The Effects of Legislatively-Mandated Sobriety on First-Time and Repeat DUI Offenders in North Dakota

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Disclaimer

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ABSTRACT

The 24/7 Sobriety Program is an intervention strategy mandating that impaired driving offenders remain sober as a condition of bond or pre-trial release. The goal is to monitor the most at-risk offenders in North Dakota and require that these individuals remain sober in order to keep roadways safe from hazardous drivers. As a component of the program, offenders are required to submit to twice-a-day blood alcohol concentration tests, ankle bracelet monitoring, drug patches, or urinalysis as a monitoring technique. If a program participant fails to remain sober, the individual is sent directly to jail. In 2013, House Bill 1302 – which mandated longer enrollment periods for repeat DUI offenders – went into effect. This project seeks to understand if the passing of this legislation altered behavioral performance of participants in the program. It also addresses potential deterrent effects stemming from the program. Results show that participants significantly improve crash and citation metrics after enrolling in the program. Longer sentencing periods appear to have stronger deterrent effects. Individuals who participate in the program multiple times have an above-average likelihood of relapsing into negative behavior. These individuals typically perform positively when enrolled in the program, but recidivate shortly after completing program mandates. Other programs may be more appropriate for these individuals as they represent the North Dakota driver population which likely has issues with alcohol abuse and self-control.

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1. INTRODUCTION

Impaired driving is an endemic safety and public health problem in the United States (Voas and Fell 2011). The seriousness of this problem is evident in the involvement of impaired drivers in fatal crashes. Impaired drivers create unnecessary financial and societal costs on other road users in the form of lost lives and medical expenditures (NHTSA 2010). Impaired driving poses a threat to both drivers who operate vehicles while impaired and other sober drivers sharing the roadway. The effects of alcohol on drivers are multifaceted and include slowed reaction time, vision impairment, interference with concentration, dulling of judgment, and creating a false sense of confidence (NDDOT 2010a). In the United States, motor vehicle crashes are the leading cause of death for people between the ages of 3 and 34 (Subramanian 2009). Nationally, 31% of all motor vehicle crash fatalities are related to alcohol impairment (NHTSA 2012). This rate is often greater in North Dakota and has been exceeded in 9 of the last 14 years (Figure 1.1). Mothers Against Drunk Driving (2015) estimates the burden on North Dakota taxpayers for drunken driving fatalities is $303 million annually. Clearly, there are both public health and economic benefits if impaired driving is deterred and roadways are made safer in North Dakota.
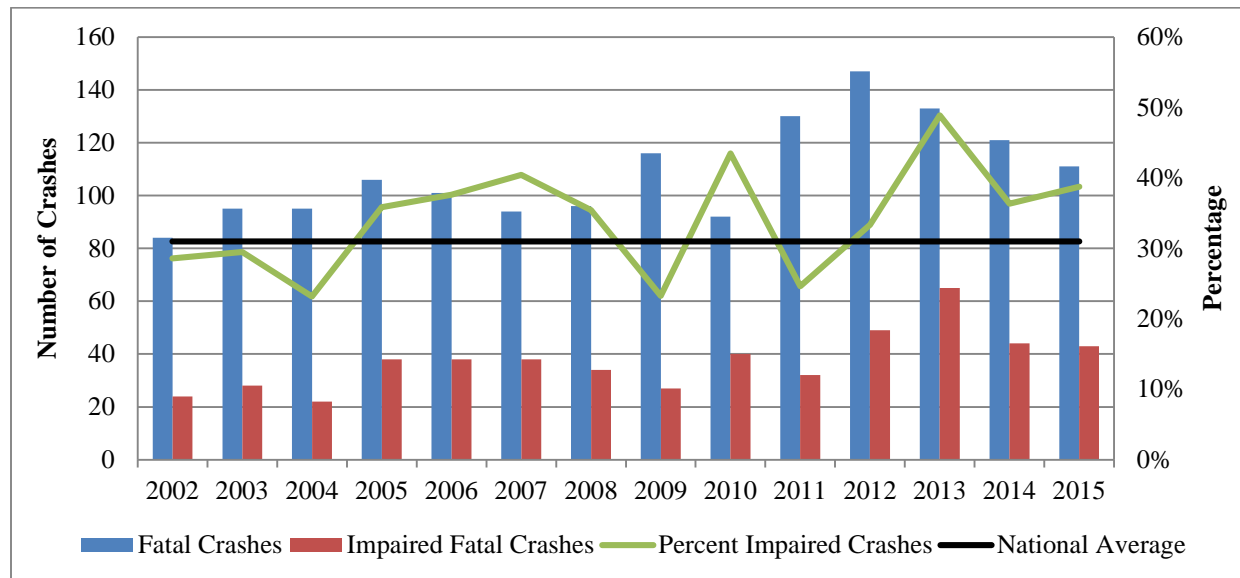
Figure 1.1 Alcohol-Related Fatal Crash Trends in North Dakota, 2002-2015

The State of North Dakota utilizes nationally-accepted strategies to deter instances of impaired driving. Legislation supports these strategies and includes an illegal per se law, implied consent law, preliminary breath test law, punishment for refusal, administrative license suspensions, minimum mandatory ("hard") suspension periods, and open container laws, among others (NHTSA 2007). Nonetheless, criminal fines and punishment associated with impaired driving in North Dakota have been perceived as lenient when compared to other states (VanWechel, Vachal, and Benson 2008).

Traditionally, North Dakota legislators passed changes to impaired driving law via piecemeal legislation. In the first few months of 2013, however, comprehensive impaired driving reform was enacted via North Dakota House Bill 1302, one of the first pieces of legislation passed during the legislative session. The successful passing of this comprehensive reform was attributed to two impaired driving events that gained statewide publicity after taking place within days of one another (Birst and Pettit Venhuizen 2014). In early July 2012, an impaired pickup truck driver traveling the wrong way on I-94 near Jamestown collided head-on with the vehicle of a young family. The impaired driver and all three travelers in the other car – a husband, pregnant wife, and 18-month-old daughter – were killed. A few days later at a campground near the Canada-North Dakota border, an impaired driver got behind the wheel of a pickup truck, lost control of the vehicle, and drove over a tent being used by a father, his two young sons, and one of their close friends. The two brothers – a five-year-old and a nine-year-old – were killed. It is widely accepted that these two events propelled legislators to reconsider the fines and punishment associated with impaired driving. These events also accelerated the process for passing impaired driving reform and helped make the issue a priority among legislators (Birst and Pettit Venhuizen 2014).

Included in House Bill 1302 was expanded use of the 24/7 Sobriety Program. Although the program had been in use for a few years in the state – it was introduced in pilot study form in 2008 and extended statewide in 2010 – enrollment in the program was largely contingent upon judicial discretion. Whereas the 24/7 Sobriety Program was used mostly as a condition of pre-trial release for repeat offenders prior to 2013 (Smith 2013), House Bill 1302 mandated enrollment for repeat offenders. Beginning in 2013, second-time offenders have a mandatory 12-month enrollment in the 24/7 Sobriety Program. Third-time offenders also have a mandatory 12-month enrollment in the program but are also subjected to supervised probation. Fourth-and-subsequent offenders are required by law to be enrolled in the program for 24 months in addition to being placed on supervised probation. This law went into effect on August 1, 2013.
The following paper discusses trends among DUI offenders enrolled in the program.

2.   BACKGROUND

According to the National Highway Traffic Safety Administration (NHTSA), alcohol-impaired motor vehicle crashes cost more than an estimated $37 billion in economic costs each year. During 2010, NHTSA reported more than 10,000 deaths caused by alcohol-impaired driving, which accounts for one-third of all traffic crashes. This is a serious problem facing the nation in promoting public health safety. Several interventions and countermeasures have been used to reduce losses caused by impaired drivers. These strategies focus on minimizing losses for both the driver choosing to operate a vehicle while impaired and for other sober roadway users impacted by someone else's flawed decision to drive while impaired. Countermeasures are typically coupled in these efforts as states work to stop alcohol-impaired driving. For instance, confounding effects may be found with policies that levy penalties such as fines, licensure loss, and incarceration, along with public education deterrence efforts. Other efforts may focus on enforcement, such as high-visibility enforcement or sustained enforcement programs. In rare cases, some states have deployed programs designed to provide interventions for individual drivers.

In North Dakota, impaired driving is an endemic problem in public safety. On average, state law enforcement personnel arrest between 5,000 and 7,000 individuals for DUI each year (NDDOT 2014). Of these arrested drivers, only about 80% will be convicted of operating a vehicle while impaired. North Dakota is among the national leaders in terms of impaired driving arrests and convictions per capita.

According to the North Dakota Department of Transportation, impairment by alcohol and/or drugs was the leading contributing factor in fatal crashes in the 2014 calendar year (2014 North Dakota Crash Summary). Moreover, North Dakota is among the top 10 states with the highest rates of alcohol-related motor vehicle fatal crashes (NDDOT 2011). In North Dakota, repeat DUI offenders account for one-third to one-half of all DUI offenses (NDDOT 2010b). Because of the high share of repeat DUI offenders, it may be particularly beneficial to understand the success for driver-based interventions that can be targeted at specific offender groups. Although early in its implementation, the goal here is to conduct an assessment of one such program in North Dakota – the 24/7 Sobriety Program – which was first introduced during a 2008 pilot study.

2.1   Impaired Driving in the United States

A seminal study surveying impaired driving attitudes and behaviors estimated that 85.5 million drinking-driving trips were taken in 2008 (Drew et al. 2010). A separate study found that 2% of randomly selected nighttime weekend drivers in the United States had illegal blood alcohol content levels (Lacey et al. 2009). The detection and apprehension rate of impaired drivers is rare (Hause, Voas, and Chavez 1982) and there is less than one arrest for every 300 trips by drivers with illegal blood alcohol concentrations (Beitel, Sharp, and Glauz 2000). A study by the NHTSA (2006) showed even lower apprehension rates and estimated that there are between 500 and 2,000 DUI violations committed for every one DUI violator arrested. In addition to trips taken by impaired drivers, there is also the threat of impaired drivers being involved in more serious crashes, such as those that result in injuries or fatalities. Alcohol-impaired driving

crashes injure 200,000 Americans and accrue roughly $130 billion in societal costs annually in the United States (Zaloshnja and Miller 2009). The latest estimates released by the FBI (2015) show that 1,117,852 drivers were arrested for DWI or DUI in the United States in 2014.

Making smart decisions with regard to driving after drinking is a major safety and public health concern in a nation where one-third of the population consumes alcohol (Voas and Fell 2011). The National Survey of Drinking and Driving Attitudes and Behaviors conducted by the NHTSA found that one in five of those surveyed aged 16 or older reported driving within two hours after drinking (NHTSA 2010). Between 1982 and 1997, the enactment of basic impaired driving laws decreased alcohol-related crash fatalities but no major declines have occurred since (Voas and Fell 2011). These laws commonly included a 0.08 g/dL BAC legal limit, license revocation or suspension for BAC higher than the legal limit, a minimum legal drinking age of 21, and the zero-tolerance law for drivers younger than 21 with alcohol in their systems (Voas and Fell 2011). Currently all 50 states and the District of Columbia have a 0.08 g/dL BAC legal limit as well as vehicle sanctions for repeat offenders (Voas and Fell 2011). Even with these laws in place, the current crash, court, and incarceration literature suggests that more must be done to reduce impaired driving incidence as this activity is still occurring at dangerous rates (Voas and Fell 2011).

A 2010 survey to assess the prevalence of alcohol-impaired driving among adults found 2.8% of respondents reported at least one episode of alcohol-impaired driving. The four million respondents yielded an estimated 112,116,000 episodes of alcohol-impaired driving in the United States for the 2010 calendar year. The results showed that impaired driving was highest among ages 21-24, binge drinkers, and among those less likely to wear seat belts (Bergen, Shults, and Rudd 2011). The impaired driving trends were also analyzed for regions and states and showed that the Midwest region had the highest rate of impaired driving with 643 episodes per 1,000 population. The state with the highest self-reported impaired driving rate in the Midwest region was North Dakota (Bergen, Shults, and Rudd 2011).

2.2   Reasons for Drinking, Treatment, and Sobriety

Reasons for drinking are diverse and vary on an individual basis. Interviews with 12 compulsory alcohol abusers found problem denial and lack of treatment to be two common themes for abusing alcohol (Ekendahl 2009). A survey of first-time and repeat DUI offenders in North Dakota discovered that inebriated drivers often did not have a passenger present in the vehicle at the time of arrest, which suggests that some individuals may be drinking alone for escapism (Huseth and Kubas 2012). Other respondents showed behaviors indicative of alcoholism and/or issues with self-control: for example, repeat offenders were more likely to have also used illicit drugs on the same day as their DUI arrest (Huseth and Kubas 2012). In a study in which counselors interviewed DWI recidivists about why they continued to drive after a DWI conviction, offenders reported a need for thorough alcohol use assessment, self-commitment to dealing with problems, personalized treatment, and continued contact with caring individuals as factors needed to reinforce positive lifestyle changes (Wiliszowski et al. 1996). DWI courts also emphasize these principles (Fell, Tippetts, and Ciccel 2010).

