FINAL REPORT

State Attorney's Fund for a Safer and Healthier Community, Driving Under the Influence (DUI) Research Project:

Final Report and Action Plan

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Executive Summary

Recent news reports indicated that in Miami Beach and across Miami-Dade County, DUI arrests have decreased. A 2016 article in the Miami Herald, noted that 3,609 DUI arrests were made in Miami-Dade County in 2015, a 57% drop from the 6,321 DUI arrests made in 2010 (Ovalle, 2016). Several reasons are cited for this decline including lack of police staffing and training as well as a possible reduction in drinking and driving in general. In order to study this decline in DUI arrests, NORC at the University of Chicago was engaged to conduct a Miami-Dade County driving-under-the-influence (DUI) project, supported through the Safer and Healthier Communities Fund administered by The Miami Foundation in partnership with the Miami-Dade County State Attorney's Office.

The objective of this research was to provide a plan for improving DUI enforcement and prosecution resulting from the research and analyses carried out for this project: (1) the analysis of existing DUI related data; (2) the analysis of a telephone survey of reported knowledge, attitudes and behaviors concerning impaired driving, (3) the analysis of roadside surveys conducted in Miami-Dade County; (4) information from focus group discussions with police and prosecutors in Miami-Dade County; and (5) a comprehensive review of the best prevention practices and enforcement strategies used across the country, including community policing and planning, transportation options (ride-sharing), DUI sanctions and monitoring.

Based on the findings from the current research, DUI arrests have decreased 64% in Miami-Dade County since 2009. This is a significantly larger decrease than has occurred in the State of Florida as a whole (34%) and in the United States (29%) over the same time period. This decline is not due to any decline in DUI behavior in the county. In fact, the data indicate an increase in impaired driving on county roads, in crashes, and in fatal crashes. Alcohol-impaired driving related fatal crashes have increased from 66 in 2010 to 100 in 2015 and 76 in 2016. The percent of drivers out on Miami-Dade County roads on weekend nights with illegal blood alcohol concentrations (BACs) greater than or equal to 0.08 grams per deciliter has increased from 1.5% in 2007 to 2.3% in 2013-2014 to 3.0% in 2017. The percent of drivers on the county roads with marijuana in their systems has also increased from 2.9% in 2007 to 14.1% in 2013-2014 and then slightly decreased to 11.5% in 2017. According to a telephone survey of Miami-Dade County drivers of all ages, over 82% say it is very important to enforce drinking and drugged driving more strictly.

Based upon the data and information gathered in this project, the following Action Plan is recommended for Miami-Dade County:

1. Police chiefs need to find ways to overcome law enforcement apathy toward DUI enforcement and persuade their traffic enforcement officers to be proactive rather than reactive when it comes to identifying and making impaired driving stops.
2. Miami-Dade County police agencies should join forces to conduct more sobriety checkpoints. Checkpoints are safer for both the police and the drivers going through them and serve as a deterrent to impaired driving.

3. The State Attorney's Office (SAO), with cooperation from the county's certified drug recognition experts (DREs), should design and offer training on DUI enforcement to all officers covering the evidence and documentation needed for a DUI arrest so the SAO can present the strongest case possible.
4. Miami-Dade County police agencies should apply for grants from the Florida Highway Safety Office or from the National Highway Traffic Safety Administration (NHTSA) to secure funds for checkpoints and saturation patrols, training and DUI enforcement equipment.
5. An interagency DUI task force or team of 5 to 7 officers should be established within the county. These officers would be solely dedicated to DUI enforcement and paid for by each individual agency or under a grant from the state or federal government.
6. A seminar or workshop on how the "Back on Track" program works should be developed and conducted by the State Attorney's Office for all traffic enforcement officers in Miami-Dade County. A better understanding of the program for DUI offenders is essential for morale purposes.
7. As DUI enforcement increases in Miami-Dade County, it should be accompanied by publicity, especially using social media (e.g. Facebook and Twitter).
8. An education program about the impairing effects of marijuana (THC) on driving performance should be developed and delivered as a series of public service announcements (PSAs) for Miami-Dade County drivers.
9. Miami-Dade police agencies should make every effort to increase the number of trained and certified drug recognition experts (DREs) in their agency.
10. The Florida Highway Safety Office and the State Attorney's Office in the county should support policies and programs that increase the availability, convenience, affordability and safety of transportation alternatives for drinkers who might drive otherwise.

Discussions with police and prosecutors in the county revealed police apathy toward DUI enforcement, lack of DUI enforcement training, and a lack of leadership from the top. Police officers need to become proactive rather than reactive toward DUI in the county. The above actions, if implemented, promise to change the culture in Miami-Dade County and get DUI enforcement "back on track."

