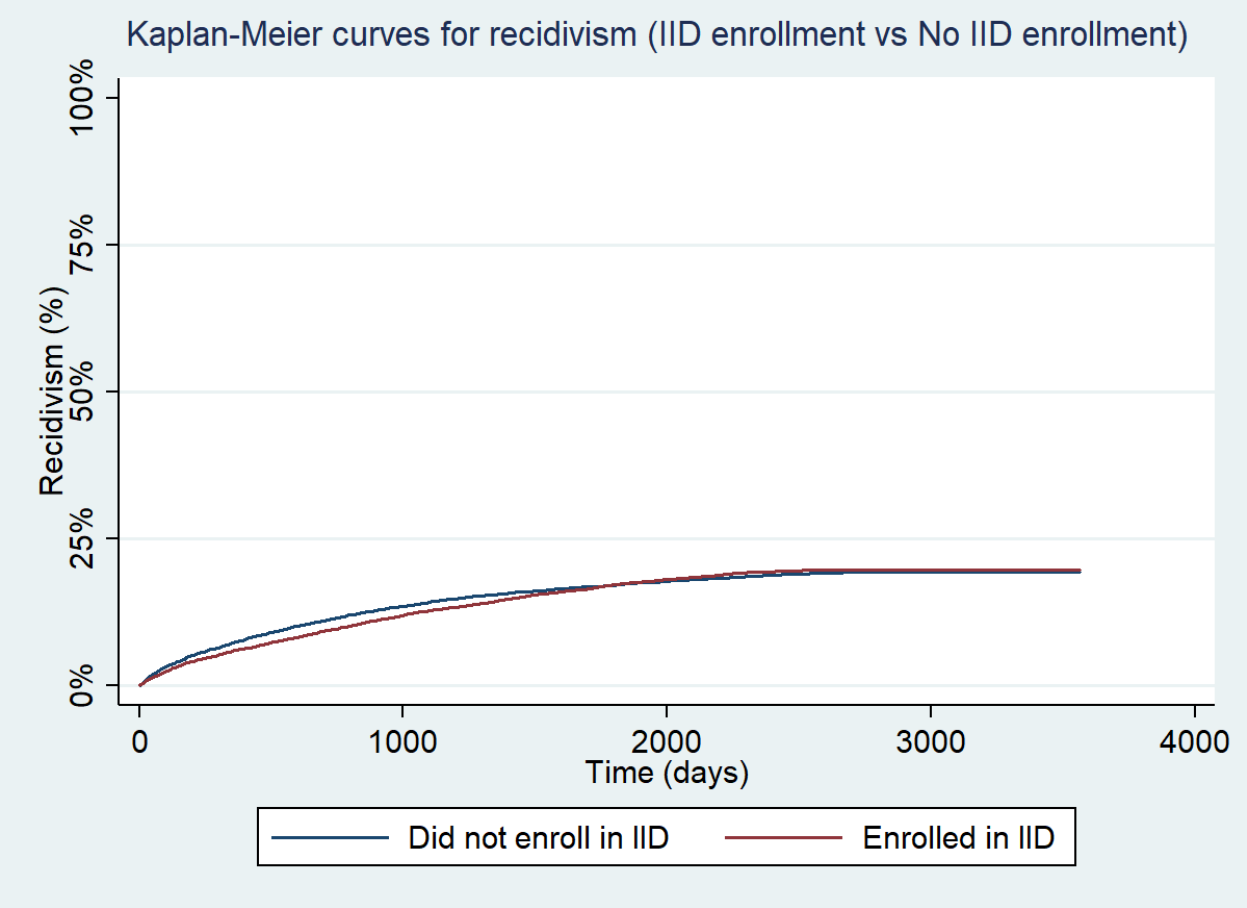
- those who enrolled in the interlock program
- those who were eligible, but did not enroll in the program

The driving records of these selected drivers were examined to extract DUI arrests during the study period. The analysis time for those drivers who enrolled in the program starts on either their completion or program removal dates (if they did not complete). The analysis time for the comparison drivers (non-participant) start on the date of DUI arrest that qualify them for the program. Thus, the analysis time for participant and non-participant groups are not identical. They are parallel but offset by the period of IID enrollment. The analysis compensates for this by using time-to-event analysis method so that the only differences are that the non-participant groups generally have more months of data available, but the time to failure is independent of start date for

either group. The research team analyzed the driving records of drivers in both groups and tagged them if they were arrested for DUI. The cut-off date for the analysis period is October 27, 2017. If a driver did not recidivate before the cut-off date, that driver is coded as such and the analysis time ends there.

A Kaplan-Meier failure analysis was performed on the dataset for the probability of recidivism over time. Two separate curves were estimated for participant and non-participant groups. Figure 3 shows the Kaplan-Meier curves for the two groups.

Figure 3: Kaplan-Meier survival curves for recidivism (IID enrollment vs. no IID enrollment)



The curves show that long-term recidivism rates are not statistically different. This should be interpreted with caution as the IID program participants included in this comparison are predominantly repeat or high-BAC offenders. Calculated absolute values of recidivism rates will therefore be higher than for general populations. However, for the relative values, between the two curves are accurate.

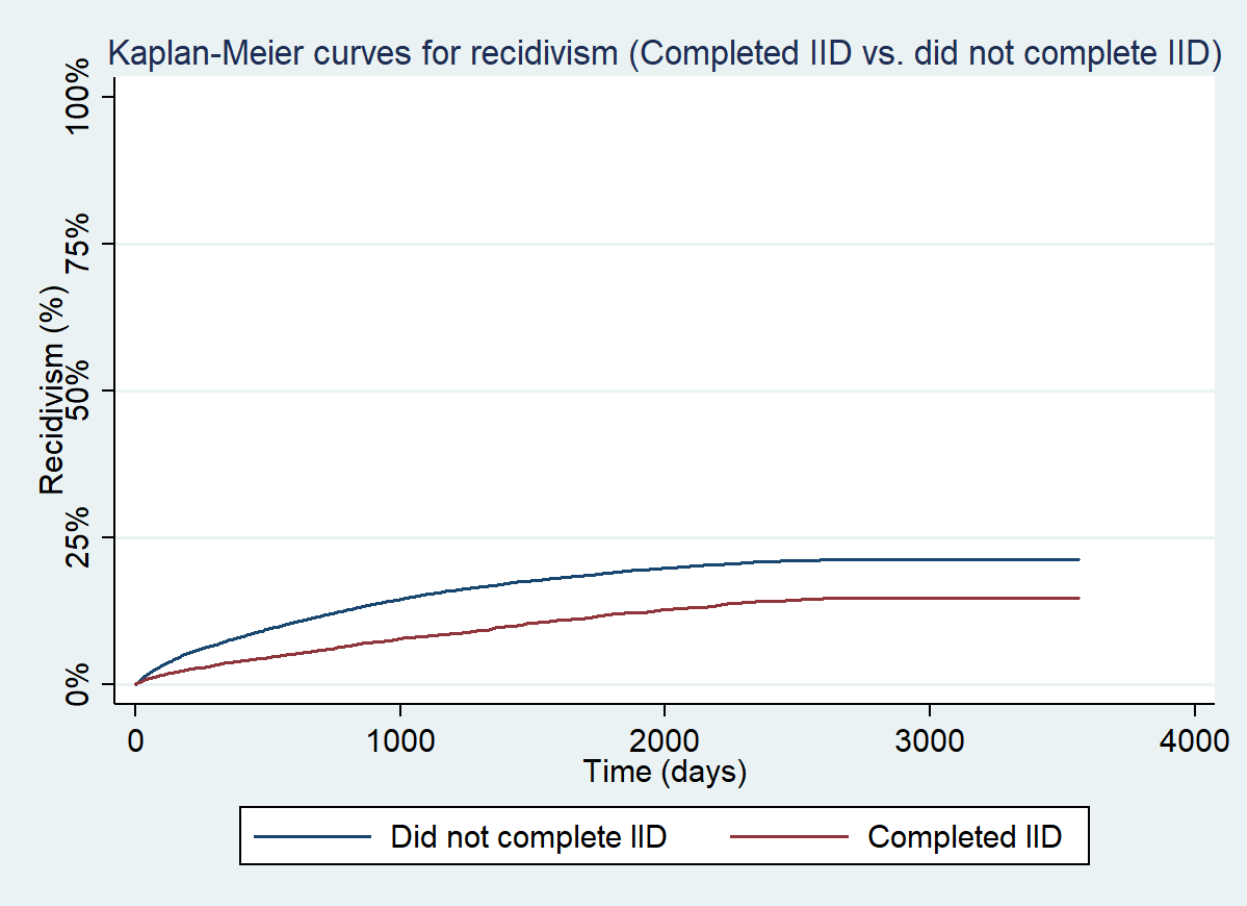
Considering the above, recidivism in the short term for non-enrolled drivers is still more likely than for those who enrolled in IID program. But this difference disappears in the long term. This is consistent with some studies that show residual interlock benefits disappear over time. The analysis presented here shows a longer-term survival analysis for both groups at just under 20%.