A study examining the effectiveness of multiple screening instruments – "CAGE," "AUDIT," and "MAST" – to gauge social and behavioral aspects of alcohol problems noted that patients with alcohol dependence "typically require more intensive counseling in alcohol treatment programs than patients with less severe alcohol problems" (Fiellin, Reid, and O'Connor 200: 820-821). An inextricable link between culture, spirituality, and one's sense of "native community" as it related to the ultimate goal of sobriety was found in a study of treatment and sobriety in Alaskan native communities (Hazel and Mohatt 2001). In this case study, recovering men typically reported seven reasons for resisting temptation and staying sober: acknowledging the benefits of sobriety, fearing the consequences of drinking, a conscious desire for sobriety, support from family, formal support programs, keeping active, and religion or spirituality. Focus groups with recovering men determined that sobriety was related to four themes – spirit, thought, physical, and feelings – at the individual, family, community, and world/environment levels. A survey about one's experiences with drinking and sobriety administered afterward identified a pivotal event, cognitive appraisal, social support, culture, and spirituality as key factors that guide alcoholics toward the "sobriety path" (Hazel and Mohatt 2001: 552-555).

2.3   Recidivism

Many studies have examined how impaired driving is related to recidivism. Approximately 35% of all DUI convictions are for drivers with a previous DUI conviction in the prior seven years (Schell, Chan, and Morral 2006). This is reaffirmed by Fell (1995), who found that roughly one-third of drivers arrested for DWI are repeat offenders. It is known that DUI recidivists carry a higher risk of future DUI arrest (Gould and Gould 1992), have a higher risk of involvement in alcohol-related and non-alcohol-related crashes (Perrine, Peck, and Fell 1988), and have a higher risk of being involved in fatal crashes (Fell and Klein 1994). In a sample of 3,884 convicted impaired drivers, repeat offenders were more likely to have a prior criminal history, less education, and substance use than first-time offenders (DeMichele and Lowe 2011). Gender, unemployment, and ethnicity are also determinants of DUI recidivism (Nochajski and Stasiewicz 2006). Males are more likely to be recidivists than females (Nochajski and Stasiewicz 2006). There is regional variation in ethnic recidivism rates; whereas the majority of repeat DUI offenders are white in the Midwest, Northeast, Northwest, and South, most recidivists are Hispanic or Native American in the Southwest (Nochajski and Stasiewicz 2006).

The NHTSA (2006) developed a guide explaining appropriate sentencing for DWI offenders. Working collaboratively with the National Institute on Alcohol Abuse and Alcoholism (NIAAA), six factors were identified as critically important to reduce recidivism:
- Evaluating offenders for alcohol-related problems and recidivism risk
- Selecting appropriate sanctions and remedies for each offender
- Including provisions for appropriate alcohol abuse or alcohol-dependent treatment in the sentencing order for offenders who require such treatment
- Monitoring the offender's compliance with the sanctions and treatment
- Acting swiftly to correct noncompliance
- Imposing vehicle sanctions, where appropriate, that make it difficult for offenders to drink and drive during said period

It has been posited that recidivism is a common characteristic of impaired drivers in fatal crashes because the current parole system largely fails to rehabilitate the parolee's behavior (Kleiman and Hawken 2008). Moreover, the habitual abuse of alcohol is common among the incarcerated population as more than two-thirds of jail inmates met substance dependence or abuse criteria (Karberg and James 2005). With this failure, it is important to find ways to address this problem as a potential means to reduce impaired driving, especially with repeat offenders. It has been suggested that the best way to deter recidivism is to use certainty over severity – responding to violations quicker and communicating the deterrent threat to the likely violators minimizes repeat offenses (Kleiman and Hawken 2008).

These strategies are used in programs such as the HOPE program and the South Dakota 24/7 Sobriety Project, and have shown positive results in reducing recidivism among parolees who participate (Kleiman and Hawken 2008). These community corrections programs conduct alcohol and drug screenings, paid by the offender, which are less costly than long-term jail sentences (Voas et al. 2011). Such alcohol treatment has been shown to reduce impaired driving and alcohol-related crashes among offenders who receive mandatory interventions (Dill and Wells-Parker 2006). It has been further suggested that alcohol-related intervention and treatment in combination with licensing actions is the best strategy to reduce recidivism (Dill and Wells-Parker 2006). Advances in technology, such as the use of electronic monitoring devices for home detention and remote BAC monitoring, are other sanction options that can further decrease DUI recidivism (Dill and Wells-Parker 2006).

Note that DUI interventions do not necessarily work for every individual convicted of impaired driving. For example, in a limited assessment of North Dakota drivers, 2.8% of individuals participating in the 24/7 Sobriety Program had at least one DUI during program enrollment (Kubas 2016). Interventions do, however, show different results for recidivism among those who complete an intervention program. A study highlighting driver performance in England and Wales examined 144 individuals in an intervention program and compared them to both a control group and a subgroup of participants who did not complete the intervention program (Palmer et al. 2012). The rate of recidivism was higher among those who did not complete the intervention than for the other groups – those who completed the program and those in the control group (Palmer et al. 2012). The study recommended highlighting the factors associated with non-completion of the program and high rates of reconviction, and also advocated directing resources to those at high-risk for reconviction rather than those who are at a lower risk for reconviction.

The failure of the parole system to deter recidivism in impaired drivers has led to new versions of parole systems in some regions that use certainty over severity. These new systems respond to violations quicker and communicate the deterrent threat with the belief that violators will subsequently minimize recidivism (Kleiman and Hawken 2008). Two ongoing programs with positive initial results are the Hawaii Opportunity Probation with Enforcement (HOPE) program and the South Dakota 24/7 Sobriety Project. These programs have the sole purpose of making roads and communities safer. These interventions, which are focused on individual drivers and rehabilitation, have been implemented as strategies to reduce recidivism. The HOPE program is broader and has been used with criminal offenses beyond impaired driving. The 24/7 Sobriety Project has been targeted specifically at impaired drivers.

2.3.1 The HOPE Program

The Hawaii Opportunity Probation with Enforcement (HOPE) program was started in 2004 to break the cycle of repeating offenses (Office of National Drug Control Policy 2011). The program engages rigorous principles to keep probationers at high-risk of failure from breaking their probation terms and being sent back to prison. It is carried out by imposing "swift, certain, and short jail sanctions" for every violation of the probation terms (Office of National Drug Control Policy 2011).

The program's principles are to identify probationers who are at high-risk for probation violation and to notify them that for every probation violation there will be an immediate penalty. The program conducts frequent and random drug tests and imposes short jail sanctions for each detected violation. It also refers participants to drug treatment upon request. Those on probation who resist abstaining from drugs while under sanctions are referred to drug treatment (Office of National Drug Control Policy 2011).

The HOPE program is estimated to cost $2,500 per program participant, which is more than standard probation terms but saves money compared to re-arrests and re-incarceration. The program was evaluated in 2009 by the National Institute of Justice, which concluded that the more than 1,500 HOPE program participants analyzed were 55% less likely to be arrested for new crimes, 72% less likely to use drugs, 61% less likely to miss appointments with their probation officer, and 53% less likely to have their probation revoked as compared with a control group.

Literature on the HOPE program outlines the positive effects it has on the participants as well as its cost effectiveness. The program's swiftness leads to longer lasting change compared to typical treatment programs (Kiyabu, Steinberg, and Yoshida 2010; DuPont and Skipper 2012). Specific HOPE program impacts with regard to alcohol-impaired driving were not found.

2.3.2 The South Dakota 24/7 Sobriety Project

Another program that uses tactics similar to HOPE in targeting recidivist DUI offenders is the South Dakota 24/7 Sobriety Project. North Dakota and other states have developed impaired driving intervention programs modeled after this South Dakota initiative. A pilot program was started under former Attorney General Larry Long in 2005 because of South Dakota's high alcohol and drug-related incarcerations. Between 1999 and 2007, 59% of the nearly 25,000 recorded felonies in South Dakota were related to drugs and alcohol (Long 2009) and 13.6% of those incarcerated were DUI offenders (Loudenburg, Drube, and Leonardson 2010). The South Dakota 24/7 Sobriety Project was started as an alternative for DUI incarceration, but as of 2009 only 59% of the participants were DUI offenders and the remaining 41% were enrolled in the program for other offenses (Loudenburg, Drube, and Leonardson 2010).

As a requirement of their probation, the program requires participants to be tested for alcohol by measures such as reporting twice daily for breath testing, wearing an ankle bracelet to electronically monitor alcohol, and using a drug patch or urine testing (Voas et al. 2011). The

project has strict enforcement: if offenders pass the alcohol screening tests, their days carry on as usual. However, if they fail an alcohol screening test or do not show up to take it, the offenders go directly to jail (Chavers 2008).

An early evaluation of the program demonstrated that it has some success and suggested further studies be conducted on its effectiveness as more data become available (Loudenburg, Drube, and Leonardson 2010). Since then, the program has been monitored across a number of academic disciplines. A comparison analysis on recidivism found that the participants of the 24/7 Sobriety Project had a 74%, 44%, and 31% reduction in recidivism on their second, third, and fourth DUI, respectively (Loudenburg, Drube, and Leonardson 2010). The reductions in DUI recidivism exceed the reported reductions for other interventions such as educational interventions and sanctions found throughout the literature. DUI offenders in the 24/7 Sobriety Project also had lower rates of DUI recidivism when compared with control groups not enrolled in the program (DuPont and Skipper 2012). When the presence of the 24/7 Sobriety Project was treated as an intervention variable, counties with the program had a 12% reduction in repeat DUI arrests, a 9% reduction in domestic violence arrests, and mixed results for traffic crashes (Kilmer et al. 2013). These findings have been reaffirmed by Midgette (2014) who also determined that males between age 18 and 40 may have fewer incidences of traffic crashes upon enrollment in the course.

South Dakota's 24/7 Sobriety Project is now imitated in North Dakota, Montana, and parts of Wyoming (Brown 2012). At an international level, the program has also been introduced in pilot form in the United Kingdom (Kilmer and Humphreys 2013). The North Dakota 24/7 Sobriety Program was one of six programs chosen for a Secure Continuous Remote Alcohol Monitoring (SCRAM) study by the National Highway Traffic Safety Administration and the Pacific Institute for Research and Evaluation. The case study found that transdermal alcohol monitoring was beneficial to courts and probation and parole departments in all the case study sites, and that research is needed to study whether transdermal alcohol monitoring reduces drinking and DUI recidivism among offenders (McKnight, Fell, and Auld-Owens 2012).