Introduction and Background

Since 1899, 3.5 million people have died in traffic crashes in the United States, with an estimated 1.6 million killed in crashes involving alcohol-impaired driving (National Center for Statistics and Analysis/NCSA, 2004). Of the 37,461 people killed in traffic crashes across the United States in 2016, almost one third (10,497) were killed in crashes involving an alcohol-impaired driver (NCSA, 2017 October). In addition, for the past 20 years, approximately 1.4 million drivers have been arrested annually for driving while intoxicated (DWI) or driving under the influence (DUI), though this has decreased in recent years to 1.1 million DWI arrests (Federal Bureau of Investigation, 2016). Although progress has been made in reducing impaired driving crash fatalities (Dang, 2008), they still account for over 10,000 deaths each year in the United States. If crashes unreported to the police are included, impaired drivers resulted in an additional 350,000 people injured annually, and more than 3.5 million property-damage crashes, costing the public $125 billion each year (Zaloshnja et al., 2013). Impaired driving is a significant public health problem in the United States.

However, research shows that the solutions to impaired driving lie mainly at the state and local community levels where the laws are applied and enforced, programs are implemented, and changes can be made. State and local community leaders need evidence-based strategies that can increase the perceived risk of being stopped and arrested by law enforcement if driving while impaired. Since most states currently have a good infrastructure of impaired-driving laws, all other factors being equal, states with highly visible, highly publicized impaired-driving enforcement programs tend to have lower rates. Georgia is a good example. It has conducted highly visible, frequent, publicized DUI enforcement throughout the state for several years (Fell et al., 2008). Georgia now has one of the lowest impaired-driving-related fatal-crash rates in the nation, going from 34% in 1982 to 15% in 2011—a 56% reduction in that proportion.

A decade ago there was a study that used statewide datasets to generate a metric of driving-while-intoxicated (DWI) enforcement and prosecution that focused on the rate of proactive DWI arrests (Dula et al., 2007). This analysis found no relationship between the level of DWI arrest activity and DWI-related crashes, suggesting that although the current level of resources and mix of enforcement policies may maintain the reductions in DWI crashes attained in the 1980s and 1990s, current methods are unlikely to lead to additional systematic reductions unless their deterrence value can be enhanced, such as through improved enforcement technology and increased media support.

Other studies have demonstrated connections between increased law-enforcement-activity levels and reductions in crashes. Johnson, Tippetts, and Vishnuvajjala (2009) performed a statistical analysis of alcohol-impaired-driving fatalities and law-enforcement-activity level (measured by DWI arrests) between 2001 and 2006. Fifteen states that experienced decreases during that period were compared to 15 states that experienced increases in impaired-driving fatalities. Increases in DWI arrests per vehicle mile traveled in a state were significantly associated with reductions in alcohol-impaired-driving fatalities in those states.

Research also shows associations between traffic crashes and certain community environmental and cultural factors, legislation, and policies in addition to law-enforcement strategies (Gruenewald et al.,

1997; Holder, 1998; Ross, 1984; Sivak, 2009). For example, it has been reported that the number of fatal crashes are associated with certain factors, such as the amount and type of travel, that is, vehicle miles traveled (O'Neill and Kyrychenko, 2006); whether the community is in an urban or rural area (Burgess, 2005; O'Neill and Kyrychenko, 2006); safety-belt-usage rate, proportion of licensed drivers who are males, proportion of licensed drivers older than age 64, income per capita, and deaths caused by alcohol-related liver failures per capita (Sivak, 2009). In addition to such community and environmental factors, a number of individual characteristics are related to fatal crashes: driving on roads at high speeds, driving with high BACs, and/or driving while unrestrained (Borkenstein et al., 1974; Peck et al., 2008; Voas et al., 2007).

Between 1982 and 1997, key impaired driving laws were adopted by most of the 50 states and the District of Columbia (DC) (Fell and Voas, 2006). As a result, the proportion of traffic fatalities involving impaired drivers decreased during that period. However, since 1997, progress has stalled (Dang, 2008; Fell, Tippetts and Voas, 2009). Impaired driving rates vary considerably by state and by community. In a recent 5-year average, the rates ranged from a low of 12% in Utah to a high of 31% in Montana (Fell, Tippetts and Voas, 2009). Some of this variability was associated with DUI enforcement.

When examining fatal crashes in Miami-Dade County, approximately 300 fatalities per year have occurred between 2014 and 2016. See Table 1.