The second analysis looks at the enrolled population and splits it into two groups:

- those who completed the interlock program
- those who did not complete the interlock program

This is a more accurate analysis of the programs impact as it accounts for the offender meeting the program requirements for reinstatement.

Figure 3: Kaplan-Meier survival curves for recidivism (completed IID vs. did not complete IID)



The curve for drivers who did not complete the IID program is consistently higher than for drivers who completed. This indicates that the chances of recidivism are higher for drivers with non-completions for all months of the analysis. The effect increases initially and remains consistent in the long term. Overall, 18.35% of program participants recidivated during the study period. The analysis presented here shows a longer-term survival analysis, resulting in a 14.7% recidivism rate for successful program participants vs. 21.3% recidivism for those who did not complete the program.

5. What factors predict recidivism?

Table 7 shows the parameters for a Cox-proportional hazard model using the inter-program data set. The model parameters reveal various factors that affect the likelihood of a driver recidivating. The estimated hazard ratios indicate how a given factor affects the likelihood of recidivism, in terms

of direction and magnitude of the effect. A hazard ratio of one means that element does not affect the outcome one way or another. A hazard ratio larger than one suggests that the element of interest is associated with an increase in the likelihood of recidivism and a hazard ratio smaller than one means the opposite. The difference between the estimated hazard ratio and one indicates the magnitude of the effect.

Table 7: Cox proportional hazard model for IID participant and comparison group

Contributing Factor	Hazard Ratio	P-value
Total number of DUI arrests	2.27	<0.01
Under 21 years old at the time of DUI arrest	1.35	<0.01
BAC level at the time of DUI arrest	1.15	0.01
Number of enrollments in treatment	1.09	<0.01
Total number of drug-related arrests	1.03	0.04
Total number of IID enrollments	0.95	0.01
Age 50 or older at the time of DUI arrest	0.89	0.04
IID completion	0.85	<0.01

The following summary provides interpretation of the variables and their impact on recidivism risk:

Factors that increase likelihood of recidivism;

- Repeat offenders are more likely to recidivate. An additional offense is associated with a 127% increase in chance of recidivating (i.e., about 2.3 times). Similarly, each drug related arrest increases the likelihood of recidivating by 3%.
- Offenders under the age of 21 are 35% more like to recidivate.
- Drivers who have multiple enrollments in education and treatment are associated with higher likelihood of recidivism. This is likely because the treatment requirement usually indicates a higher level (i.e., high BAC or repeat offender) as reflected in the hazard ratio for BAC level (1.15). It is worth noting that the TIRF USA team developed a correlation matrix between explanatory variables and only include in the models those elements that were not highly correlated to avoid problems of multi-collinearity in the analysis of data.

Factors that decrease likelihood recidivism:

- With an estimated hazard ratio of 0.85, on average, those who completed the program are 15% less likely to recidivate (get arrested for DUI again) than those who did not enroll in the program.
- Offenders 50 years or older are 11% less likely to recidivate.
- Each additional IID enrollment is associated with 5% lower likelihood of recidivism. In other words, offenders who have enrolled more times are less likely to recidivate compared to offenders who have enrolled fewer times.

Other variables including sex and race were not tested as these were missing in a significant

number of records.

IID impact on education and treatment compliance and completion rates

The IID program participants' compliance and completion of treatment programs was assessed using data supplied by OBH. This analysis used statistical modeling to assess differential compliance and completion rates for IID program participants and either (a) those who fail the IID program, or (b) those eligible for IID who did not participate in the program. Records for 42,290 education and treatment participants were analyzed.

1. Which interlock participants are given education and treatment requirements?

Table 8 below provides a brief description (in percentages) of the demographic characteristics of the study group in terms of sex, age and race.

Table 8: Demographic characteristics of the study groups, interlock participants, education and treatment participants, in percentages (2010*-2013)

	IID Participants	Education and Treatment Participants
Sex		
Female	Not available	25.9%
Male	Not available	74.1%
Unknown	Not available	0.1%
Age Group		
under 21	4.7%	9.6%
21-24	19.0%	20.6%
25-34	33.6%	33.4%
35-49	28.4%	24.9%
50-64	12.9%	10.5%
65 and older	1.4%	1.0%
Race		
White	Not available	79.1%
Black	Not available	6.3%
Hispanic	Not available	12.2%
American Indian/Alaskan native	Not available	0.8%
Asian Pacific Islander	Not available	1.0%
Other	Not available	0.6%
Unknown	Not available	0.0%

*Note: *Partial year data from June to December.*

2. Who is successful and how long is their treatment period?

Table 9 below presents the annual rate of completion for the study period. The overall program completion rate for the study period is 78.7%, which is significantly higher than the IID completion rate of 54.9%.

Table 9: Education and treatment program completion rates (2010-2013)

	Arrest Year				Total
	2010*	2011	2012	2013	
Number of client records	6980	12338	12107	10865	42290
Number of completions	5579	9819	9531	8365	33294
Completion rates	79.9%	79.6%	78.7%	77.0%	**78.7%**

*Note: *Partial year data from June to December.*

The table below shows the completion rates by sex, age and race.

Table 10: Education and treatment program completion rates by demographic group (2010*-2013)

	Completion Rate
Sex	
Female	81.4%
Male	77.8%
Unknown	70.8%
Age	
under 21	77.4%
21-24	77.7%
25-34	77.1%
35-49	79.8%
50-64	83.6%
65 and older	88.2%
Race	
White	79.5%
Black	69.3%
Hispanic	78.5%
American Indian/Alaskan native	69.6%
Asian Pacific Islander	86.1%
Other	79.9%
Unknown	68.8%

*Note: *Partial year data from June to December.*

The average time in treatment is presented below.