2.4   Implementing the 24/7 Sobriety Program in North Dakota

North Dakota's 24/7 Sobriety Program is modeled directly after the South Dakota program. Program authorization is granted by North Dakota Century Code 54-12-27 through 54-12-31. These statutes give the Attorney General the ability to use the program, establish program fees, create program funding, and establish the program's use as conditions of bond for offenders (North Dakota Century Code 54-12-27 through 54-12-31). A pilot program was first authorized by the North Dakota legislature in 2007 to administer breath tests for alcohol offenders in select parts of the state (Fisher, McKnight, and Fell 2013). On January 1, 2008, the pilot program began in 12 counties near the South Central Judicial District (Figure 2.1), and statewide implementation was completed in August 2010 based on the success of the pilot study (Fisher, McKnight, and Fell 2013).
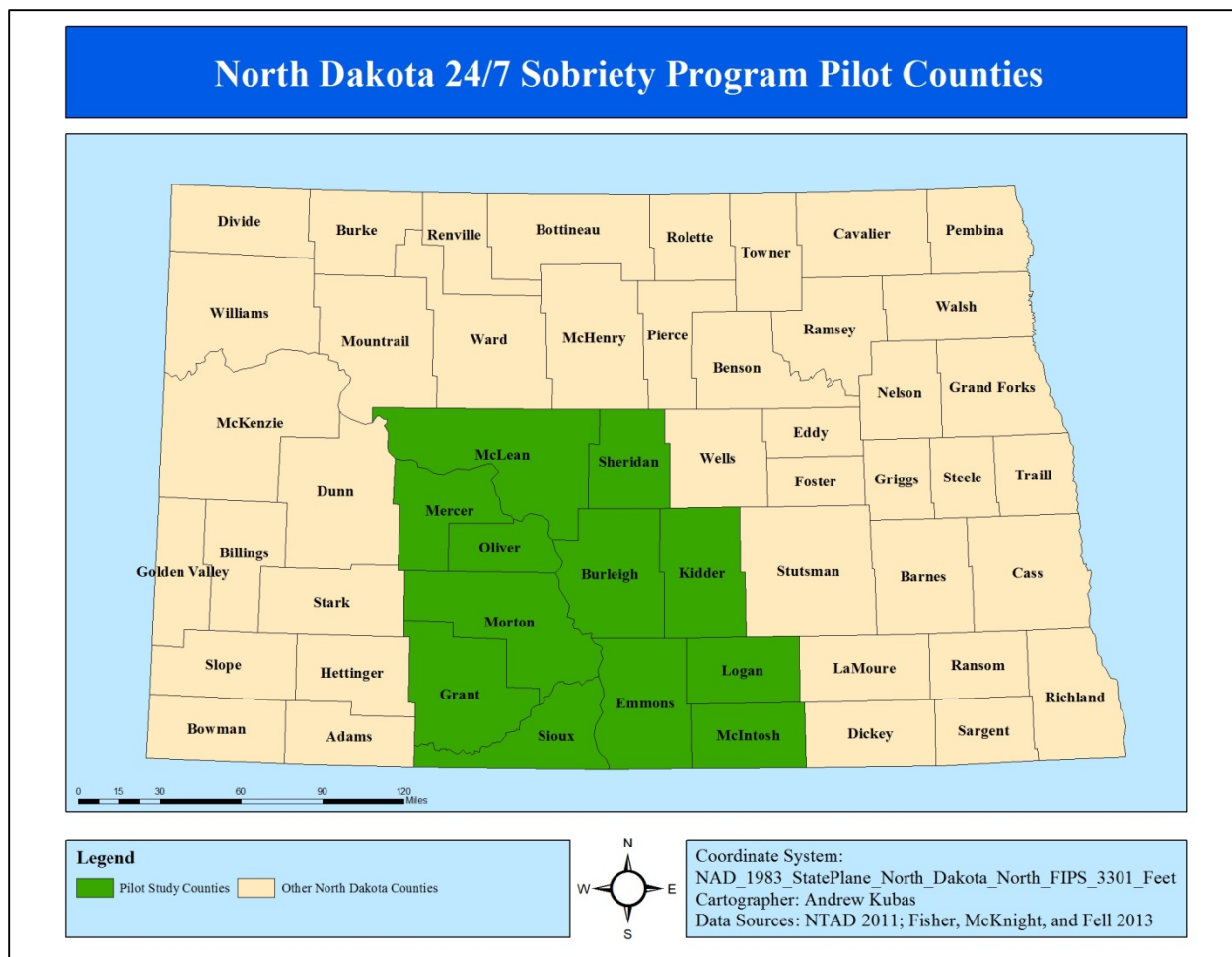
Figure 2.1 2008 Pilot Program Counties

For the majority of the program's existence, DUI offenders were assigned to the program at the discretion of judges. This allowed for individuals with other alcohol-related offenses – such as domestic violence or abuse/neglect of a child – to also be enrolled in the program. New legislation implemented on August 1,
2013 now mandates that any repeat DUI offender will be required to participate in the program as a condition of bond or pre-trial release (Fisher, McKnight, and Fell 2013).

Like South Dakota's 24/7 Sobriety Project, North Dakota DUI offenders are required to have twice-daily breath tests or, alternatively, urinalysis and/or ankle bracelet monitoring. Some offenders may also be required to wear a drug patch if deemed necessary by the judge. Like the South Dakota model, DUI offenders in North Dakota are also required to pay for each breath test or alcohol monitoring system. This makes the program self-sustainable as it is fully funded by DUI offenders. The most recent available data indicate that 95.82% of the individuals placed in the 24/7 Sobriety Program successfully complete it (North Dakota Attorney General's Office 2016).

A prior assessment of the 24/7 Sobriety Program in North Dakota found positive results. The program appeared to have a stronger deterrent effect on females and the legislation enacted by House Bill 1302 was more effective at reducing impaired driving events (Kubas, Kayabas, and Vachal 2015). There were some limitations to this study via probabilistic matching and tracking participants in equal intervals before and after completing the program. The forthcoming analysis is more robust as it includes an improved participant probabilistic matching process and a higher volume of participants. The following research questions guided the work:

- Is there a before-and-after deterrent effect when examining program entrants?
- Is there a difference in crash/citation rates factoring for House Bill 1302?
- Can a model be developed to assist practitioners in identifying enrollees most likely to recidivate?

This study contributes to the literature by assessing the efficacy of legislation and evaluating traffic safety performance by a diverse set of program participant groups. Gender, region, geography, repeat DUI offenders, multi-entry participants, and participation length are factors considered throughout the report.

3.   METHODS

Individual records were obtained from two data sets. First, the North Dakota Bureau of Criminal Investigation (BCI) provided historical records of North Dakotans enrolled in the 24/7 Sobriety Program. This database encompassed eight years of driver records from January 2008 to December 2015. Per the data agreement between NDSU and the BCI, once the data were cleaned and useful variables were created, personal identification information was removed from the database to protect the anonymity of DUI offenders. The first record in the database started the program on January 8, 2008 during the pilot program era. The most recent records from the latter months in 2015 were not used because the research team only had access to crash data through the calendar year 2015. Because each participant was tracked for a minimum of 60 days after starting the program, this meant that participants beginning the program after November 1, 2015 were not included in the analysis as they were incapable of being tracked for the minimum study period. Therefore, the last valid record had a program start date of October 30, 2015.

The original data transfer consisted of 17,064 entries. Of these, 11,860 were removed for numerous reasons. Parameters for removing entries from the final data set include non-DUI-related arrests, data entry errors, enrollment periods outside of the study timeframe, participants under the age of 18, out-of-state participants, participants with drug violations only, and an inability to match 24/7 Sobriety Program records to state crash and conviction databases (Figure 3.1).

Valid 24/7 Sobriety Program records were matched to driver's license records provided to the research team by the North Dakota Department of Transportation. This driver's license database includes both crash and conviction information for North Dakota drivers. Thus, if a link is established connecting these two databases, it becomes possible to track individual drivers enrolled in the 24/7 Sobriety Program with regard to crashes and convictions before, during, and after enrollment in the program.

Probabilistic matching was used to link 24/7 Sobriety Program records with driver's license records. The North Dakota Department of Transportation provided the research team with a unique numeric code (hereafter referred to as the "Record ID") corresponding to each individual driver. This file containing each driver's Record ID also included the last four digits of their social security number. Working backwards, the research team first linked the Record ID to the 24/7 Sobriety Program participant list provided by the North Dakota Bureau of Criminal Investigation as both data sources contained the last four digits of one's social security number. Once the Record ID was linked to program participants, this new database was linked a second time to driver records as both of these sources contained the Record ID variable. The matching rate for this process was 85.9% as 5,330 entries were linked from a possible 6,202 records meeting study criteria.
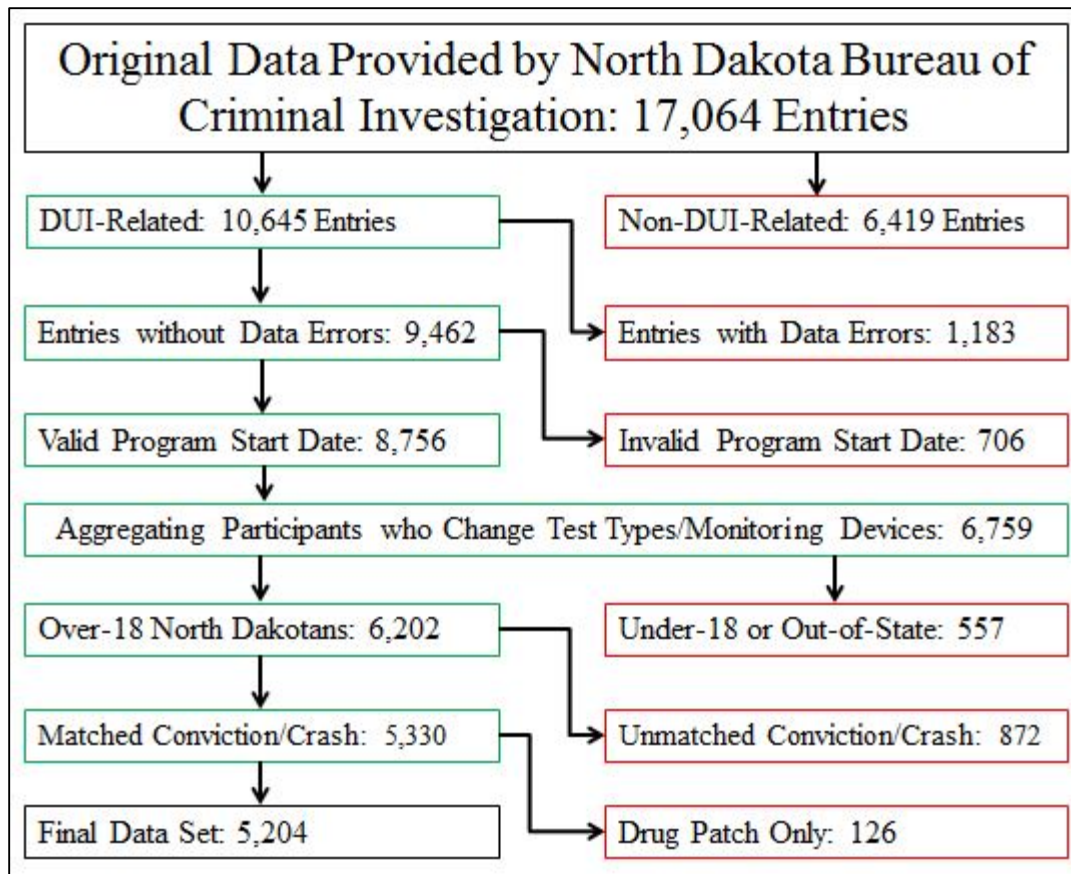
Figure 3.1 Data Matching Process

Once records were matched, the database was cleaned and a series of variables were created for use in various statistical analyses. These variables include DUI history, crash history, DUI-related citation history, non-DUI-related citation history, the date of enrollment in the 24/7 Sobriety Program, the type of alcohol monitoring system used by the offending driver, and demographic information such as age, gender, and regional/geographic characteristics. For each participant, the DUI, crash, and citation records were tracked for 60-, 365-, and 730-day intervals before and after starting the program. The arbitrary study periods were used as these relate directly to sentencing timeframes mandated by law. Prior to the passing of House Bill 1302, individuals were commonly sentenced to the program for 60 days. After the enactment of this legislation, second- and third-time offenders were required to participate in the program for 365 days and fourth-or-subsequent offenders for 730 days.

One variable highlighted the type of monitoring system being used to track program participants. Within this variable, it was discovered that 126 participants were tracked using only a drug patch. Because the focus of this research paper is on understanding alcohol-impaired driver behavior, these 126 records were eliminated from the database as they were not specific to alcohol-impaired driving. The final database consisted of 5,204 alcohol-impaired driving-related records.

It is possible for a participant to have an impaired driving event, be sentenced to the program, successfully complete the program, have another impaired driving event in the future, and be sentenced to the program for a second time. For the purposes of this study, statistical analyses are pertinent to the number of program entries as it is possible for participants to enter the program multiple times. In sum, there were 4,518 individuals who accounted for 5,204 program entries. These entries constitute the final data set used in the analysis.

3.1   Data Characteristics

3.1.1   Program Start Year

As expected, enrollment in the 24/7 Sobriety Program expanded once it was scaled statewide. Participation in the program grew noticeably after 2013, which is perhaps attributed to the new legislation mandating that repeat offenders participate in the 24/7 Sobriety Program (Table 3.1).