Table 1. Traffic Fatalities in Miami-Dade County, Florida: 2009-2016

Year	Traffic Fatalities
2009	260
2010	246
2011	248
2012	233
2013	224
2014	280
2015	339
2016	294

Source: https://www.flhsmv.gov/resources/crash-citation-reports/

To shed some light on this issue, a prior research study utilized nationwide data on the local prevalence of impaired driving from the 2007 National Roadside Survey (NRS) and measures of DUI enforcement activity provided by the police departments that participated in the 2007 NRS. These measures were merged with impaired driving crashes from the General Estimates System (GES), a nationally representative crash dataset maintained by the National Highway Traffic Safety Administration (NHTSA). Results indicated that a 10% increase in the DUI arrest rate is associated with a 1% reduction in the alcohol-impaired-driving crash rate (Fell, et al., 2014). This study also explored how enforcement intensity related to the prevalence of weekend, nighttime drivers who had been drinking with a BAC $\geq$.01 g/dL, those who had BACs $\geq$.05 g/dL, and those who were driving with an illegal BAC $\geq$.08 g/dL. Drivers on the roads in communities with fewer than 3.7 driving-under-the-influence (DUI) arrests per 10,000 population had 2.7 times the odds of BAC-positive drivers on the roads compared to communities with the highest intensity of DUI arrest activity (>38 DUI arrests per 10,000 population). The number of traffic stops and DUI arrests per capita were significantly and negatively associated with the odds of drinking and driving on the roads in these communities (Fell, et al., 2015).

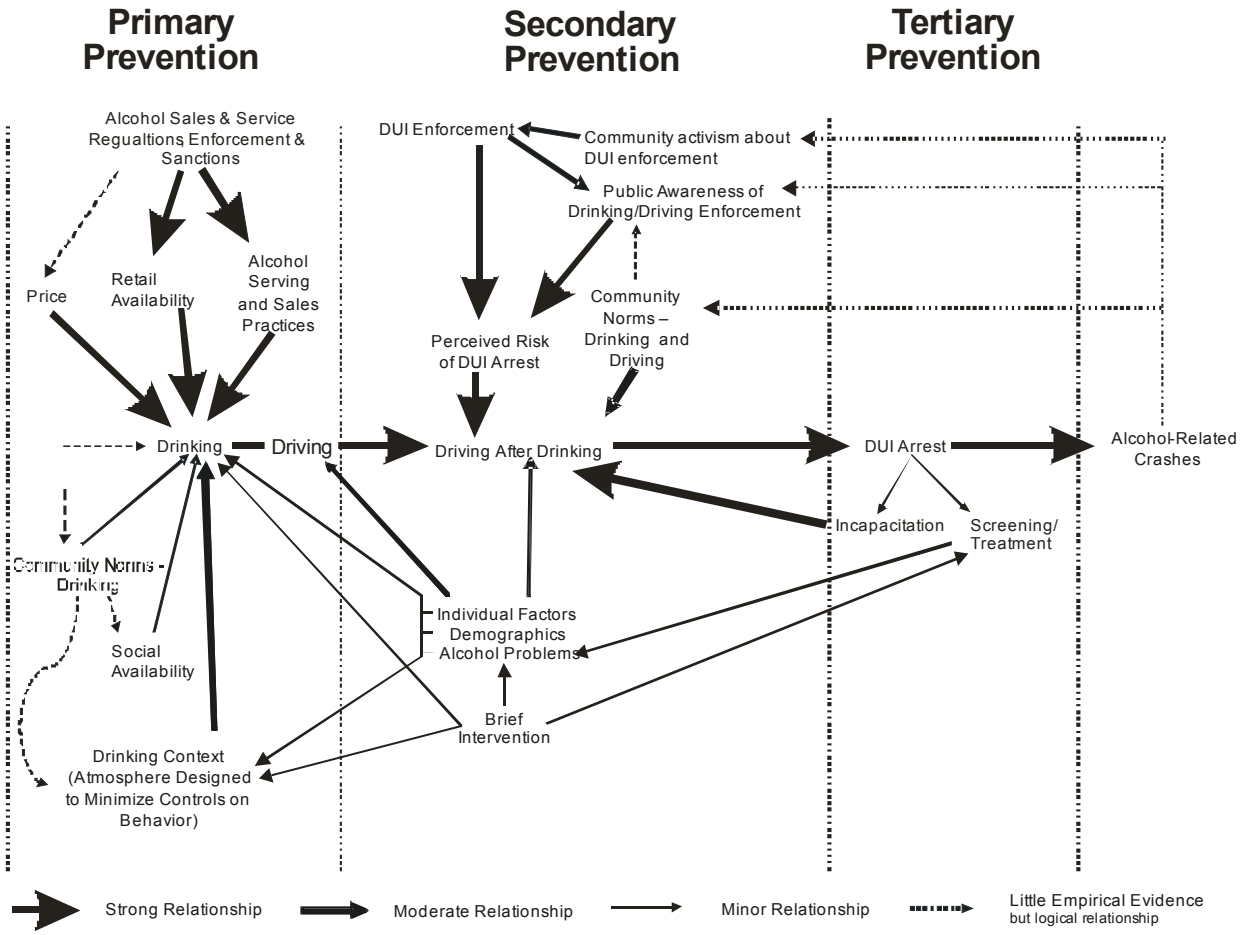
In 2010, the state of Washington implemented a high intensity enforcement campaign entitled Target Zero Teams (TZT) project involving specially trained members of the Washington State Police focusing their enforcement efforts on impaired driving in certain counties in the state. There were notable countywide net increases in impaired driving arrests by TZT troopers in the TZT counties compared to non-TZT counties. In addition, the TZT counties had a relative reduction of 24.8% in driver alcohol involvement (BAC>.01) in fatal crashes compared to the non-TZT counties (Thomas, et al., 2015). It was estimated that the TZT program saved 11 lives in Washington, making it highly cost effective.