Table 11: Average time in education and treatment program (days)

	Arrest Year				Overall
	2010*	2011	2012	2013	
Did not complete treatment	165	142	159	148	152
Completed treatment	243	247	244	236	243
Overall	228	227	227	219	**225**

*Note: *Partial year data from June to December.*

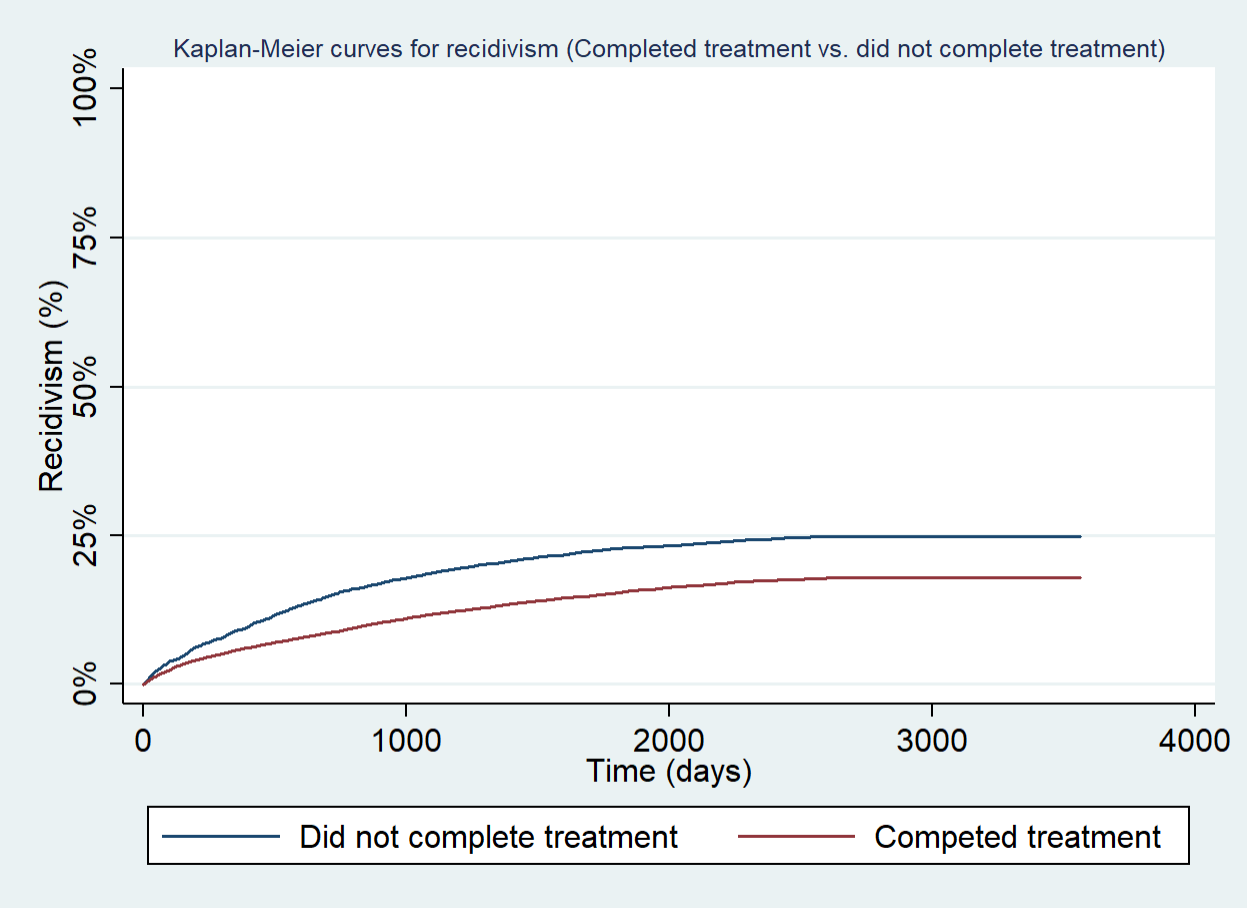
3. Has the link between ILK and treatment programs produced the anticipated changes in recidivism?

The education and treatment program's impact on DUI recidivism rely on comparisons between two groups of drivers:

- those who completed the prescribed education and treatment program
- those who did not

A Kaplan-Meier failure analysis was performed on the inter-program dataset. The analysis time begins at the time of their first DUI arrest within the study period (Jun 2010-Dec 2013). Every driver's progress is tracked until that person is arrested again for DUI. The subsequent DUI arrest (recidivism) and time before that happens is recorded. If recidivism did not occur, that time period was recorded. If a person completed treatment, that person is put into the treatment completion category and vice versa. The two groups were then compared using the Kaplan-Meier analysis for recidivism rate overtime. As with the IID program recidivism analysis above, the cut-off date for the analysis period is October 27, 2017. If a driver did not recidivate before the cut-off date, that driver is coded as such and the analysis time ends there. Figure 5 shows the Kaplan-Meier curves for the two groups.

Figure 4: Kaplan-Meier survival curves for recidivism (completed education and treatment vs. did not complete)



The curve for drivers who did not complete the prescribed education and/or treatment program is consistently higher than for drivers who completed. This indicates that the chances of recidivism are higher for drivers with non-completions for the period of analysis. The effect increases in size initially and remains consistent in the long term. The analysis presented here shows a longer-term survival analysis, resulting in a 17.8% recidivism rate for successful program participants vs 24.7% recidivism for who do not.

Table 12 shows the parameters for a Cox-proportional hazard model using the same data set. The model parameters reveal various factors that affect the likelihood of completing the education and treatment program.

Table 12: Cox proportional hazard model for treatment and education completion

Contributing Factors	Hazard Ratio	P-value
Completed probation or failed due to technical violation	5.26	<0.01
Enrolled in IID	2.89	<0.01
Employed (full or part-time), student, unemployed but looking, or retired	1.36	<0.01
Married	1.21	<0.01
The first DUI offense	1.19	<0.01
Age at the time of DUI arrest	1.00	0.01
Total number of DUI arrests	0.89	<0.01
Number of previous treatments	0.89	<0.01
Number of previous uncompleted treatments	0.39	<0.01

The following summary provides interpretation of the variables and their impact on recidivism risk:

Among positive contributors:

- The influence of probation outcome was also assessed, and a very strong correlation was observed. Those who completed probation, including those who failed due to technical reasons, were over 5 times more (hazard ratio of 5.26) likely to complete their education and treatment program.
- With an estimated hazard ratio of 2.89, on average, those who enroll in IID are almost three times as likely to complete their education and treatment program. This benefit, including probation completion above, should be interpreted as synergistic (i.e., completing treatment and education also increases the chances of someone completing their probation or IID program).
- Among personal status, being married or in employment (full- or part-time), school, retired or actively seeking work increase the chance of program completion by 21% and 36%.
- First-time DUI offenders are 19% more likely to complete their education and treatment program and the age at time of first offense does not make any significant impact on outcome.

Among negative contributors:

- Repeat education and treatment clients are less likely to complete the program. An additional education and treatment regime is associated with an 11% decrease in chance of completing the program. More significantly, each incomplete education and treatment regime is associated with a 61% decrease in chance of completing the program.
- Increasing number of DUI arrests reduces the chances of completing the program. An additional offense is associated with an 11% decrease in chance of completing the program.

Other variables including sex, education and race were also tested but did not result in acceptable levels of statistical significance, so the research team decided not to include them in the model.