Table 3.1 Program Start Year

Start Year	Number of Entries	Percent of Sample
2008[1]	122	2.3%
2009[1]	183	3.5%
2010[2]	476	9.1%
2011	718	13.8%
2012	679	13.0%
2013	854	16.4%
2014	1,186	22.8%
2015[3]	986	18.9%

[1]24/7 Sobriety Program was used only in pilot form
[2]24/7 Sobriety Program was used statewide starting on August 1, 2010
[3]Figure is based on enrollment through October 30, 2015

3.1.2   Demographic Information

In this sample of DUI offenders, men outnumbered women at roughly a four-to-one ratio based on program entries. Males were 79.1% of the entries compared to just 20.9% who were female. This follows other studies of DUI offenders in the state (Huseth and Kubas 2012; Kubas, Kayabas, and Vachal 2015). Younger drivers had a higher representation in the sample than older drivers (Table 3.2). A majority (58.4%) in the sample were under the age of 34, which parallels other statewide studies finding that 18-to-34-year-olds exhibit behaviors at odds with traffic safety goals, such as operating a vehicle after consuming alcohol more frequently than others (Vachal, Benson, and Kubas 2016). This is especially true for male drivers, as this particular group has been labeled as high-risk throughout the literature. Note that, in this sample, drivers in two age cohorts – those between the ages of 65 and 74 and those over the age of 75 – have fewer than 30 entries in their respective age groups. Sample sizes smaller than 30 are not considered reliable when conducting tests of significance and cannot be extrapolated to fit the entire demographic being studied. Therefore, any conclusions made in this report about the 65-to-74-year-old group or the 75+ cohort cannot be considered representative of all DUI offenders in those age groups in North Dakota. To account for this shortcoming, the 65-to-74 and the 75+

age cohorts were aggregated with the 55-64-year-old group to create one larger 55-and-above cohort used throughout statistical analyses.

Table 3.2 Age of Participant at Time of Entry

Age Cohort	Number of Entries	Percent of Sample
18-24	1,152	22.1%
25-34	1,888	36.3%
35-44	1,061	20.4%
45-54	773	14.9%
55-64	286	5.5%
65-74	36	0.7%
75+	8	0.2%

Participation in the 24/7 Sobriety Program was not evenly distributed across region and geography (Table 3.3). A majority of program entries (53.7%) were from urban counties in the western half of the state. This makes sense considering that most of the 12 pilot counties were located in the western half of the state and included the cities of Bismarck and Mandan, the urban hub of the region. Since this area has had the program in place for the longest period of time, it is reasonable to assume that a higher-than-average number of program entries would meet these regional and geographic categorizations.

Table 3.3 Program Entries, by Region and Geography

		GEOGRAPHY		
		Urban	Rural	**Total**
R E G I O N	East	1,349 (26.0%)	479 (9.2%)	**1,828 (35.3%)**
	West	2,786 (53.7%)	571 (11.0%)	**3,357 (64.7%)**
	Total	**4,135 (79.7%)**	**1,050 (20.3%)**	**5,185**

The regional definition was created by aggregating state health regions into two areas representing an east/west division. The geography definition includes an urban/rural dichotomy. Urban participants are from counties with the largest urban population according to US Census data. Four urban counties are located in the east and five in the west, based on population density metrics in the study (Figure 3.2). These nine counties represent nearly 95% of the urban population in the state (US Census Bureau 2010) and likely explains why nearly four-fifths (79.7%) of program entries are for urban individuals.

North Dakota County Stratification

Legend
- East Rural
- East Urban
- West Rural
- West Urban

Coordinate System:
NAD_1983_StatePlane_North_Dakota_North_FIPS_3301_Feet
Cartographer: Andrew Kubas
Data Sources: NTAD 2011; US Census Bureau 2015
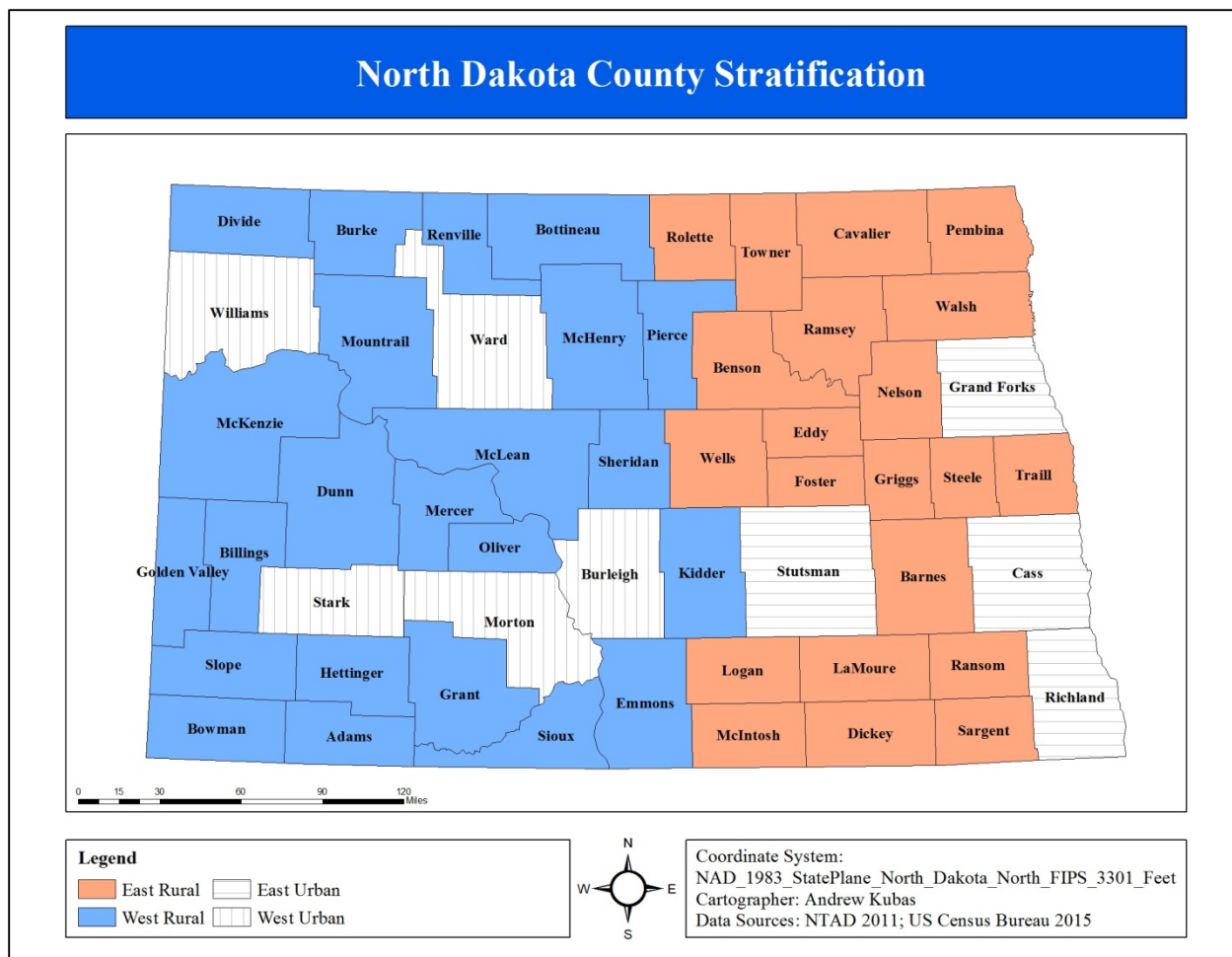
Figure 3.2 North Dakota County Stratification

3.1.3 Monitoring System

Once enrolled in the 24/7 Sobriety Program, participants must remain sober for the duration of the enrollment period. For the offender to stay accountable and remain sober in the program, regular alcohol testing must occur. In North Dakota, multiple alcohol monitoring systems are utilized as part of the 24/7 Sobriety Program. These systems include twice-a-day preliminary breath tests, ankle bracelet monitoring, and urinalysis testing. (Some respondents, as advocated by judicial discretion, may be subjected to additional monitoring via drug patches capable of monitoring illegal substances in a participant's sweat.) The "SCRAM" (secure continuous remote alcohol monitoring) ankle bracelets vary by function and are not a truly continuous monitoring device. In general, the bracelet takes a test roughly every 30 minutes. This data remains stored and may require hard line/Ethernet, machine, or wireless capability to upload data to a database. This information is downloaded to track compliance to sobriety, but the download frequency varies. Of the 5,204 entries in this sample, about two-thirds (3,593 entries) were monitored with only one type of alcohol-testing system. The majority of participants (54.5%) in this sample were monitored with twice-a-day preliminary breath tests only (Table 3.4). Of the remaining 1,611 entries with two or more alcohol-monitoring systems, 93.1% were monitored by

both the twice-a-day preliminary breath tests and SCRAM ankle bracelets. It should be clarified that these individuals were never monitored by two devices at once; these participants switched monitoring devices at some point in the program. Just 34 entries (0.7%) were tracked by three monitoring systems. Once again, no participant was subjected to being monitored by more than one alcohol-monitoring device at once. It is possible that the drug patch was used simultaneously with an alcohol monitoring device.

Table 3.4 Monitoring System

Monitoring System	Number of Entries	Percent of Sample
Preliminary Breath Test Only	2,835	53.2%
Preliminary Breath Test and SCRAM	1,500	28.1%
SCRAM Only	753	14.1%
Drug Patch Only*	126	2.4%
Preliminary Breath Test and Drug Patch	42	0.8%
Preliminary Breath Test, SCRAM, and Drug Patch	21	0.4%
SCRAM and SCRAM Wireless	20	0.4%
SCRAM and Drug Patch	11	0.2%
Preliminary Breath Test, SCRAM, and SCRAM Wireless	9	0.2%
Urinalysis Only	5	0.1%
Preliminary Breath Test, SCRAM, and Urinalysis	4	0.1%
Preliminary Breath Test and Urinalysis	3	0.1%
SCRAM and Urinalysis	1	0.02%

*Data provided to the research team included some individuals tracked by drug patch only. These entries are excluded from the analysis as this report of 24/7 Sobriety Program entries requires at least one alcohol monitoring system

3.1.4 Recidivist Status

Most studies monitoring the behaviors and patterns of alcohol abusers define recidivists as anyone who relapses into repetitive criminal behaviors. With regard to driving under the influence of alcohol, repeat DUI offenders are considered to be among the most dangerous drivers as their habitual use of alcohol and subsequent decisions to drive while impaired pose a major threat on the roadway. Studies throughout the literature validate that these drivers pose a safety threat to other drivers sharing the road. For the purposes of this study, however, "recidivist" refers to drivers in the 24/7 Sobriety Program who receive a citation for impaired driving after enrolling in the program. This definition will be used because the agencies supporting this research are most interested in determining how the program affects traffic safety. Other alcohol-related citations neither guarantee that an individual was operating a vehicle at the time of the citation nor guarantee that the individual was impaired. In this sample of 24/7 Sobriety Program entries, over four-fifths (80.2%) had a DUI as the triggering event mandating initial participation in the program (Table 3.5).

Table 3.5 Offense Type Triggering Enrollment in 24/7 Sobriety Program

Offense Type	Number of Entries	Percent
Actual Physical Control	798	15.3%
Driving Under Suspension	63	1.2%
Minor in Possession/Control	166	3.2%
DUI 1st Offense	915	17.6%
DUI 2nd Offense	2,202	42.3%
DUI 3rd Offense	767	14.7%
DUI 4th+ Offense	293	5.6%

Based on this study's definition of a recidivist driver, three levels of recidivism will be examined: high-risk recidivists, moderate-risk recidivists, and post-program recidivists. High-risk recidivists are classified as those drivers receiving an impaired driving citation within 60 days of entering the 24/7 Sobriety Program. An arbitrary period of 60 days was chosen because – prior to the latest legislative changes made in House Bill 1302 – this represents the typical time a DUI offender was sentenced to the program (McKnight, Fell, and Auld-Owens 2012). All entries in the data set used for the analysis were subjected to the program for a minimum of 60 days. Moderate-risk recidivists are categorized as those drivers who received an impaired driving citation while enrolled in the program at some point after day 61 of participation. Only those drivers who began the program after the passing of House Bill 1302 can be categorized as moderate-risk recidivists as enrollees in the program pre-House Bill 1302 would not have typically been required to remain sober for more than 60 days. Post-program recidivists are those who successfully remain sober while enrolled in the program but have an impaired driving violation at some point after completing the 24/7 Sobriety Program.

In this sample of entries, 55 (1.1%) received a citation for impaired driving within 60 days of starting the program and are considered high-risk recidivists. A smaller share of 36 entries (0.7%) received an impaired driving citation at some point while enrolled in the program after day 61. These individuals represent moderate-risk recidivists in this sample. A much larger share of 402 entries (7.7%) received an impaired driving citation at some point after completing the program and are considered post-program recidivists.

4.   RESULTS

Data will be reported both in terms of general trends and specific differences between driver groups. Descriptive consideration must occur to account for overall patterns among impaired driving offenders. Beyond these overall trends, different hypothesis testing statistical procedures – one-way ANOVAs and independent-samples t-tests – will be used to determine if there are differences in DUI offenders when factoring for various participant groups. This information will be provided to highlight possible differences in impaired driving events, non-DUI-related citations, and crash rates. Recidivism will be discussed based on earlier definitions and binary logistic regression models will attempt to identify factors associated with increased risk of the entrant relapsing into illegal behavior.