A program similar to the TZT was implemented in Maryland. It was called State Police Impaired Driving Reduction Effort (SPIDRE). The resulting decrease in the ratio of single vehicle nighttime (SVN) crashes to multiple vehicle daytime (MVD) crashes translated to 178 SVN crashes avoided in the SPIDRE counties over the 35-month SPIDRE period. If the SPIDRE team had operated in the non-SPIDRE counties and had the same effect, 192 SVN crashes would have been avoided. The benefit/cost ratio for the SPIDRE program was a savings of $3.75 for every $1.00 spent on the program (Beck, et al., 2017).

DUI Enforcement Strategies

A report by Voas and Fell (2014) that appeared in the Oxford Handbook of Substance Use Disorders provides a comprehensive background on programs and policies that are designed to reduce impaired driving. Efforts to reduce impaired driving were reviewed and summarized under three headings: Primary Prevention, Secondary Prevention, and Tertiary Prevention shown in Figure 1, taken from the Birckmayer et al. (2008, p. 8) crash causation model. Primary Prevention consists of the programs directed at reducing the high-risk drinking that leads to impaired driving. It includes programs directed at preventing drinking by high-risk groups, such as youths under age 21, and at preventing service to obviously intoxicated patrons. Secondary Prevention covers programs directed at separating drinking from driving through law enforcement, public information programs, and driver-licensing regulations. Tertiary Prevention focuses on programs directed at preventing convicted drinking drivers from future recidivism through license actions, treatment programs, and monitoring systems. The interactions among the programs are shown by the directional arrows, and the relative importance of the various programs is indicated with lines.

Figure 1. Alcohol-related motor-vehicle crash causal model



The focus in this report is on DUI enforcement strategies. The effectiveness of traffic laws related to impaired driving depends on deterring vehicle operators from driving after drinking. The principal factor in creating deterrence is how effectively the laws are enforced. Classical deterrence theory is a psychological model designed to explain the influence of punishment on personal behavior. It hypothesizes that three factors—risk of detection, severity of the sanction, and the speed with which the sanction is applied—determine the response to laws. Ross (1982) provided perhaps the clearest explanation of deterrence, emphasizing that it is the *perception* of each of the three factors—rather than the actual risk of detection, the sanction severity, and sanction celerity—that affects the behavior of offenders. The basic theoretical concept has been demonstrated in many evaluations of traffic safety programs conducted in the last half century. The relative influence of each element of the theory, however, has been studied less. Ross and Klette (1995), based on their studies of Scandinavian laws, concluded that the perceived probability of arrest was a more significant factor than the severity of the penalty (Ross, 1992a). Some evidence for this position was developed from other studies of DUI enforcement in the United States (Ross, McCleary, & LaFree, 1990; Ross & Voas, 1990). The relative effectiveness of enforcement compared to sanctions in creating deterrence is a significant issue; much of the cost of sanctions (fines, treatment, and vehicle sanctions) is borne by offenders, making them of relatively low cost to the state. Conversely, the full cost of enforcement is born by the state.

The actual risk of arrest for DUI in the United States is quite small. Estimates have varied from 1 in 2,000 impaired drivers, based on an analysis of average annual officer arrest rates (2 per year per officer) (Borkenstein, 1975), to about 1 in 88 impaired drivers, based on responses to a national telephone survey and FBI crime statistics (Zador, Krawchuck, & Moore, 2001). The most carefully developed risk estimates were those reported by Beitel, Sharp, and Glauz (2000) and by Hause, Voas, and Chavez (1982), based on field researchers riding with police. They found a probability of arrest for 6 in 1,000 drivers with BACs of .10 or higher. A more recent study estimated that only about 1 in 1,000 drivers on the roads with illegal BACs (>.08 g/dL) is ever arrested for DWI (Zaloshnja et al., 2013). The public is generally not aware of these low probabilities.

The swiftness in applying a sanction has substantially increased with the adoption of administrative license revocation (ALR) laws, and laws for offenders with egregious BACs (≥.15 g/dL) have increased the severity of sanctions for DUI. Although the technology for apprehending impaired drivers has improved, much of its potential is underused, leaving enforcement as the element in deterrence with the most potential for further progress.