IID Impact on Probation Compliance and Completion Rates

The IID program participants' probation compliance and completion was assessed using data supplied by DPS. This analysis used statistical modeling to assess differential compliance and completion rates for IID program participants and either (a) those who fail the IID program, or (b) those eligible for IID who did not participate in the program. Records for 27,918 probation participants were analyzed.

1. **Which interlock participants are given probation requirements?**

Table 13: Demographic characteristics of the study groups, interlock and probation participants, in percentages (2010*-2013)

	IID Participants	Probation Participants
Sex		
Female	Not available	24.2%
Male	Not available	75.8%
Unknown	Not available	0.1%
Age Group		
under 21	4.7%	6.5%
21-24	19.0%	17.6%
25-34	33.6%	33.1%
35-49	28.4%	28.7%
50-64	12.9%	13.0%
65 and older	1.4%	1.1%
Race		
White	Not available	79.1%
Black	Not available	5.0%
Hispanic	Not available	13.2%
American Indian/Alaskan native	Not available	1.4%
Asian Pacific Islander	Not available	0.8%
Other	Not available	0.5%
Unknown	Not available	0.0%

	IID Participants	Probation Participants
BAC Level		
Under 0.08	0.2%	0.2%
0.08 up to 0.14	21.9%	10.6%
0.14 up to 0.17	14.5%	10.4%
0.17 or higher	46.4%	51.9%
Refusal	16.9%	26.9%

*Note: *Partial year data from June to December.*

2. Who is successful and how long is their treatment period?

Table 14: Probation completion rates

	Arrest Year				Total
	2010*	2011	2012	2013	
Number of client records	4,849	8,442	7,989	6,638	27,918
Number of completions	3,500	6,183	5,872	4,866	20,421
Completion rates	72.2%	73.2%	73.5%	73.3%	**73.1%**

*Note: *Partial year data from June to December.*

The overall probation completion rate for the study period is 73.1, which is significantly higher than the IID completion rate of 54.9%. The table below shows the completion rates by sex, age and race.

Table 15: IID probation completion rates by demographic group (2010*-2013)

	Completion Rate
Sex	
Female	80.6%
Male	70.8%
Unknown	61.9%
Age	
under 21	64.8%
21-24	70.4%
25-34	71.0%
35-49	74.9%
50-64	81.5%
65 and older	84.1%
Race	
White	75.8%
Black	59.0%
Hispanic	64.2%
American Indian/Alaskan native	56.6%
Asian Pacific Islander	79.6%
Other	73.3%
Unknown	42.9%

*Note: *Partial year data from June to December.*

The average time in probation is presented below.

Table 16: Average time in probation (days)

	Arrest Year				Overall
	2010	2011	2012	2013	
Did not complete probation	461	492	461	444	467
Completed probation	591	600	596	562	588
Average	555	571	560	530	**556**

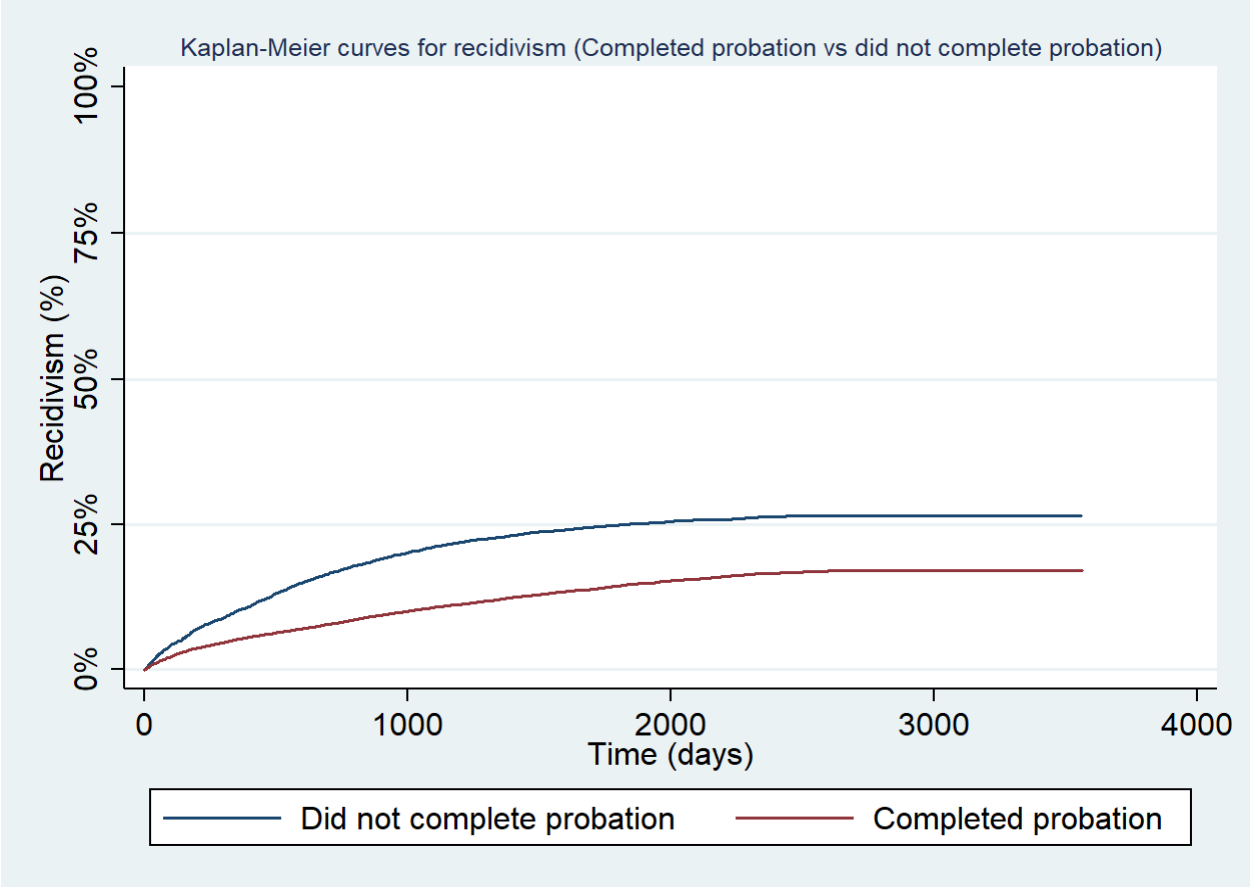
3. Has the link between ILK and probation programs produced the anticipated changes in recidivism?

The probation program's impact on DUI recidivism relies on comparisons between two groups of drivers:

- those who completed probation
- those who did not

A Kaplan-Meier failure analysis was performed on the inter-program dataset. The analysis time period and methodology are the same as the education and treatment Kaplan-Meier analysis above, except drivers are grouped by probation completion. Figure 6 shows the Kaplan-Meier curves for the two groups.

Figure 5: Kaplan-Meier survival curves for recidivism (completed probation vs. terminated probation)



The curve for drivers who did not complete probation is consistently higher than for drivers who completed. This indicates that the chances of recidivism are higher these drivers for all months of the analysis. The effect increases in size initially and remains consistent in the long term. The analysis presented here shows a longer-term survival analysis, resulting in a 17% recidivism rate for successful probationers vs. 26.5% recidivism for unsuccessful ones.

Table 17 shows the parameters for a Cox-proportional hazard model for probation completion. The model parameters reveal various factors that affect the likelihood of completing the probation sentence.