4.1   Descriptive Statistics

4.1.1   Impaired Driving Events

With regard to impaired driving-related citations, this sample of 24/7 Sobriety Program entries was responsible for 5,407 citations committed by 3,957 entrants in the two years prior to entering the program. After starting the program, there were just 538 DUI citations committed by 493 program entrants in the two-year period following enrollment into the program. Before-and-after improvements were made in the two-year, one-year, and sixty-day intervals used in the analysis (Figure 4.1). The number of impaired driving-related citations is not the best metric to measure program performance as having an impaired driving-related event is a prerequisite for program entry. Nonetheless, the rate at which DUI citations are issued per program entry does show that offenders have a lower rate of DUI citations after entering the program.
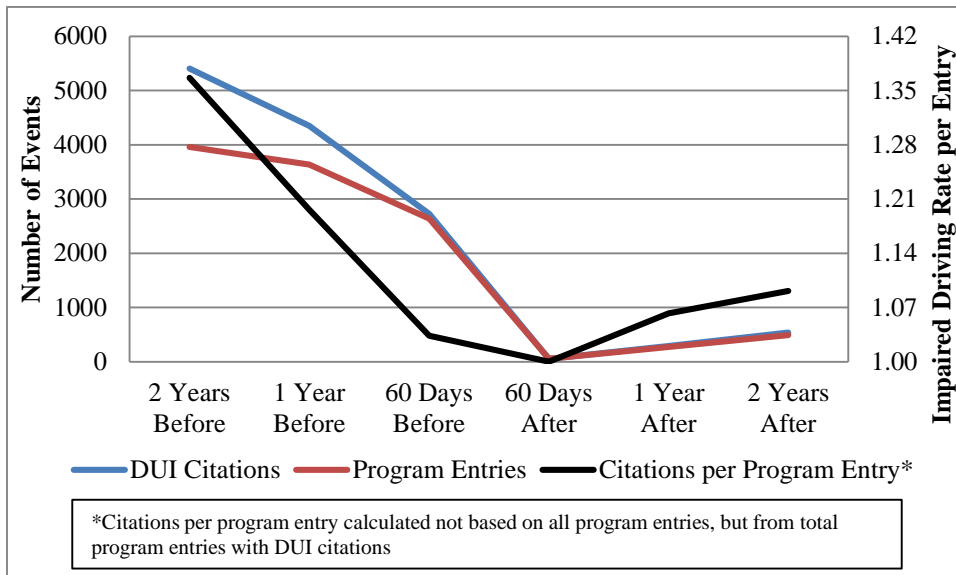
Figure 4.1 Impaired Driving Events

4.1.2 Non-DUI-Related Citations

A similar trend emerged when analyzing non-DUI-related citations. In all time intervals studied in this report, both the number of citations and the rate in which citations are issued per program entry was smaller after starting the 24/7 Sobriety Program (Figure 4.2). Because non-DUI-related citations do not necessarily trigger a legislatively-mandated enrollment into the program, this demonstrates a positive aspect of the program: it appears as though entrance into the 24/7 Sobriety Program has some deterrent effect on participants that extends to non-DUI-related crime.
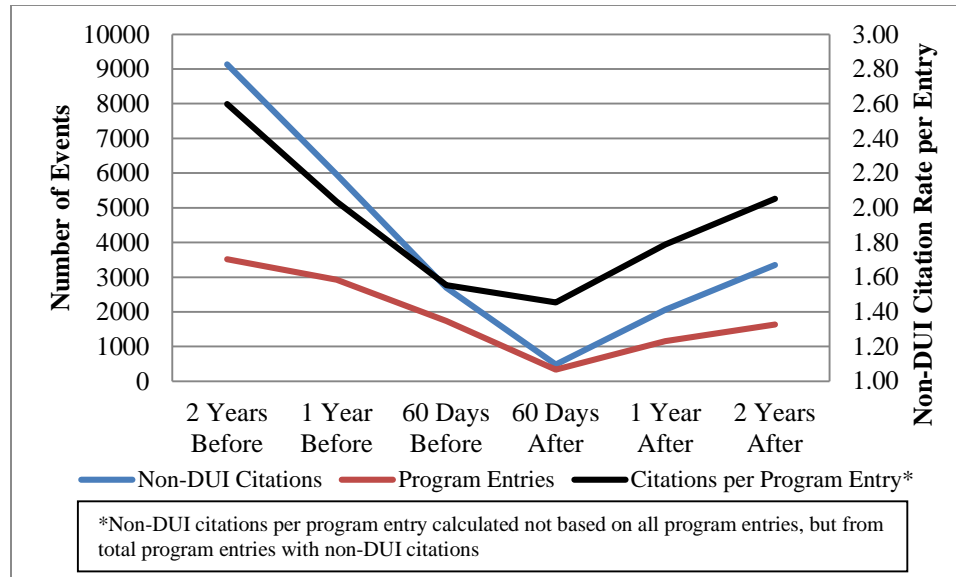
Figure 4.2 Non-DUI-Related Citations

4.1.3 Crashes

Crashes serve as another metric with noticeable improvement after individuals begin the 24/7 Sobriety Program. The volume of fatal, injury, and property-damage-only crashes declines significantly after participants are enrolled in the program (Table 4.1). For instance, program participants were responsible for seven fatal crashes in the two years before starting the intervention. The number of fatal crashes declined to just two in the two years after a participant entered the program. Similar reductions took place for the other crash severity levels. One limitation is that travel for individual participants was not tracked by vehicle miles traveled, therefore an exposure rate is unknown.

Table 4.1 Crash Severity Before and After Starting 24/7 Sobriety Program

Severity	2 Years Before	1 Year Before	60 Days Before	60 Days After	1 Year After	2 Years After
Fatal	7	6	4	0	1	2
Injury	466	367	190	17	67	115
Property Damage Only	834	611	297	45	153	245

One method for normalizing crash rates is to examine the number of crashes per program entry (Figure 4.3). This method determined that the rate at which crashes occur does generally decline after an individual enters the 24/7 Sobriety Program.
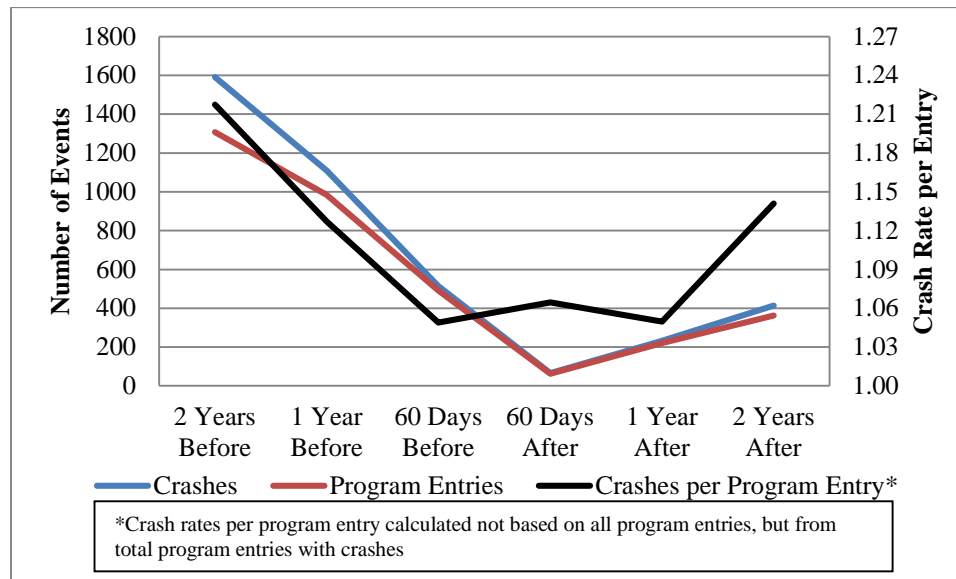
Figure 4.3 Total Crashes

4.2   Participant Groups

It is important to analyze the response of different variables – impaired driving events, non-DUI-related citations, and crashes – when factoring for individual driver groups. Differences across groups can help explain behavior and can also be used to target safety strategies to high-risk groups. Six participant groups will be examined: gender, age, region, geography, multi-time program entrants, and repeat DUI offenders.

4.2.1   Gender

Results across gender were largely expected (Table 4.2). Males on average had more DUI citations after starting the 24/7 Sobriety Program for the 1-year (F=6.780, df=1, p=0.009) and 2-year (F=13.032, df=1, p<0.001) time periods. This follows other studies which recognize that men tend to have higher rates of impaired driving than women, even after completing interventions specifically geared toward deterring alcohol abuse (Kubas, Kayabas, and Vachal 2015). Males were also found to have more non-DUI-related citations in both the 1-year and 2-year intervals before starting the program. After starting the program, however, men perform at levels that are on-par with women for non-DUI-related citations; this suggests that the program may have a stronger deterrent effect on males for this metric. Women were more likely to have had a traffic crash 60 days before (F=12.189, df=1, p<0.001), one year before (F=7.603, df=1, p=0.006), and two years before (F=13.191, df=1, p<0.001) enrolling in the intervention. These same females, however, generally crashed at rates that were on-par with their male counterparts after completing the program. This indicates that there may be a stronger deterrent effect on females with regard to traffic crashes.

Table 4.2 Mean Values Displaying Total Violations Across Program Entries, by Gender

Metric	Mean Value		Significance
	Male	Female	
DUI Citations, 60 Days Before Program Start	0.52	0.55	
DUI Citations, 60 Days After Program Start	0.01	0.01	
DUI Citations, 1 Year Before Program Start	0.83	0.85	
DUI Citations, 1 Year After Program Start	0.06	0.04	##
DUI Citations, 2 Years Before Program Start	1.03	1.07	
DUI Citations, 2 Years After Program Start	0.11	0.07	##
Non-DUI-Related Citations, 60 Days Before Program Start	0.53	0.48	
Non-DUI-Related Citations, 60 Days After Program Start	0.09	0.10	
Non-DUI-Related Citations, 1 Year Before Program Start	1.19	0.99	##
Non-DUI-Related Citations, 1 Year After Program Start	0.40	0.37	
Non-DUI-Related Citations, 2 Years Before Program Start	1.80	1.59	##
Non-DUI-Related Citations, 2 Years After Program Start	0.66	0.59	
Crashes, 60 Days Before Program Start	0.09	0.13	##
Crashes, 60 Days After Program Start	0.01	0.02	#
Crashes, 1 Year Before Program Start	0.20	0.25	##
Crashes, 1 Year After Program Start	0.04	0.04	
Crashes, 2 Years Before Program Start	0.29	0.36	##
Crashes, 2 Years After Program Start	0.08	0.08	

##Significant at the 1% level for 1-way ANOVA
#Significant at the 5% level for 1-way ANOVA

4.2.2 Age

Some patterns occurred when examining violations across age cohorts (Table 4.3). Impaired driving citations were uniform across age groups. Non-DUI-related citations generally declined across age groups: the 18-24-year-old cohort typically had the highest average number of violations and the 55+ age cohort commonly had the lowest average number of these citations. The differences were statistically significant at the 1% level across all three time periods both before and after starting the 24/7 Sobriety Program. This is a plausible finding as 18-34-year-old North Dakotans more commonly exhibit behaviors at-odds with traffic safety goals and less regularly engage in safe driving practices (Vachal, Benson, and Kubas 2016). In terms of traffic crashes, a multimodal distribution was evident as those in the youngest (18-24) and oldest (55+) cohorts typically had the highest average number of crashes. This makes sense considering novice drivers are often more dangerous behind-the-wheel (Mayhew, Simpson, and Pak 2003) and elderly drivers have slower reaction times which put them at a higher propensity to be in a crash (Svetina 2016).