Sobriety Checkpoints

Sobriety checkpoints provide U.S. police departments with the closest approximation to the highly successful random breath-test (RBT) enforcement procedure used in Australia, Sweden, and other countries. RBT, as implemented in Australia, allows officers to stop any vehicle on the road at random and to take a breath test from the driver. Operators with BACs higher than .05, the legal limit, are transported to the police station for an evidential test. In contrast, in the United States, vehicles can only be stopped at random at specially designed and publicized "checkpoints," and the drivers cannot be required to take a breath test. Rather, the officer must conduct an interview to determine whether the driver is impaired, and if there is evidence of impairment, the officer must require the driver to perform a set of field sobriety tests to establish impairment before transporting the offender to the police station.

Henstridge, Homel, and Mackay (1997), in a time-series analysis of four Australian states, found that RBT was twice as effective as "selective" checkpoints similar to those conducted in the United States. Sherman (1990) found that in Queensland, Australia, RBT resulted in a 35% reduction in fatal crashes, compared with 15% for checkpoints. They estimated that every increase of 1,000 drivers in the daily RBT testing rate corresponded to a decline of 6% in all serious crashes and 19% in single-vehicle nighttime crashes. This increase of 1,000 drivers tested in the daily RBT operations is very achievable in Australia. In many Australian states, the annual number of drivers tested in the RBT operations equals the adult population for that state. Moreover, analyses revealed a measurable continuing deterrent effect of RBT on the motorist population after the program had been in place for 10 years. Homel (1988) showed that the deterrent influence of RBT also provided heavy drinkers with a legitimate excuse to drink less when drinking with friends.

Studies of the U.S. sobriety checkpoints found that they are associated with significant decreases in alcohol-related crashes (Epperlein, 1987; Lacey, Rudisill, Popkin, & Stewart, 1986; Levy, Asch, & Shea, 1990; Levy, Shea, & Asch, 1988; Voas, Rhodenizer, & Lynn, 1985; Voas, 2008; Wells, Preusser, & Williams, 1992). Four reviews of checkpoint programs have been published. Peek-Asa (1999) reviewed six studies occurring between 1983 and 1996 and reported reductions of 17 to 75% in alcohol-related

fatalities. Two related meta-analyses studies of 15 U.S. checkpoint programs occurring between 1985 and 1999 were conducted by Shults et al. (2001) and Elder et al. (2002). Elder et al. (2002) found that the median reduction in crashes associated with checkpoints was 20%. A survey of state checkpoint operations by Fell and colleagues (2004) reported effectiveness figures similar to those of Elder et al. (2002). A cost-benefit study of sobriety checkpoints indicated that, for every $1 invested in the checkpoint strategy, the community conducting the checkpoint saved $6 (Miller, et al., 1998). In a report published by the Transportation Research Board of the National Academies of Science (Transportation Research Board, 2010), the lessons from other nations indicate that frequent and sustained use of sobriety checkpoints could save up to 3,000 lives annually if similarly used in the United States.

Despite these positive results, a survey of states that use checkpoints (Fell, Ferguson, Williams, & Fields, 2003) showed that only 12 of the 37 states conducted checkpoints weekly. Their survey found four main reasons for their infrequent use: (1) lack of local police resources and funding, (2) lack of support by state task forces and citizen activists, (3) checkpoints are not efficient for producing DUI arrests, and (4) checkpoints are not cost-effective in reducing crashes. Other investigators have reported similar reasons (Ross, 1992b). There are counterarguments available to each of these issues:

1. Police departments generally use larger numbers of officers and vehicles in checkpoint operations than is required by the courts. This increases their expense, thus making checkpoint operations dependent on receiving additional outside funds. Studies have shown that low-manpower checkpoints staffed by relatively few (four to six) officers can be effective. The Stuster and Blowers (1995) study demonstrated that checkpoints with as few as three to five officers could be as effective as a much larger staff of officers. A "mini-checkpoint" program was undertaken by Lacey, Kelley-Baker, Ferguson, and Rider (2006) in West Virginia. Low-staff checkpoints (with three to five officers) were conducted weekly in two experimental counties in the state (106 in one year). The low-staff checkpoints were relatively inexpensive to conduct, costing from $350 to $400 per checkpoint.
2. Local support by community action groups can significantly encourage strong enforcement, as described hereafter.
3. Many checkpoint operations limit the interviews with motorists to a minute or less in order to contact as many drivers as possible and avoid traffic delays. The short interview time is inadequate for officers to assess the driver's appearance and behavior to determine whether they are impaired. Consequently, half of the over-the-limit drivers escape detection (discussed hereafter). It is possible, as Voas (2008) found with a low-staff checkpoint program in Charlottesville, Virginia, for officers to produce DUI arrests as efficiently at a checkpoint as on regular patrol, particularly if passive alcohol sensors (PAS) are used.
4. As described, there is ample evidence that well-publicized checkpoint programs effectively reduce alcohol-related crashes. Much of this benefit is attributable to their general deterrent effect, independent of the extent to which they apprehend over-the-limit drivers. This has encouraged the view that it is not important for checkpoints to produce arrests because their primary purpose is deterrence. However, no one has examined the effect that checkpoints have on the impaired driving of over-the-limit motorists who escape detection at checkpoints. Are they encouraged to drink and drive more frequently?