Table 17: Cox proportional hazard model for probation completion

Contributing Factors	Hazard Ratio	P-value
Completed treatment	8.08	<0.01
Enrolled in IID	2.77	<0.01
Employed (full or part-time), student, unemployed but looking, or retired	1.66	<0.01
Female	1.38	<0.01
Married	1.07	0.04
Age at the time of DUI arrest	1.02	<0.01
Total number of license violation related citations	0.97	<0.01
Number of previous treatments	0.92	<0.01
Treatment discharge related to attendance	0.81	<0.01
Number of previous uncompleted treatments	0.80	<0.01
Test refusal	0.72	<0.01
Total number of DUI arrests on record	0.66	<0.01
BAC level at the time of arrest	0.31	0.01

The following summary provides interpretation of the variables and their impact on a successful probation:

Among positive contributors:

- Completed treatment (8 times more likely to succeed) and IID enrollment (2.77 times) have the most impact on probation. This benefit should be interpreted as synergistic, i.e., completing probation also increases the chances of someone completing their IID program.
- Employed, student, unemployed but looking or retired individuals are 66% more likely to complete probation.
- Females are 38% more likely to have a successful probation.
- Married individuals are 7% more likely to have a successful probation

Among negative contributors:

- Offenders who refuse a BAC test at time of arrest are 28% less likely to complete probation.
- Increasing number of DUI arrests reduces the chances of completing the program. An additional offense is associated with a 69% decrease in chance of completing probation.
- Those discharged from treatment due to attendance are 19% less likely to complete probation.
- The number of repeat and uncompleted treatment programs reduces the chances of completing probation by 8% and 20% for each event.

Other variables including education and race were also tested but did not result in acceptable levels of statistical significance, so the research team decided not to include them in the model.

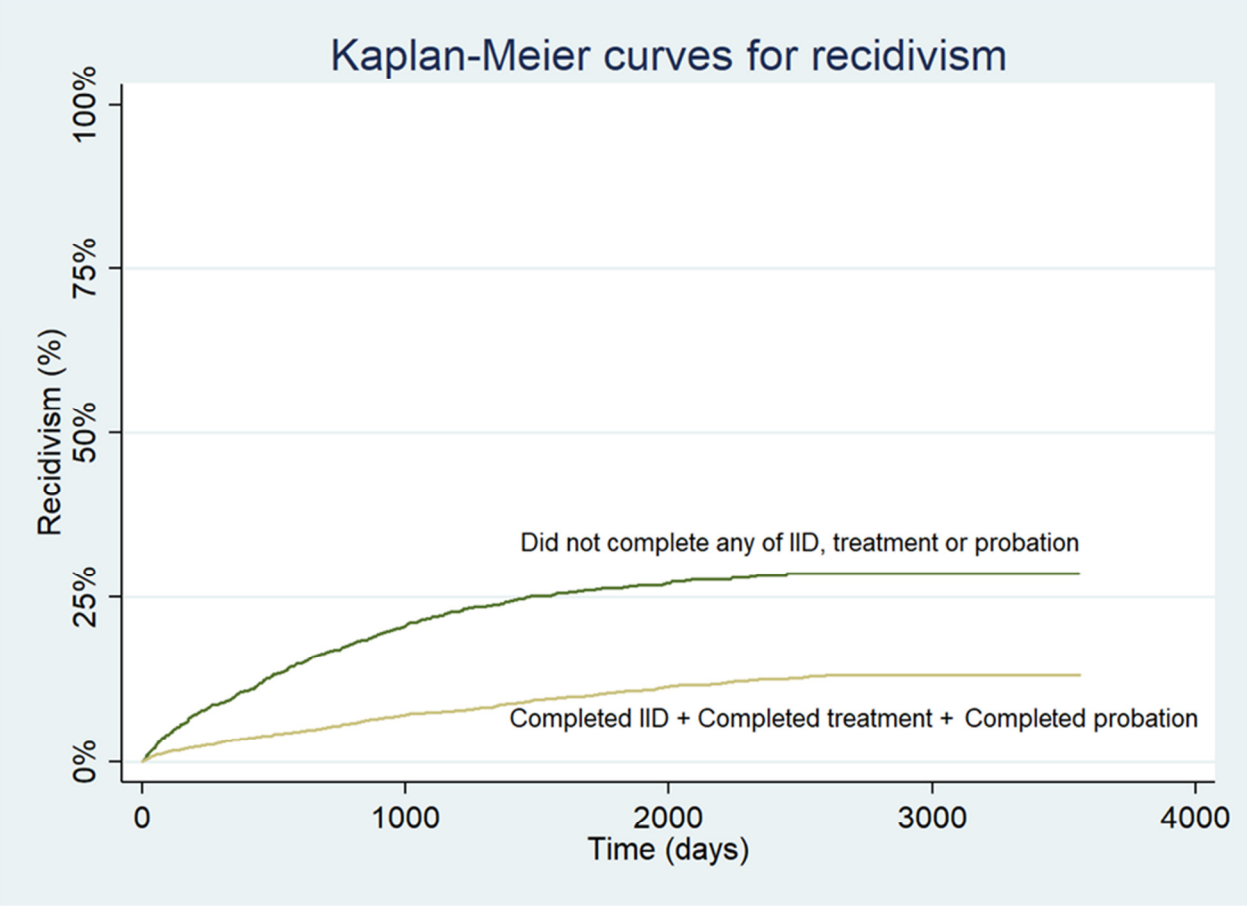
Cumulative Impaired Driving Intervention Programs Impact

The final analysis looks at the combined impact of the IID, education and treatment and probation programs' impact on DUI recidivism using the inter-program dataset. The analysis looked at two group of drivers:

- those who completed all three programs
- those who did not complete any of the three programs

The team matched DUI records for 3,899 drivers who completed all three programs vs. 2,720 who enrolled but did not complete any program. The analysis time begins at the time of their first DUI arrest within the study period (Jun 2010-Dec 2013). Every driver's progress is tracked until that person is arrested again for DUI. The subsequent DUI arrest (recidivism) and time before that happens were recorded. If the recidivism did not occur, that time period was recorded. If a person completed all three programs, that person is put into the completed category and vice versa. The two groups were then compared using the Kaplan-Meier analysis for recidivism rate overtime. The cut-off date for the analysis period is October 27, 2017. If a driver did not recidivate before the cut-off date, that driver is coded as such and the analysis time ends there. Figure 7 shows the Kaplan-Meier curves for the two groups.

Figure 6: Kaplan-Meier survival curves for recidivism: combined impact



The curve for participants who did not complete any of the programs is consistently higher than for those who completed all three. This indicates that the chances of recidivism are higher for non-completions. The effect increases in size initially and remains consistent in the long term. The analysis presented here shows a longer-term survival analysis, resulting in a 13.12% recidivism rate for successful program participants. Those who failed to complete any of the three recidivate at about double that rate (26.07%).

Table 18 shows the parameters for a Cox-proportional hazard model for completing the three programs.

Table 18: Cox proportional hazard model for three-program completion

Contributing Factors	Hazard Ratio	P-value
Employed (full or part-time), student, unemployed but looking, or retired	2.65	<0.01
Female	1.76	<0.01
Married	1.37	<0.01
Age at the time of DUI arrest	1.01	<0.01
Test refusal	0.72	0.02
BAC level at the time of arrest	0.65	0.02
Total number of DUI arrests on record	0.62	<0.01
Number of previous uncompleted treatments	0.12	<0.01

The following summary provides interpretation of the variables and their impact on a successful completion of all three programs:

Among positive contributors:

- Being employed, student, unemployed but looking or retired individuals are 165% more likely to succeed.
- Females are 76% more likely to succeed.
- Married individuals are 37% more likely to succeed in all three programs.