Table 4.3 Mean Values Displaying Total Violations Across Program Entries, by Age

Metric	Mean Value					Significance
	18-24	25-34	35-44	45-54	55+[1]	
DUI Citations, 60 Days Before	0.49	0.53	0.54	0.53	0.53	
DUI Citations, 60 Days After	0.01	0.01	0.02	0.01	0.01	
DUI Citations, 1 Year Before	0.80	0.83	0.88	0.84	0.83	
DUI Citations, 1 Year After	0.06	0.05	0.06	0.06	0.05	
DUI Citations, 2 Years Before	1.03	1.02	1.10	1.02	0.99	
DUI Citations, 2 Years After	0.11	0.10	0.11	0.10	0.08	
Non-DUI-Related Citations, 60 Days Before	0.61	0.49	0.52	0.48	0.46	##
Non-DUI-Related Citations, 60 Days After	0.14	0.08	0.09	0.06	0.09	##
Non-DUI-Related Citations, 1 Year Before	1.45	1.11	1.09	0.97	0.89	##
Non-DUI-Related Citations, 1 Year After	0.56	0.38	0.36	0.31	0.24	##
Non-DUI-Related Citations, 2 Years Before	2.36	1.68	1.64	1.41	1.24	##
Non-DUI-Related Citations, 2 Years After	0.90	0.63	0.58	0.50	0.37	##
Crashes, 60 Days Before	0.11	0.10	0.09	0.10	0.11	
Crashes, 60 Days After	0.02	0.01	0.01	0.00	0.02	##
Crashes, 1 Year Before	0.27	0.20	0.19	0.18	0.21	##
Crashes, 1 Year After	0.07	0.04	0.04	0.03	0.05	##
Crashes, 2 Years Before	0.40	0.29	0.28	0.25	0.29	##
Crashes, 2 Years After	0.11	0.07	0.07	0.06	0.07	##

[1]The 65-74 and 75+ age cohorts were merged with the 55-64 age group because there were fewer than 30 drivers in those cohorts

##Significant at the 1% level for 1-way ANOVA

4.2.3 Region

There are regional discrepancies in driver performance (Table 4.4). Program participants from the western half of the state are generally more dangerous than those from the east. With the exception of the 60-day interval after starting the program, drivers from the west are statistically more likely to have a DUI citation in every time period studied in this report. Similarly, 24/7 Sobriety Program participants from western counties in North Dakota have more non-DUI-related citations in all six time frames. It is clear that these individuals engage in illegal activity more often than their eastern counterparts. Although the western residents performed poorly for DUI citations and non-DUI-related citations, crash patterns were similar across statewide regions. One positive improvement made by western residents related to crashes in the two-year time frame. Whereas western residents had more crashes on average in the two years preceding program enrollment (F=4.928, df=1, p=0.026), there was no statistically significant difference for these program entrants in the two years following the start of the program (F=2.901, df=1, p=0.089). This implies that the program may have a positive deterrent effect on western residents for crashes as they transitioned from being worse than their eastern counterparts to being on-par with their crash incidence levels.

Table 4.4 Mean Values Displaying Total Violations Across Program Entries, by Region

Metric	Mean Value		Significance
	East	West	
DUI Citations, 60 Days Before Program Start	0.44	0.57	##
DUI Citations, 60 Days After Program Start	0.01	0.01	
DUI Citations, 1 Year Before Program Start	0.78	0.87	##
DUI Citations, 1 Year After Program Start	0.04	0.06	##
DUI Citations, 2 Years Before Program Start	0.95	1.09	##
DUI Citations, 2 Years After Program Start	0.08	0.12	##
Non-DUI-Related Citations, 60 Days Before Program Start	0.47	0.54	##
Non-DUI-Related Citations, 60 Days After Program Start	0.07	0.11	##
Non-DUI-Related Citations, 1 Year Before Program Start	1.09	1.18	#
Non-DUI-Related Citations, 1 Year After Program Start	0.31	0.44	##
Non-DUI-Related Citations, 2 Years Before Program Start	1.63	1.83	##
Non-DUI-Related Citations, 2 Years After Program Start	0.50	0.72	##
Crashes, 60 Days Before Program Start	0.09	0.10	
Crashes, 60 Days After Program Start	0.01	0.01	
Crashes, 1 Year Before Program Start	0.21	0.22	
Crashes, 1 Year After Program Start	0.04	0.05	
Crashes, 2 Years Before Program Start	0.28	0.32	#
Crashes, 2 Years After Program Start	0.07	0.08	

##Significant at the 1% level for 1-way ANOVA
#Significant at the 5% level for 1-way ANOVA

4.2.4 Geography

Results for traffic violations are mixed when factoring for geography, but urban residents mostly exhibit more dangerous behaviors than do their rural counterparts (Table 4.5). For example, urban residents on average had more DUI citations in the 60 days (F=9.811, df=1, p=0.002) and 2 years (F=7.618, df=1, p=0.006) before enrolling in the intervention. These same entrants had more crashes on average than rural North Dakotans in the two years prior to starting the program (F=5.331, df=1, p=0.021). Urban residents committed violations for these three metrics, however, on-par with rural residents after starting the 24/7 Sobriety Program. This again suggests that it may have a stronger deterrent effect on urban North Dakotans as they have a more significant behavior change.

In contrast to these improvements, urban residents regressed in terms of non-DUI-related citations. Whereas these individuals were on-par with their rural counterparts before starting the intervention program, these same program entrants had more non-DUI-related citations on average in the 1-year interval following the program (F=4.658, df=1, p=0.031).

This demonstrates a dichotomy in program effectiveness factoring for geographic discrepancies. The program appears to have a stronger deterrent effect for urban residents for DUI citations and crashes. However, the same group commits a statistically higher number of non-DUI-related violations on average than their rural counterparts in the presence of the 24/7 Sobriety Program as an intervening variable. There is room for improvement as the program does not appear to effectively deter urban residents from committing non-DUI-related citations.

Table 4.5 Mean Values Displaying Total Violations Across Program Entries, by Geography

Metric	Mean Value		Significance
	Urban	Rural	
DUI Citations, 60 Days Before Program Start	0.54	0.48	##
DUI Citations, 60 Days After Program Start	0.01	0.01	
DUI Citations, 1 Year Before Program Start	0.85	0.80	
DUI Citations, 1 Year After Program Start	0.06	0.05	
DUI Citations, 2 Years Before Program Start	1.05	0.98	##
DUI Citations, 2 Years After Program Start	0.10	0.10	
Non-DUI-Related Citations, 60 Days Before Program Start	0.53	0.48	
Non-DUI-Related Citations, 60 Days After Program Start	0.10	0.08	
Non-DUI-Related Citations, 1 Year Before Program Start	1.15	1.13	
Non-DUI-Related Citations, 1 Year After Program Start	0.41	0.34	#
Non-DUI-Related Citations, 2 Years Before Program Start	1.77	1.69	
Non-DUI-Related Citations, 2 Years After Program Start	0.66	0.58	
Crashes, 60 Days Before Program Start	0.10	0.08	
Crashes, 60 Days After Program Start	0.01	0.01	
Crashes, 1 Year Before Program Start	0.22	0.19	
Crashes, 1 Year After Program Start	0.04	0.04	
Crashes, 2 Years Before Program Start	0.32	0.27	#
Crashes, 2 Years After Program Start	0.08	0.07	

##Significant at the 1% level for 1-way ANOVA
#Significant at the 5% level for 1-way ANOVA

4.2.5 Multi-Time Program Entrants

As discussed in the methods section, it is possible for an individual to enroll in the program multiple times. It was hypothesized that there might be differences between individuals who have been enrolled in the intervention just once and those who have been sentenced to the program two or more times. Perhaps the program has a stronger deterrent effect on those who only participated in the course once and there is knowledge to be gained about recidivism. Conversely, perhaps external factors such as a legitimate addiction or issues with self-control are factors which best explain why participants may be enrolled in the program multiple times. Understanding differences across these groups contributes to the existing literature as to why the same intervention may be successful for some but not others.

Those who have been enrolled in the program multiple times were much more likely to have DUI citations both before and after enrollment (Table 4.6). This is logical as an impaired driving-related arrest is typically the event which triggers participation in the program. As such, this metric may not be useful in explaining some differences between these groups.

Multi-entry offenders engage in non-alcohol-related crime at rates that are significantly higher than single-entry participants. Multi-entry individuals are more likely to have a non-DUI-related citation for both before and after timeframes in the 60-day, 1-year, and 2-year intervals. Based on these analyses, it is clear that multi-entry offenders revert to both alcohol-related and non-alcohol-related illegal activity more regularly after starting the 24/7 Sobriety Program.

Further yet, this group is responsible for danger on the roadway with a higher propensity to be involved in a traffic crash in the two years after starting the program (F=6.999, df=1, p=0.008). If the program does have a deterrent effect on crash likelihood, it diminishes somewhere after the first year of starting the program for multi-entry offenders.

Table 4.6 Mean Values Displaying Total Violations Across Program Entries, by Multi-Time Entrants

Metric	Mean Value		Significance
	Multi-Entrant	Single-Entrant	
DUI Citations, 60 Days Before Program Start	0.50	0.53	
DUI Citations, 60 Days After Program Start	0.02	0.01	#
DUI Citations, 1 Year Before Program Start	0.84	0.84	
DUI Citations, 1 Year After Program Start	0.13	0.03	##
DUI Citations, 2 Years Before Program Start	1.15	1.00	##
DUI Citations, 2 Years After Program Start	0.27	0.05	##
Non-DUI-Related Citations, 60 Days Before Program Start	0.57	0.50	#
Non-DUI-Related Citations, 60 Days After Program Start	0.12	0.09	#
Non-DUI-Related Citations, 1 Year Before Program Start	1.28	1.10	##
Non-DUI-Related Citations, 1 Year After Program Start	0.51	0.36	##
Non-DUI-Related Citations, 2 Years Before Program Start	2.03	1.67	##
Non-DUI-Related Citations, 2 Years After Program Start	0.91	0.56	##
Crashes, 60 Days Before Program Start	0.09	0.10	
Crashes, 60 Days After Program Start	0.01	0.01	
Crashes, 1 Year Before Program Start	0.21	0.21	
Crashes, 1 Year After Program Start	0.05	0.04	
Crashes, 2 Years Before Program Start	0.33	0.30	
Crashes, 2 Years After Program Start	0.10	0.07	##

##Significant at the 1% level for 1-way ANOVA
#Significant at the 5% level for 1-way ANOVA

4.2.6 Repeat DUI Offenders

On average, entrants with multiple DUI arrests on records had more DUI arrests before starting the program. This is logical as first-time offenders would never have more than one DUI arrest but repeat DUI offenders are required to have at least two DUI arrests to be categorized as a multiple-DUI offender (Table 4.7).

There were mixed results based on non-DUI-related citations and crashes. Repeat DUI offenders had more non-DUI-related citations in the two years before starting the program than their counterparts (F=4.016, df=1, p=0.045) but declined to levels on-par with first-time offenders in the two years following course completion (F=0.509, df=1, p=0.476). This suggests that there may be a deterrent effect on repeat DUI offenders for non-DUI-related citations, although it is not present in the months immediately following program enrollment. For crashes, first-time offenders were involved in more crashes, on average, in the 60 days before starting the program (F=4.156, df=1, p=0.042) but declined to levels on-par with repeat offenders in the 60 days after finishing the 24/7 Sobriety Program (F=0.066, df=1, p=0.797). This reveals that there could be a deterrent effect on first-time DUI offenders with regard to crashes, but the effect diminishes at some point after being in the program for 60 days.

This finding contrasts current literature which contends that drivers with two or more impaired driving events on record are more dangerous than first-time offenders. It should be mentioned that this study only examines non-DUI-related citations and total crashes as dependent variables relevant to repeat and first-time DUI offenders. It is possible that other traffic safety metrics – speeding, seat belt use, acceleration time, reaction time, and emotional decisions, among other factors – could be worse for repeat DUI offenders compared to first-time DUI arrestees. Because the research team only had access to crash and conviction records, these other factors related to traffic safety could not be examined in-depth and this serves as a slight limitation of this study.

Table 4.7 Mean Values Displaying Total Violations Across Program Entries, by DUI Recidivist Status

Metric	Mean Value		Significance
	Repeat Offender	First-Time Offender	
DUI Citations, 60 Days Before Program Start	0.59	0.51	##
DUI Citations, 60 Days After Program Start	0.01	0.01	
DUI Citations, 1 Year Before Program Start	0.92	0.82	##
DUI Citations, 1 Year After Program Start	0.05	0.05	
DUI Citations, 2 Years Before Program Start	1.14	0.98	##
DUI Citations, 2 Years After Program Start	0.10	0.09	
Non-DUI-Related Citations, 60 Days Before Program Start	0.56	0.53	
Non-DUI-Related Citations, 60 Days After Program Start	0.09	0.09	
Non-DUI-Related Citations, 1 Year Before Program Start	1.18	1.11	
Non-DUI-Related Citations, 1 Year After Program Start	0.38	0.37	
Non-DUI-Related Citations, 2 Years Before Program Start	1.79	1.69	#
Non-DUI-Related Citations, 2 Years After Program Start	0.61	0.58	
Crashes, 60 Days Before Program Start	0.10	0.13	#
Crashes, 60 Days After Program Start	0.01	0.01	
Crashes, 1 Year Before Program Start	0.21	0.23	
Crashes, 1 Year After Program Start	0.04	0.04	
Crashes, 2 Years Before Program Start	0.30	0.32	
Crashes, 2 Years After Program Start	0.07	0.07	

##Significant at the 1% level for 1-way ANOVA
#Significant at the 5% level for 1-way ANOVA

4.3 Before-and-After Program Effects

All participant groups studied in this report had positive before-and-after effects when enrollment into the 24/7 Sobriety Program is treated as an intervention. Each driver group decreased the average number of DUI citations, non-DUI-related citations, and crashes in the 60-day, 1-year, and 2-year before-and-after intervals. All improvements were statistically significant at the 1% level. A detailed discussion of before-and-after averages is provided in Appendix A.