A benefit of checkpoint operations that has not been fully evaluated is the suppression of crime beyond impaired driving. Elder et al. (2002), in their review of sobriety checkpoints, noted that checkpoint operations resulted in the apprehension of suspended DUI offenders driving illicitly and individuals carrying weapons (p. 273) that provide benefits in addition to their influence on impaired-driving crashes. Other reports on checkpoint operations have noted this serendipitous benefit (Lacey, Jones, & Smith, 1999; Fell, Langston, Lacey, Tippetts, & Cotton, 2008; Voas, et al., 1985; Voas, 2008). Particularly important from a traffic safety viewpoint are the citations for safety belt nonuse, which is a particular problem with impaired drivers (Voas, et al., 2007).

In 2003, the Fresno California Police Department increased impaired driving enforcement from 1 or 2 operations per year between 1998 and 2002, to 32 in 2003 and almost 130 in 2010. Not only were alcohol-related crashes reduced by 17%, but burglary rates and motor vehicle theft rates per capita declined by 17% and 32%, respectively, between 2003 and 2011 (Fell, 2013). This is compared to another city in California (Simi Valley) that did not change their traffic enforcement over that same period (2003-2011), conducting 3 impaired driving operations in each year. Burglary rates per capita increased 5% while motor vehicle theft rates per capita decreased only 3% during that period. When examining robberies, the rates in Fresno decreased 29% between the periods from 1996-2002 (pre-intervention) and 2003-2011(post-intervention). In contrast, the Simi Valley rates for robberies increased 35% between those same periods. Employing high-visibility traffic enforcement, such as the use of sobriety checkpoints and saturation patrols, is known to raise the perceived probability of apprehension for impaired driving, but may also raise the perceived risk of being arrested for other criminal activity. If it can be demonstrated that increased traffic enforcement reduces other crime in the community, police departments in the United States and other countries may be more willing to use resources to implement that strategy.

Between 2000 and 2003, the U.S. Department of Transportation funded demonstration projects designed to reduce impaired driving through well-publicized and frequent enforcement in seven States: Georgia, Indiana, Louisiana, Michigan, Pennsylvania, Tennessee, and Texas. Significant reductions in fatal crashes in the intervention states relative to surrounding states were obtained in Georgia, Indiana, Michigan, and Tennessee when comparing the ratio of drinking to nondrinking drivers in fatal crashes (Fell, Tippetts, & Levy, 2008). Significant reductions in a second measure—alcohol-related fatalities per 100 million vehicle miles traveled—were also obtained in Indiana and Michigan. The other three states showed only marginal, nonsignificant changes relative to their comparison jurisdictions or states. As compared to surrounding states, fatal crash reductions in Georgia, Indiana, Michigan, and Tennessee, ranged from 11 to 20%. In these four states, the programs were estimated to have saved lives ranging from 25 to 60: Indiana, 23; Tennessee, 43; Michigan, 57; and Georgia, 60. Some common features of the programs that provided significant reductions were the use of paid media to publicize the enforcement (in three states), the use of a statewide model rather than selected portions of the state (all four states), and the use of highly visible and frequent sobriety checkpoints (in three states). The authors concluded that a variety of media and enforcement procedures that supplement ongoing statewide efforts can yield meaningful crash reduction effects among alcohol-impaired drivers.

Traditional DUI Enforcement

Procedures for enforcing laws against impaired driving have grown out of the standard traffic enforcement responsibilities of police departments. Traffic officers have many responsibilities, some of which include directing traffic, responding to crash scenes, and enforcing traffic regulations related to high-risk driving (such as speeding and red-light running). In addition, they may be called to crime scenes or tasked with security responsibilities for government officials. Police departments have limited resources that must cover competing responsibilities for traffic general enforcement, crime suppression, and security operations. DUI arrest activity must compete with other high-priority functions for the same limited resources. In a classic study of DUI enforcement for NHTSA, Borkenstein (1975) analyzed the enforcement activities in urban areas in the United States. He noted that "In a typical American city, 10% of police resources are allocated to traffic law enforcement, but included in the violations are such mundane offenses as blocking driveways and parking violations" (p. 659). Because the typical patrol officers have a wide range of activities, Borkenstein estimated that they made only two DUI arrests a year. Based on surveys of the number of drinking drivers on the roads, he further estimated that the probability of being arrested with a BAC of .10, the legal limit at that time, was 1 in 2,000.