Among negative contributors:

- The number of uncompleted treatment programs reduced the chances of completing all three programs by 88% for each event.
- Increasing number of DUI arrests reduces the chances of completing all three programs. An additional offense is associated with a 38% decrease in chances of success.
- Increased BAC level at time of arrest reduces chances of completing all three programs by 65%.
- Offenders who refuse a BAC test at time of arrest are 28% less likely to complete all programs.

Other variables including education and race were also tested but did not result in acceptable levels of statistical significance, so the research team decided not to include them in the model.

CONCLUSIONS AND EVALUATION RECOMMENDATIONS

The data analysis and synthesis of all information gathered show the following:

Main Findings

- Colorado's IID program is effective. The recidivism analysis shows a longer-term recidivism rate of 14.7% for successful IID program participants vs. 21.3% recidivism for those who were not. This difference in recidivism is more pronounced when combining the effect of successful education and treatment program participation, and probation services. Recidivism rate difference increases; 13.12 % for those who complete all three programs vs 26.07% for those who fail to complete any of the three. The results show that the IID, education and treatment, and probation services programs combine to reduce the chances of recidivism by half.
- Colorado's IID program is efficacious. The installation results show significant growth from already relatively high installation rates, 41.5% during the overall study period ending in 2013, and increasing to 63.7% in 2016. IID program changes since 2014 continue to show that more growth is still possible, and necessary in light of the impact stated above.

Additional Considerations

- The IID program benefits from its combination with education and treatment, and probation services. The synergy between the three programs is demonstrated in their combined impact on recidivism and on each other. On their own, they consistently lower the chances of long-term recidivism; education and/or treatment completion reduce longer term recidivism from 24.7% to 17.8%, and probation completion from 26.5% to 17%. The program synergies are significant; probation completion and IID enrollment increase chances of education and treatment completion by five and three times, respectively. Completed education and/or treatment and IID enrollment increase chances of completing probation by eight and three times, respectively. As stated above, the three programs combine to reduce the chances of recidivism by half.
- Notable predictors of success, other than the synergistic impact of the three programs discussed above include; being in full- or part-time work, school, retired or actively seeking work, female, and being married. Negative factors include; high levels of BAC at time of arrest, test refusals and number of prior DUI offenses. It is interesting to point out though that repeated enrollment in IID is a positive contributor in reducing recidivism (5% less likely), while repeated enrollment in education and/or treatment is not (9% more likely). Previous uncompleted education and/or treatment episode is in fact the most significant negative factor for completing all three programs combined. The number of uncompleted treatment programs reduced the chances of completing all three programs by 88%.

Study Strengths and Limitations

- This evaluation has benefited from various strengths that contributed to the reliability of the study results. The availability of various data sets from the three agencies and over long periods of time helped build participants' history in each program. The extensive data base provided a high number of records such that there were sufficient individuals to compose comparison groups, despite the challenges in data matching.
- Nonetheless some limitations impacted the resources available to dig deeper into the assembled data, collaboration with the agencies for follow up analyses, and the timing of the delivery of these results. These include a lack of accurate entry of data elements for deterministic linking across data sets (however the probabilistic matching yielded robust results), missing data for variables like sex and IID program completion status across the different data sets. Random assignment was also not possible so while an experimental design was used it was only a quasi-experimental design and while confounding factors were controlled for, not all biases can be ruled out. There was also significant delay in the delivery of driver records and IID program data which ultimately limited the resources available for follow up investigation of the emerging trends in the analyses.
- The level of detail to determine success levels of the offender within each agency and the influence of the three agency programs upon each other was originally intended to help identify as many associated relationships between agencies regarding offender profiles and program successes as possible. However, only high-level correlations were accomplished in this study due to the limited availability of data in terms of individual offender violations within each agency. For example, while detailed IID appointment records were available from OIT data, the format in which it was provided required significant effort to assemble a complete participant history. In addition, IID program records only went back to May 2010 when the OIS started. Therefore, detailed IID device data was not included in the analysis. Similarly, there were no electronic records of individual probation violations. For example, not knowing the nature of a technical violation limited the ability to interpret important contextual elements of non-compliance. These are future areas of evaluation improvement.

Recommendations

- The IID program continues to deliver growth and effectiveness in reducing impaired driving in Colorado in that it clearly reduces the chances of recidivism. Its continued implementation will build on this success.
- The recent changes in DUI and IID program procedures show a significant increase from the study period installation rate to 2016. The surest way of increasing program benefit is to continue to seek ways to increase the installation rate.
- There is clear synergy among the IID, education and treatment, and probation programs. Continuing and strengthening these linkages will contribute to the shared program objective of reducing the instances and impacts of impaired driving.

- There is significant room to increase IID program completion among the study group, which is below the education and treatment, and probation rates. Previous program failures also tend to negatively impact future participation. Further strengthening monitoring to increase completion rates, particularly among first time participants, will help immediate as well as long-term success.
- The benefits of IID installation and IID program completion are clear. It is recommended that consideration be given to removing the option to wait out IID period for first time offenders.
- Improve data collection for future evaluations. A series of recommendations dealing with the collection and interpretation of each data source is provided in Appendix B, C and D for future evaluations.

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APPENDIX A: STATE INTERLOCK LAWS AS OF FEBRUARY 2017

State	Administrative license suspension 1st offense	Restore driving privileges during suspension	Mandatory ignition interlock under state law for the following offenses	
			First offenders	Repeat offenders
Alabama	90 days	No	all offenders	yes
Alaska	90 days	after 30 days, with an interlock	all offenders	yes
Arizona	90 days	after 30 days	all offenders	yes
Arkansas	6 months	yes, with an interlock	all offenders	yes
California	4 months	after 30 days, (effective 1/1/19, yes with an interlock)	only 4 counties[1] all offenders- effective 1/1/19	yes
Colorado	9 months	yes, with an interlock	high-BAC offenders only	yes
Connecticut	45 days	no[2]	all offenders	yes
Delaware	3 months	no[3]	all offenders	yes
District of Columbia	2-90 days	yes	all offenders	yes
Florida	6 months	yes	high-BAC offenders only	yes
Georgia	1 year	yes	no	yes[4]
Hawaii	3 months	yes, with an interlock	all offenders	yes
Idaho	90 days	after 30 days	no	yes
Illinois	6 months	yes, with an interlock	all offenders[5]	yes
Indiana	180 days	yes	no	no
Iowa	180 days	yes	high-BAC offenders only	yes
Kansas	30 days	no[6]	all offenders	yes
Kentucky	no	not applicable	high-BAC offenders only	yes
Louisiana	90 days	after 30 days or immediately with an interlock	all offenders	yes
Maine	90 days	yes	all offenders	yes
Maryland	90 days	yes, with an interlock	all offenders	yes
Massachusetts	30 days	no	no	yes
Michigan	no	not applicable	high-BAC offenders only	yes
Minnesota	90 days	after 15 days	high-BAC offenders only	yes
Mississippi	90 days	no	all offenders	yes
Missouri	30 days	yes, with an interlock	all offenders	yes
Montana	no	not applicable	no	no
Nebraska	180 days	yes, with an interlock	all offenders	yes
Nevada	90 days	after 45 days	high-BAC offenders only [7]	high-BAC offenders only [7]
New Hampshire	6 months	no	all offenders	yes
New Jersey	no	not applicable	high-BAC offenders only	yes
New Mexico	6 months	yes, with an interlock	all offenders	yes