4.4 Program Entry Patterns Related to House Bill 1302

House Bill 1302 became effective on August 1, 2013. The legislative changes mandated by this bill included longer enrollment periods in the 24/7 Sobriety Program for repeat offenders: second-time and third-time offenders were required to remain sober for one year and fourth-and-subsequent offenders were mandated to participate in the program for two years. In sum, 2,625 entries (50.4% of the sample) started the program after the new legislation was implemented. Of these, 1,457 were enrolled due to a second or third impaired driving citation and were required to participate for one year. A smaller number – 284 entries – were for fourth-or-subsequent offenders mandated by law to be in the program for two years.

To adequately compare groups, an arbitrary binary variable was created based on legislatively-mandated enrollment times. Entries were labeled as either enrolled for 60 days ("0") or enrolled for more than 365 days ("1"). Comparisons were made across groups as anyone enrolled for 365 or 730 days was adhering to more stringent standards created by House Bill 1302.

Results from independent-samples t-tests demonstrate that longer sentencing to the program results in safer long-term behavior (Table 4.8). For instance, individuals sentenced to the program for 60 days receive DUI citations in the first year (t=7.400, df=5,147, p<0.001) and in the second year (t=9.845, df=5,092, p<0.001) at rates that are more than double those of participants who are required to be in the program at least one year. These same individuals receive non-DUI-related citations at approximately a one-and-a-half-times higher rate (t=6.386, df=4,283, p<0.001) and crash at roughly twice the rate of those enrolled for 60 days (t=4.454, df=4,395, p<0.001) in the two years after starting the program.

Table 4.8 Mean Values Displaying Total Violations Across Program Entries, by Enrollment Length

Metric	Mean Value		Significance
	Enrolled 60 Days	Enrolled 365+ Days	
DUI Citations, 60 Days Before Program Start	0.53	0.52	
DUI Citations, 60 Days After Program Start	0.01	0.01	
DUI Citations, 1 Year Before Program Start	0.82	0.86	
DUI Citations, 1 Year After Program Start	0.07	0.03	##
DUI Citations, 2 Years Before Program Start	1.03	1.05	
DUI Citations, 2 Years After Program Start	0.13	0.05	##
Non-DUI-Related Citations, 60 Days Before Program Start	0.52	0.50	
Non-DUI-Related Citations, 60 Days After Program Start	0.09	0.10	
Non-DUI-Related Citations, 1 Year Before Program Start	1.15	1.15	
Non-DUI-Related Citations, 1 Year After Program Start	0.41	0.37	
Non-DUI-Related Citations, 2 Years Before Program Start	1.78	1.71	
Non-DUI-Related Citations, 2 Years After Program Start	0.72	0.50	##
Crashes, 60 Days Before Program Start	0.10	0.10	
Crashes, 60 Days After Program Start	0.01	0.01	
Crashes, 1 Year Before Program Start	0.21	0.21	
Crashes, 1 Year After Program Start	0.05	0.04	
Crashes, 2 Years Before Program Start	0.31	0.30	
Crashes, 2 Years After Program Start	0.09	0.05	##

##Significant at the 1% level for Independent-Samples t-Test

These findings signify a powerful component of the program: more stringent sentencing deters long-term illegal behavior. Individuals required to participate in the program for 60 days relapse at greater rates in the two years after starting the intervention. It is possible that those sentenced to the program for 365 days have a lingering deterrent effect created by longer exposure to the 24/7 Sobriety Program. Moreover, those sentenced to the program for 730 days presumably have

lower rates of illegal behavior due to program compliance. Any duration of program enrollment has positive benefits to traffic safety, but longer enrollment periods clearly result in even safer conditions on North Dakota roadways.

4.5   Logistic Regression Model

A final exercise in the assessment is the development of logistic regression models to better understand safety outcomes. This type of model measures the relationship between dependent and independent variables while recognizing simultaneous effects among the independent variables. The log-odd ratios provide measures of association that are indicative of the relative likelihood that enrollees will exhibit safe behavior. The dependent and independent variables considered in the original model are presented in Table 4.9. The independent variables are gender, region, geography, repeat DUI offender, multi-entry participant, and program participation length. The dependent variables are non-DUI-related citations, crashes, and recidivist level. Three models were developed for each dependent variable and represent the time of the study intervals (60-day, 1-year, and 2-year) for each safety outcome. Since enrollment in the 24/7 Sobriety Program was considered the intervention in this experimental design, safety outcomes were only modeled for the time periods after starting the program. This was the best indicator of which variables have effects on safe driving behavior post-intervention.

Table 4.9 24/7 Sobriety Program Safety Outcome Model Variables

Variable Name	Definition
Independent Variables	
Gender	Female (0) or Male (1)
Region	West (0) or East (1) as defined in Figure 3.2
Geography	Rural (0) or Urban (1) as defined in Figure 3.2
Repeat DUI Offender	First-Time Offender (0) or Repeat DUI Offender (1)
Multi-Entry Participant	Single-Entrant (0) or Multi-Entrant (1)
Program Participation Length	60 Days (0) or 365+ Days (1)
Dependent Variables	
Non-DUI Traffic Citation	No Citations (0) or One or More Citations (1)
Crash	No Crashes (0) or One or More Crashes (1)
High-Risk Recidivist	No DUI in Program (0) or One or More DUI from Day 1 to 60 (1)
Moderate-Risk Recidivist	No DUI in Program (0) or One or More DUI from Day 61 to 730 (1)
Post-Program Recidivist	No DUI in Program (0) or One or More DUI After Exiting Program (1)

4.5.1 Non-DUI-Related Citations

The non-DUI-related citation outcome model varied based on time interval studied (Table 4.10). Region was the only variable consistent across the three time periods: regardless of whether a 60-day, 1-year, or 2-year time period was studied, entries from the western half of the state were more likely than those from the west to have a non-DUI-related citation after starting the program. Participants who had enrolled in the program multiple times were more likely to have a non-DUI-related citation in the 1-year (OR=1.258, C.I. 1.080, 1.465) and the 2-year (OR=1.568,

C.I.=1.368, 1.797) periods after starting the program. This could stem from a habitual cycle of crime as these individuals are required to have multiple alcohol-related arrests in order to be enrolled in the program. In the two years after starting the 24/7 Sobriety Program, those sentenced to the program for 60 days were 1.309 times more likely to have a non-DUI-related citation (C.I. 1.117, 1.535). This reaffirms the idea that longer sentencing deters illegal behavior, and can even influence non-alcohol-related illegal activity.

Table 4.10 24/7 Sobriety Program Non-DUI-Related Citation Outcome Model

60-Day$_1$ Interval After Starting Course						
Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	-0.203	0.133	2.317		0.816	0.629-1.060
Region	-0.483	0.134	12.890	**	0.617	0.474-0.803
Geography	0.099	0.148	0.441		1.104	0.825-1.476
Repeat DUI Offender	-0.063	0.142	0.195		0.939	0.711-1.241
Multi-Entry Participant	0.081	0.132	0.379		1.085	0.838-1.405
Program Participation Length	0.070	0.150	0.219		1.073	0.800-1.438
1-Year$_2$ Interval After Starting Course						
Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	-0.044	0.082	0.291		0.956	0.814-1.124
Region	-0.363	0.077	22.447	**	0.696	0.599-0.808
Geography	0.190	0.088	4.703	*	1.210	1.019-1.437
Repeat DUI Offender	-0.179	0.085	4.440	*	0.836	0.708-0.988
Multi-Entry Participant	0.230	0.078	8.693	**	1.258	1.080-1.465
Program Participation Length	0.072	0.090	0.633		1.074	0.900-1.282
2-Year$_3$ Interval After Starting Course						
Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	0.063	0.075	0.692		1.065	0.919-1.234
Region	-0.278	0.068	16.595	**	0.758	0.663-0.866
Geography	0.067	0.077	0.748		1.069	0.919-1.243
Repeat DUI Offender	-0.024	0.075	0.104		0.976	0.842-1.131
Multi-Entry Participant	0.450	0.070	41.828	**	1.568	1.368-1.797
Program Participation Length	-0.270	0.081	11.048	**	0.764	0.651-0.895

$_1$N=5,185; Nagelkerke R^2=0.009; model correctly classified 93.5% of cases
$_2$N=5,185; Nagelkerke R^2=0.013; model correctly classified 77.9% of cases
$_3$N=5,185; Nagelkerke R^2=0.028; model correctly classified 68.6% of cases
**Statistically significant at the 1% level
*Statistically significant at the 5% level

4.5.2 Crashes

The crash outcome model provides some insight into short-term and long-term determinants of crashes after starting the intervention (Table 4.11). In the short-term, females are 1.829 times more likely than males to have a crash within the first 60 days of starting the 24/7 Sobriety Program (C.I. 1.066, 3.137). This validates findings from Table 4.2 and suggests that females do have a higher likelihood than males of crashing within 60 days of starting the intervention.

From a longer-term perspective, individuals who had entered the program more than once were 1.312 times more likely to have a crash within two years of starting the program (C.I. 1.031, 1.670). This reaffirms the idea that habitual users of alcohol may engage in dangerous activity more often as crashes generally stem from risky behind-the-wheel activity. Lastly, those sentenced to the program for 60 days were once again more likely to crash than those sentenced to the program for at least 365 days. Individuals with a 60-day sentence were found to be 1.567 times more likely to have a crash (C.I. 1.160, 2.117). This once again supports the contention that longer enrollment periods have a stronger effect on deterring danger on the roadway.

Table 4.11 24/7 Sobriety Program Crash Outcome Model

60-Day$_1$ Interval After Starting Course						
Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	-0.604	0.275	4.813	*	0.547	0.319-0.938
Region	-0.262	0.295	0.786		0.770	0.431-1.373
Geography	0.005	0.327	0.000		1.005	0.529-1.907
Repeat DUI Offender	-0.169	0.315	0.289		0.844	0.456-1.565
Multi-Entry Participant	0.095	0.299	0.100		1.099	0.612-1.976
Program Participation Length	-0.123	0.353	0.122		0.884	0.443-1.766
1-Year$_2$ Interval After Starting Course						
Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	-0.011	0.170	0.004		0.989	0.708-1.380
Region	-0.077	0.153	0.254		0.926	0.685-1.250
Geography	-0.030	0.171	0.031		0.970	0.693-1.357
Repeat DUI Offender	-0.243	0.172	2.010		0.784	0.560-1.098
Multi-Entry Participant	0.190	0.158	1.440		1.209	0.887-1.648
Program Participation Length	-0.109	0.192	0.323		0.896	0.615-1.307
2-Year$_3$ Interval After Starting Course						
Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	-0.092	0.132	0.486		0.912	0.703-1.182
Region	-0.057	0.124	0.210		0.945	0.741-1.204
Geography	0.037	0.140	0.069		1.037	0.789-1.364
Repeat DUI Offender	-0.052	0.132	0.158		0.949	0.733-1.228
Multi-Entry Participant	0.272	0.123	4.867	*	1.312	1.031-1.670
Program Participation Length	-0.449	0.153	8.559	**	0.638	0.472-0.862

$_1$N=5,123; Nagelkerke R^2=0.010; model correctly classified 98.8% of cases
$_2$N=4,964; Nagelkerke R^2=0.004; model correctly classified 95.7% of cases
$_3$N=5,185; Nagelkerke R^2=0.011; model correctly classified 93.0% of cases
**Statistically significant at the 1% level
*Statistically significant at the 5% level

4.5.3 DUI-Related Citations

Within two years of starting the 24/7 Sobriety Program, 493 entrants in this sample committed at least one DUI-related violation (Table 4.12). These numbers do not represent unique individuals as it is possible that an entrant could have started the program multiple times due to committing multiple impaired-driving-related crimes. Of the 493 entrants with a DUI-related violation, just 91 took place during enrollment in the program. This represents 18.5% of all DUI-related citations and only 1.7% of the overall sample. The remaining 402 entries with DUI-related

citations committed the violation after successfully completing the program. The following sections discuss possible determinants of recidivism both during and after program enrollment.