Dedicated Patrols

Since Borkenstein's study in 1975, state BAC limits have been reduced from .10 to .08, federal funding for DUI enforcement has increased, and many police departments have established special DUI patrols. Such patrols dedicated only to DUI enforcement can significantly increase DUI arrests. Dedicated patrols generally operate on weekends when the prevalence of impaired driving is greatest. Experience in the 35 community Alcohol Safety Action Programs (ASAPs) funded by NHTSA in the 1970s indicated that two or three dedicated patrols operating on weekends could double the annual number of DUI arrests (Levy, Voas, Johnson, & Klein, 1978; Voas, 1981).

Saturation Patrols

Saturation patrols are dedicated patrols that generally involve larger than normal numbers of officers frequently achieved by more than one jurisdiction participating in the activity. They provide a high-visibility alternative to checkpoints that are particularly suitable for the states with constitutional limitations on the use of sobriety checkpoints (Fell, et al., 2003). The large number of police vehicles is intended to attract public and media attention to the enhanced enforcement effort. Saturation patrols appear to be effective in reducing impaired driving if they are highly publicized, but recent research on this strategy is much more limited and is not as extensive or as convincing as that on sobriety checkpoints. The one direct comparison of the checkpoint and saturation methods in California conducted by Stuster and Blowers (1995) favored checkpoints. In addition, saturation patrols may have the same major limitation as checkpoints in that they require a substantial number of officers.

Detection of Vehicles Driven by DUI Offenders

For detection of vehicles driven by impaired drivers, the federal government has funded several studies of the vehicle maneuvers that suggest the driver is impaired (Harris, Dick, Casey, & Jarosz, 1980; Stuster, 1993). These signs provide the officers with probable cause to stop the vehicle to determine whether the

driver has been drinking. To develop these cues, research assistants rode with the police and recorded their observations of the cues that led to stopping a motorist. The BACs for all motorists stopped were obtained: they were either arrested for DUI or volunteered to be breath tested after being dismissed by the officer as not impaired. Based on these data, a manual containing a cue list for police use was assembled, field tested and validated (Stuster, 1997). Later, NHTSA published the cues in a pamphlet (NHTSA, March 2010). See Appendix A.

Next is the identification of a driver who has been drinking heavily. Because a breath test is generally viewed as a search under the Fourth Amendment of the U.S. Constitution, officers must have a "reason to believe" the suspect is impaired before proceeding with a DUI investigation. Typically, officers use a set of signs—such as bloodshot eyes, odor of alcohol on the breath, fumbling with the driver's license—as indicators of impairment (Stuster, 1997). Perhaps the most frequently occurring indicator appearing on police reports is the odor of alcohol. Moskowitz, Burns, and Ferguson (1999) found, however, that when individuals were limited to detecting drinking only through their sense of smell, they were unable to identify impaired drivers with any regularity. Thus, officers have limited and relatively unreliable cues when interviewing a driver at the left window of a vehicle. The utility of the random test system in Australia does not depend on observations of the driver's appearance and behavior.

The next step involves a sobriety test. In the United States, drivers cannot be required to take a preliminary breath test; therefore, officers must rely on observations of the driver's behavior that demonstrate impairment. To provide a standardized (or standard) set of observations for use in court, Burns and Moskowitz (1977) developed a set of three Standardized Field Sobriety Tests (SFSTs): a one-leg stand, the walk and turn, and the horizontal gaze nystagmus tests. Several field evaluations demonstrated that the battery of tests has substantial validity for identifying drivers with BACs of .10 or higher (Burns & Anderson, 1995; Stuster & Burns, 1998; Tharp, Burns, & Moskowitz, 1981). Stuster and Burns (1998) and Burns and Dioquino (1997) demonstrated that the three-test battery was equally accurate for identification of drivers at BACs of .08. McKnight et al. (2002) and Stuster and Burns (1998) found that, by modifying the scoring of the horizontal gaze nystagmus test, it was useful for identifying drivers with BACs as low as .04. However, Burns and Anderson (1995) found that, when breath tests were collected after the officer released the driver because the officer believed he or she was not over the limit, 36% of those released had BACs that exceeded the legal limit (see Burns, 2003, for a review of the development of the SFSTs).