State	Administrative license suspension 1st offense	Restore driving privileges during suspension	Mandatory ignition interlock under state law for the following offenses	
			First offenders	Repeat offenders
New York	variable[8]	yes	all offenders	yes
North Carolina	30 days	after 10 days	high-BAC offenders only	yes
North Dakota	91 days	after 30 days	no	no
Ohio	90 days	after 15 days	no	yes
Oklahoma	180 days	yes, with an interlock	high-BAC offenders only	yes
Oregon	90 days	after 30 days	all offenders	yes
Pennsylvania	no	not applicable	high BAC offenders only (effective 8/25/17)	yes
Rhode Island	no	not applicable	all offenders	yes
South Carolina	no	not applicable	high-BAC offenders only	yes
South Dakota	no	not applicable	no	no
Tennessee	no	not applicable	all offenders	yes
Texas	90 days	yes	all offenders	yes
Utah	120 days	no	all offenders	yes
Vermont	90 days	after 30 days, with an interlock	all offenders	yes
Virginia	7 days	no	all offenders	yes
Washington	90 days	yes, with an interlock	all offenders	yes
West Virginia	6 months	after 15 days, with an interlock	all offenders	yes
Wisconsin	6 months	yes	no	yes
Wyoming	90 days	yes	high-BAC offenders only	yes

Chart courtesy of Insurance Institute for Highway Safety/Highway Loss Data Institute April 2017

[1]In California, the all-offender pilot program is in Alameda, Los Angeles, Sacramento and Tulare counties.
[2]In Connecticut, the suspension period is 45 days after which an ignition interlock is required as a condition for license reinstatement.
[3]In Delaware, any person who meets the criteria for a first offense election may apply for an interlock to be installed on a vehicle to be driven by the applicant and may be issued an interlock license.
[4]In Georgia, the interlock is mandatory unless waived due to financial hardship.
[5]In Illinois, the interlock is mandatory for first offenders at the time of arrest, not conviction.
[6]In Kansas, the suspension period is 30 days after which an ignition interlock is required as a condition for license reinstatement.
[7]In Nevada, the interlock is also mandatory for felony offenses, regardless of BAC level.
[8]In New York, the court at arraignment suspends the license for test failure "pending prosecution

APPENDIX B: COLORADO DRIVES DATA ELEMENTS REQUEST

DMV and Ignition Interlock Data

To aid interpretation, each data record should be read in four parts:

1) Driver and license information - this information is repeated for each prior DUI or moving violation and IID program event. (Columns 1 to 26)
2) DUI arrest information - this information is repeated for each prior DUI or moving violation and IID program event. (Columns 27 to 42)
3) Previous DUI and moving violations – a separate record is created for each prior violation. This information is repeated for each IID program event (Columns 43 to 47)
4) IID program information – a new record is created for each IID event (e.g., IID removal, vendor change, financial assistance disbursement). (Columns 48 to 67)

Column #	Data	Sample Record1	Sample Record2	Sample Record3
1	DLN	*000111XXX*	*000111151*	*000180XXX*
2	DL Code	*291,015*	*291,015*	*1,096,531*
3	Document Status	*Replacement*	*Replacement*	*New Issuance*
4	Status Date	*15-Sep-09*	*15-Sep-09*	*3-Oct-16*
5	Surrendered	*3-Jul-09*	*3-Jul-09*	
6	Issued	*9-Oct-08*	*9-Oct-08*	*24-Apr-08*
7	Expire	*7-Jul-12*	*7-Jul-12*	*5-Feb-13*
8	Action Code			
9	DL State	*CO*	*CO*	*CO*
10	First Name	*JOHN*	*JOHN*	*JANE*
11	Last Name	*DOE1*	*DOE1*	*DOE2*
12	Middle Name	*JONES*	*JONES*	*SMITH*
13	Address Type			
14	Address Date			
15	City	*LOVELAND*	*LOVELAND*	*AURORA*
16	Phone Number			
17	State	*CO*	*CO*	*CO*
18	Street	*XXX E 50TH ST*	*XXX E 50TH ST*	*XXX GALINA STREET*
19	Zip	*805380000*	*805380000*	*800100000*
20	County			
21	Current Address	*XXX E CONSERVATION DR FREDERICK CO 80504-9650*	*XXXX E CONSERVATION DR FREDERICK CO 80504-9650*	*XXX GALENA ST AURORA CO 80010-3922*
22	Date Of Birth	*X-Jul-XX*	*X-Jul-XX*	*X-Feb-XX*
23	Sex			

Column #	Data	Sample Record1	Sample Record2	Sample Record3
24	Hair Color			
25	Eye Color			
26	Race			
27	VIN			*138XXX*
28	Notice Date	*3-Jul-09*	*3-Jul-09*	*7-Jul-09*
29	Test Type	*Refusal*	*Refusal*	*Refusal*
30	BAC	*0.00*	*0.00*	*0.00*
31	License Surrendered	*Yes*	*Yes*	*No*
32	Served	*Yes*	*Yes*	*Yes*
33	Sanction Status			
34	Sanction Action	*RECR*	*RECR*	*REC2*
35	Sanction Action Taken	*2-Sep-09*	*2-Sep-09*	*21-Aug-09*
36	Sanction Reinstatement	*1-Sep-10*	*1-Sep-10*	*14-Aug-17*
37	Citation PA			
38	Citation Disposition			
39	Withdrawal	*REV*	*REV*	*REV*
40	Citation Jurisdiction	*CO*	*CO*	*CO*
41	Citation Issued	*3-Jul-09*	*3-Jul-09*	*7-Jul-09*
42	Citation Entered	*3-Jul-09*	*3-Jul-09*	*7-Jul-09*
43	Conviction Key	*481,002*	*472,810*	*1,279,089*
44	Common Code	*152*	*005*	*542*
45	Conviction	*Failed to Drive as Required on (Divided/Controlled-Access) Highway*	*Speeding 10-19 over limit*	*Drove a (Defective/Unsafe) Vehicle*
46	Convicted	*24-Jul-03*	*10-Nov-04*	*19-Jun-00*
47	Docket Number			
48	Program Start			*12-Aug-17*
49	Estimated Removal			*11-Sep-19*
50	Num Requirement Extended	*0*	*0*	*0*
51	Completed Successfully			
52	Vendor			*GUAR*
53	Vendor Fee	*0.00*	*0.00*	*0.00*
54	Sub Vendor			*HOPE & OPPORTUNITY TREATMENT CENTER*
55	Days In Program	*0*	*0*	*12*

Column #	Data	Sample Record1	Sample Record2	Sample Record3
56	Removal From Program			
57	Removal Reason			
58	Encumbrance Start			
59	Encumbrance End			
60	Awarded To Date	*0.00*	*0.00*	*0.00*
61	Encumbrance	*0.00*	*0.00*	*0.00*
62	Installation Date			*12-Aug-17*
63	Vehicle Make			*MITSUBISHI*
64	Vehicle Plate Number			*751134T*
65	Vehicle Removal Date			
66	Vehicle Plate State			*CO*
67	Vehicle Year	*0*	*0*	*1,997*

Data Observations

Contrary to expectations, the driver and IID records were the most challenging data to compile. This was due to the complexity of the records, as well as the timing of the study which coincided with the DRIVES data system roll out. The reason for significant missing data from the DRIVES system is not apparent to the TIRF USA team but a review of the level of compliance with data entry guidelines and data transfers from the OIS database is recommended prior to future evaluations.