Table 4.12 DUI-Related Citations During and After Program Enrollment

Metric	Enrolled in Program	Completed Program	Total
Failed in First 60 Days	55*	0	55
Failed between Day 61 and Day 365	31**	186	217
Failed between Day 366 and Day 730	5**	216	221
Total	91	402***	**493**

*High-Risk Recidivists
**Moderate-Risk Recidivists
***Post-Program Recidivists

4.5.3.1 High-Risk Recidivists

As defined in the methods section, high-risk recidivists were defined as those who committed at least one DUI-related violation within 60 days of starting the 24/7 Sobriety Program. In this sample of entries, there were no statistically significant determinants of high-risk recidivism based on the binary logistic regression model (Table 4.13). It is possible that independent variables not considered in this analysis better explain a participant's likelihood of recidivating during the first two months of program enrollment. Alcohol-impaired crime has been studied exhaustively, with some studies indicating socioeconomic status, genetic predisposition, dependency, addiction, race, issues with self-control, and a variety of other factors as determinants of alcohol abuse and subsequent criminal activity. Because of the limited scope of this report related just to the realm of traffic safety, it is reasonable to assume that other variables outside of this study better explain factors leading to recidivism during the first 60 days of program enrollment.

Table 4.13 24/7 Sobriety Program High-Risk Recidivist Outcome Model

60-Day$_1$ Interval and Enrolled in Course

Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	0.757	0.435	3.027		2.132	0.909-5.003
Region	-0.397	0.334	1.411		0.673	0.350-1.294
Geography	0.063	0.355	0.031		1.065	0.531-2.136
Repeat DUI Offender	0.232	0.326	0.506		1.261	0.665-2.392
Multi-Entry Participant	0.525	0.288	3.330		1.690	0.962-2.969
Program Participation Length	-0.369	0.360	1.049		0.691	0.341-1.401

$_1$N=5,185 (55 high-risk recidivists); Nagelkerke R^2=0.022; model correctly classified 98.9% of cases

4.5.3.2 Moderate-Risk Recidivists

Moderate-risk recidivists are those who are enrolled in the 24/7 Sobriety Program and commit a DUI violation at some point between day 61 and day 730 of the intervention. Among the 36 entries which fit this definition, there was no statistically significant determinant of moderate-risk recidivism based on the binary logistic regression model (Table 4.14). It is once again plausible that other independent variables outside the scope of this study better explain a participant's likelihood of recidivating at some point after day 61 of program enrollment.

Table 4.14 24/7 Sobriety Program Moderate-Risk Recidivist Outcome Model

61-730 Day[1] Interval and Enrolled in Course						
Parameter[2]	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	-0.118	0.404	0.086		0.888	0.403-1.960
Region	0.134	0.355	0.142		1.143	0.570-2.295
Geography	0.044	0.426	0.011		1.045	0.454-2.406
Multi-Entry Participant	0.615	0.354	3.009		1.850	0.923-3.705

[1]N=5,185 (36 moderate-risk recidivists); Nagelkerke R^2=0.007; model correctly classified 99.3% of cases
[2]The Repeat DUI Offender and Program Participation Length variables were removed from the model. Any participant subjected to the program for more than 61 days is a repeat offender. Similarly, all repeat offenders are sentenced to the program for at least 365 days. In other words, all participants enrolled for 61-730 days are repeat offenders sentenced to at least 365 days of sobriety.

4.5.3.3 Post-Program Recidivists

Among program entries with a DUI citation at any point after completing the 24/7 Sobriety Program, post-program recidivists were 1.424 times more likely to be male (95% C.I. 1.057, 1.920), 6.588 times more likely to be a multi-entry participant (95% C.I. 5.258, 8.255) and 5.465 times more likely to have been sentenced to the program for 60 days (95% C.I. 3.695, 8.081).

All three of these statistically significant determinants provide insight into recidivism. For example, the higher rate of recidivism among male program entrants follows other North Dakota studies of the relationship between gender and impaired driving (Huseth and Kubas 2012; Kubas, Kayabas, and Vachal 2015). It may be worthwhile to provide extra services to male program entrants as these individuals are at a greater risk of reoffending in the future.

The higher rate of recidivism for entrants who have been in the program multiple times demonstrates two key findings. First, there exists a strong deterrent effect when enrolled in the program. Based on the in-program binary logistic regression models, multi-time program entrants do not re-offend at higher rates than first-time entrants. This model, however, suggests that the participants in this group change behavior after completing the program. This may explain results in Table 4.6: multi-time program entrants have skewed results because they have a higher probability of relapsing once they have completed the program. This once again validates the effectiveness of the program and its ability to keep participants sober during enrollment. Second, it is these very multi-entry individuals who could perhaps benefit from additional targeted anti-alcohol treatment as these are the individuals who relapse into illegal behavior. For these entrants, sobriety is maintained during program intervention, but lost somewhere after course completion.

Lastly, the post-program recidivist outcome model once again validates that longer program enrollment periods have stronger deterrent effects. Entrants who successfully complete the program after having participated in it for 60 days are over five times more likely to have a DUI arrest than entrants who successfully complete the program after participating in it for a minimum of 365 days.

Table 4.15 24/7 Sobriety Program Post-Program Recidivist Outcome Model

DUI-Related Citation at Any Point After Completing Program						
Parameter	Beta Value	S.E.	Wald	Sig.	Log Odds	95% C.I.
Gender	0.354	0.152	5.394	*	1.424	1.057-1.920
Region	0.150	0.129	1.355		1.162	0.902-1.497
Geography	-0.121	0.138	0.771		0.886	0.677-1.160
Repeat DUI Offender	0.103	0.122	0.713		1.109	0.872-1.409
Multi-Entry Participant	1.885	0.115	268.306	**	6.588	5.258-8.255
Program Participation Length	-1.698	0.200	72.372	**	0.183	0.124-0.271

[1]N=5,185 (400 post-program recidivists); Nagelkerke R^2=0.203; model correctly classified 92.3% of cases
**Statistically significant at the 1% level
*Statistically significant at the 5% level

5. CONCLUSIONS

The 24/7 Sobriety Program in North Dakota has positive deterrent effects when factoring for crashes, non-DUI-related citations, and impaired driving arrests. Throughout the analysis two variables emerged as strong predictors of these traffic safety metrics: multi-time program enrollees and enrollees sentenced to the program for 60 days.

On average, multi-time program enrollees have more non-DUI-related citations and DUI arrests than first-time program enrollees. This is true when examining time periods both before and after program intervention. It would be incorrect to say that the program is ineffective for multi-time enrollees; the before-and-after average number of citations and crashes demonstrates that the program has a positive influence on this group (see Appendix Table A-10). Moreover, this group generally remains sober during program enrollment and relapses into illegal behavior after completing the program. It is therefore recommended that multi-time entrants be given additional resources to target possible issues with self-control and alcohol abuse as the only way to trigger re-entry into the program is to have multiple violations involving impaired driving.

Compared to those enrolled in the program for a minimum of 365 days, participants sentenced to the program for 60 days have a higher average number of impaired driving citations, non-DUI-related citations, and crashes the longer they are removed from starting the program. This implies that a stronger deterrent effect is generated from longer sentencing periods. The program is clearly more influential on those sentenced to it for longer amounts of time – even after an entrant has completed a longer sentence.

The interaction between these two variables sheds light into predictors of illegal behavior. Binary logistic regression models presented in this report determined three highlights with regard to these two variables. First, these two participant groups were more likely to have non-DUI-related citations in the longer time frames after starting the program. Second, log odds ratios indicate that these groups are responsible for more crashes in the longer time periods after beginning program enrollment. Third, these two participant groups have more DUI arrests after successfully finishing the program. From these three findings, it can be argued that multi-time entrants are more prone to relapse based on the habitual abuse of alcohol and those sentenced to the program for 60 days do not experience as strong of a deterrent effect as those mandated to participate in the program for a minimum of 365 days.

Any enrollment time in the 24/7 Sobriety Program is worthwhile as the number of DUI arrests, non-DUI-related citations, and crashes decrease upon entering the program. However, for those enrolled for only 60 days, the likelihood of relapsing into repetitive illegal behavior is much greater as they more commonly engage in alcohol-related illegal behavior in the first and second year after starting the program. Due to the more stringent standards set forth by House Bill 1302, those mandated to be in the program one or two years do not have this opportunity to relapse into these behavioral patterns. Therefore, more stringent standards work as these individuals continue to have lower rates of DUI arrests, non-DUI-related citations, and crashes in the two years following the start of program enrollment.

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7. APPENDIX A. BEFORE-AND-AFTER DETAILED RESULTS

Table A-1 Before-and-After Results Factoring for Average Number of Events, Males

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.52	0.01	**
Non-DUI Citations	0.53	0.09	**
Crashes	0.09	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.83	0.06	**
Non-DUI Citations	1.19	0.40	**
Crashes	0.20	0.04	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.76	0.11	**
Non-DUI Citations	1.80	0.66	**
Crashes	0.29	0.08	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-2 Before-and-After Results Factoring for Average Number of Events, Females

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.55	0.01	**
Non-DUI Citations	0.48	0.10	**
Crashes	0.13	0.02	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.85	0.04	**
Non-DUI Citations	0.99	0.37	**
Crashes	0.25	0.04	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.77	0.07	**
Non-DUI Citations	1.59	0.59	**
Crashes	0.36	0.08	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-3 Before-and-After Results Factoring for Average Number of Events, Eastern Residents

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.44	0.01	**
Non-DUI Citations	0.47	0.07	**
Crashes	0.09	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.78	0.04	**
Non-DUI Citations	1.09	0.31	**
Crashes	0.21	0.04	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.74	0.08	**
Non-DUI Citations	1.63	0.50	**
Crashes	0.28	0.07	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-4 Before-and-After Results Factoring for Average Number of Events, Western Residents

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.57	0.01	**
Non-DUI Citations	0.54	0.11	**
Crashes	0.10	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.87	0.06	**
Non-DUI Citations	1.18	0.44	**
Crashes	0.22	0.05	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.77	0.12	**
Non-DUI Citations	1.83	0.72	**
Crashes	0.32	0.08	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-5 Before-and-After Results Factoring for Average Number of Events, Urban Residents

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.54	0.01	**
Non-DUI Citations	0.53	0.10	**
Crashes	0.10	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.85	0.06	**
Non-DUI Citations	1.15	0.41	**
Crashes	0.22	0.04	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.76	0.10	**
Non-DUI Citations	1.77	0.66	**
Crashes	0.32	0.08	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-6 Before-and-After Results Factoring for Average Number of Events, Rural Residents

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.48	0.01	**
Non-DUI Citations	0.48	0.08	**
Crashes	0.08	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.80	0.05	**
Non-DUI Citations	1.13	0.34	**
Crashes	0.19	0.04	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.75	0.10	**
Non-DUI Citations	1.69	0.58	**
Crashes	0.27	0.07	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-7 Before-and-After Results Factoring for Average Number of Events, First-Time DUI Offender

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.41	0.01	**
Non-DUI Citations	0.45	0.09	**
Crashes	0.10	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.70	0.06	**
Non-DUI Citations	1.08	0.43	**
Crashes	0.22	0.05	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.66	0.11	**
Non-DUI Citations	1.69	0.71	**
Crashes	0.31	0.09	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-8 Before-and-After Results Factoring for Average Number of Events, Repeat DUI Offender

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.59	0.01	**
Non-DUI Citations	0.56	0.09	**
Crashes	0.10	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.92	0.05	**
Non-DUI Citations	1.18	0.38	**
Crashes	0.21	0.04	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.82	0.10	**
Non-DUI Citations	1.79	0.61	**
Crashes	0.30	0.07	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-9 Before-and-After Results Factoring for Average Number of Events, First-Time Entrant

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.53	0.01	**
Non-DUI Citations	0.50	0.09	**
Crashes	0.10	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.84	0.03	**
Non-DUI Citations	1.10	0.36	**
Crashes	0.21	0.04	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.76	0.05	**
Non-DUI Citations	1.67	0.56	**
Crashes	0.30	0.07	**

**Statistically significant at the 1% level for paired-samples t-test

Table A-10 Before-and-After Results Factoring for Average Number of Events, Multi-Time Entrant

Metric	60 Days Before	60 Days After	Significance
DUI Citations	0.50	0.02	**
Non-DUI Citations	0.57	0.12	**
Crashes	0.09	0.01	**
	365 Days Before	365 Days After	Significance
DUI Citations	0.84	0.13	**
Non-DUI Citations	1.28	0.51	**
Crashes	0.21	0.05	**
	730 Days Before	730 Days After	Significance
DUI Citations	0.76	0.27	**
Non-DUI Citations	2.03	0.91	**
Crashes	0.33	0.10	**

**Statistically significant at the 1% level for paired-samples t-test