- Driver names (Column 10, 11 and 12) were inconsistently entered, with some combined in a single field or inconsistently entered. This was cleansed prior probabilistic matching with OBH and probation records. Consideration should be given to including driver license number to either OBH or probation records to allow for simpler deterministic matching in future evaluations.
- A number of driver demographic information were missing, particularly "Sex" and "Race" (Columns 23 to 26). This should be reviewed in future evaluation as it could be a sign of bigger data issues.
- "Convictions" (Column 45) only contains driver's violation history up to the time of recorded DUI. Driver violations after the DUI are missing except for subsequent DUI's. This prevented the team from assessing IID program impact on moving violations as part of the recidivism analysis. Completeness of this data should be reviewed and included in future analyses.
- A significant number of records had blank "Removal Reason" (column 57) entries. It was therefore not clear if the removal followed a successful completion or not (e.g., voluntary withdrawal, transfer, forced termination, etc.). To address this, the TIRF USA team used supplemental data from the appointment records of the OIS platform. Future evaluations should address this.

APPENDIX C: OFFICE OF BEHAVIORAL HEALTH DATA ELEMENTS

Treatment and Education Data

Column #	Data Element	Sample Record1	Sample Record2	Sample Record3	Source
1	County name	*Denver*	*Denver*	*Larimer*	ADDSCODS
2	Court Case No	*2012M013146 C0XX*	*2012M 013146C0XX*	*2009T003027C 0XX*	ADDSCODS
3	Age	*46*	*46*	*23*	ADDSCODS/DRS
4	Sex	*M*	*M*	*F*	ADDSCODS
5	Last Name	*DOE1*	*DOE1*	*DOE2*	ADDSCODS/DRS
6	First Name	*JOHN*	*JOHN*	*JANE*	ADDSCODS/DRS
7	Date of Birth	*5/24/1967*	*5/24/1967*	*9/29/1987*	ADDSCODS/DRS
8	Ethnicity	*White*	*White*	*White*	ADDSCODS
9	Marital Status	*Divorced*	*Divorced*	*Divorced*	ADDSCODS
10	Employment Status	*Employed Part Time*	*Employed Part Time*	*Employed Full Time*	ADDSCODS
11	Hi (highest) Grade Completed	*12*	*12*	*13*	ADDSCODS
12	Monthly Income	*600*	*600*	*1700*	ADDSCODS
13	Recommended Treatment	*Level II Intensive outpatient*	*Level II Intensive outpatient*	*Level II Education*	ADDSCODS
14	Prior Treatments	*2*	*2*	*0*	ADDSCODS
15	Prior DUI DWAI Arrests	*2*	*2*	*0*	ADDSCODS/DRS
16	BAC	*0.900*	*0.900*	*0.157*	ADDSCODS/DRS
17	Arrest Date	*12/23/2012*	*12/23/2012*	*11/28/2009*	ADDSCODS/DRS
18	Arrest Charge	*DUI Per Se*	*DUI Per Se*	*1st Offense DUI*	ADDSCODS
19	LOS	*77*	*315*	*104*	DRS
20	Admission Date	*7/26/2013*	*10/28/2013*	*2/26/2010*	DRS
21	Discharge Date	*10/11/2013*	*9/8/2014*	*6/10/2010*	DRS
22	Client Status	*Did not Complete*	*Completed*	*Completed*	DRS
23	DRS Status Code	*DM*	*DC*	*DC*	DRS
24	Clinic Name	*BI, Incorporated*	*Song Godwin Counseling*	*Creative Counseling Services - The Reyes Corp.*	DRS

Data Observations

- It was noted that "Court Case No" (Column 2) were inconsistently entered with some having a space between the primary and secondary numbers. (e.g. 2012M 013146C0XX instead of 2012M013146C0XX). This was corrected via a simple data cleansing process.
- There were a significant number of "unknown" entries for "Recommended Treatment" (Column 13). This made it difficult to identify the prescribed level and duration of treatment. For future evaluations, it is recommended to use the "Level of Participation" and assigned "Treatment Track" entries from the DRS records. These will give actual duration for prescribed education or treatment level which can be compared to the LOS (length of service) entry.
- There were duplicate discharge records for some clients that appear to be due to poor record keeping when providers either close or change company names. Client records with identical entries except for the discharge dates were cleansed with the record bearing the later discharge date being retained.
- Clients who recidivate have multiple complex records that need cleaning as subsequent DRS records were added to the preceding court case records.

APPENDIX D: DIVISION OF PROBATION SERVICES DATA ELEMENTS REQUEST

Probation Data

Column #	Data Element	Sample Record1	Sample Record2	Sample Record3
1	Probation Location	*19*	*20*	*17*
2	Court Location	*62*	*7*	*1*
3	Last Name	*DOE1*	*DOE2*	*DOE3*
4	First Name	*JOHN*	*JANE*	*JOHN*
5	Middle Name	*JONES*	*SMITH*	*NEIL*
6	DOB	*4/8/1985*	*11/26/1955*	*6/28/1991*
7	Race	*W*	*W*	*W*
8	Gender	*M*	*F*	*M*
9	Case Number	*C0622012T 0026XX*	*C0072012T 0036XX*	*D0012014CR00 03XX*
10	Statute #	*42-4-1301(1)(a)*	*42-4-1301(1)(a);42-4-1307(3)(b)*	*42-4-1301(1)(a)*
11	Description	*DRIVING UNDER THE INFLUENCE*	*DRIVING UNDER THE INFLUENCE - 0.20+*	*DRIVING UNDER THE INFLUENCE*
12	Law Class	*M*	*M*	*M*
13	Offense Date	*5/20/2012*	*10/28/2012*	*1/31/2014*
14	Conviction Date	*5/21/2012*	*3/1/2013*	*2/27/2014*
15	Probation Start Date	*7/10/2012*	*3/1/2013*	*2/27/2014*
16	Expected End Date	*7/10/2014*	*3/1/2015*	*5/27/2015*
17	Actual Term Date	*10/10/2014*	*1/7/2015*	*4/7/2015*
18	Case Status	*RTEC*	*TERM*	*TERM*

Data Observations

- The court "Case Number" (Column 9)'s composition is identical to the OBH "Court Case No." record entries, but are formatted differently. Having a common format would facilitate data matching for future evaluation by allowing direct matching.
- The "Expected End Date" (Column 16) appears to be inconsistently chosen as there is no clear relationship with the severity of the DUI violation and the expected length of probation. Some 1st time DUI offenders have 2-year expected probations and are shown to finish early. While some repeat offenders have 1-year expected probation sentences. It is

therefore not possible to compare this value with the "Actual Term Date" (Column 17) to determine any extension in probation.

- The RTEC (probation revoked for technical reason) entries for "Case Status" (Column 18) needs careful interpretation as a revocation. Offenders revoked for technical violations cannot be entirely interpreted as non-compliant. For example, an offender may fail to complete the required treatment conditions, not because they did not want to go to treatment, but because they did not have transportation to get to treatment. So, without seeing the nature of the technical violation, it would be hard to determine if it was really non-compliant or just unable. Further coding to identify the nature of the technical violation would clarify this situation.
- It is not clear in the data if the new offense that caused the probation revocation (RNOM or RNOF in Column 18) was DUI related or not. It will be useful if future evaluations could include the nature of the new conviction (i.e., DUI vs other criminal offense) for a more specific interpretation of a DUI related recidivism.

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