Passive Breath Testers

As noted, police departments have resisted implementing checkpoints, partly because few DUI arrests are made in checkpoint operations (Fell, et al., 2004). An important factor in this limitation in arrests is the fact that officers cannot test every driver stopped, as they do in Australia, but must first determine that the individual has been drinking and may be impaired. A device designed to aid the officer in detecting drinking is the PAS III, a standard police flashlight with a built-in passive alcohol sensor. It draws in a mix of expired and environmental air from in front of a person's face and is not considered a search prohibited by the Fourth Amendment. These sensors (Figure 2) can provide a good estimate of the driver's BAC (Farmer, Wells, Ferguson, & Voas, 1999; Voas, Romano, & Peck, 2006). The PAS is particularly effective when observation time is short, as it is in checkpoints. However, efforts to persuade officers to make greater use of passive sensors have generally failed (Fell, Compton, & Voas, 2008c). A

series of studies has demonstrated that when officers use passive sensors at a checkpoint, more drinking drivers are detected and the arrest rate increases by approximately 50% (Ferguson, Wells, & Lund, 1995; Lestina & Lund, 1989; Lund & Jones, 1987; Lund, Kiger, Lestina, & Blackwell, 1991). Aside from its effectiveness in increasing the detection of drinking drivers, the most important effect of the PAS on impaired driving may be its potential to increase the perceived risk of being apprehended for DUI if driving after drinking. If police use of the PAS is well publicized, it should increase general deterrence to impaired driving. Heavy drinkers who count on their increased tolerance to alcohol to avoid detection (Ross & Gonzales, 1988) might be deterred by the police's ability to detect drinking in an otherwise sober-appearing driver. Further, making underage drivers aware that even very small amounts of alcohol in the blood can be detected should increase their concern about being cited under the zero-tolerance law. Although the PAS has been used in many enforcement programs, relatively few (Voas, Holder, & Gruenewald, 1997; Wells, et al., 1992) have actively publicized its use. More comprehensive research on the effects of publicizing PAS use in DUI enforcement is needed.

Figure 2. PAS III, a standard police flashlight with a built-in passive alcohol sensor

Publicizing Enforcement Programs

Because deterrence depends upon the perceived rather than the actual probability of being arrested, it is generally accepted that enforcement programs must be well publicized to be effective. General safety publicity without a related enforcement program is usually ineffective in reducing crashes. For example, publicizing general safety messages, such as *If You Drink Don't Drive,* without an associated law or enforcement effort, have generally failed to demonstrate an effect on a highway safety measure (Wilde, Hoste, Sheppard, & Wind, 1971). However, Ross (1973) and Voas and Hause (1987) documented crash reductions produced by publicity in advance of program application, such as a new law (Ross) or enforcement effort (Voas and Hause). Sometimes, an enforcement program by itself produces enough public visibility and media attention to make the public aware of the program without a special media program (e.g., Voas, 2008, and Voas & Hause, 1987). Aside from free media provided by the press because of an ongoing enforcement effort, three types of information campaigns help educate the public on impaired-driving laws and enforcement: (a) public service announcements (PSAs), (b) paid media campaigns, and (c) media advocacy programs. Each program has its strengths and limitations. Few media campaigns of any type have been adequately evaluated.

Public Service Announcements

PSAs, which local television stations must air as a part of their continued licensing requirements from the Federal Communications Commission in the United States, have been a major method for warning the

public about the danger of impaired driving and for promoting safety behaviors, such as *Friends don't let friends drive drunk.* Because PSAs are usually funded by the communications industry, they are attractive, high-quality products based on standard industry focus group research procedures. Although local TV stations provide free airtime, they are likely to air the PSAs during nonprime time when other paying advertisements are not being aired (e.g., late-night or early-morning hours). Studies have indicated that PSAs can familiarize the public with safety slogans, but no studies have demonstrated a reduction in impaired driving or risky drinking based on a program of PSAs (Holder & Treno, 1997). Giesbrecht and Grube (2003) reviewed research on the effects of media designed to reduce alcohol use or its related problems. They cited only a single study of the effects of PSAs about drinking during pregnancy that showed an increased awareness of the dangers of drinking while pregnant.

Paid Media Campaigns

In relation to alcohol safety, paid media campaigns have been used most frequently in national, annual *Click It or Ticket* campaigns to increase the use of safety belts or campaigns directed at impaired driving during holidays, such as Labor Day and Christmas, when many local police departments receive funding to implement special enforcement efforts (Tison et al., 2008). Holder and Treno (1997) concluded that planned mass media campaigns are most effective as reinforcers of efforts to reduce high-risk drinking, in general, and drink-driving, in particular. Mass media efforts alone are insufficient, however. Friend and Levy (2002) conducted a comprehensive review of mass media campaigns on tobacco. Results suggested that well-funded and implemented mass media campaigns targeted at smokers, with a comprehensive tobacco control program, were associated with reduced smoking rates among both adults and youths. Similar strong effects of paid media on impaired driving remain to be demonstrated.

Media Advocacy

Media advocacy refers to the strategic use of news media by those seeking to advance a social or public policy initiative. Unlike specifically designed public information campaigns, media advocacy works directly with the local news outlets (radio, television, newspapers, and magazines) to increase local news attention to a specific public health problem or program. Media advocacy encompasses a range of strategies aimed at reframing public debate of issues (Wallack, Dorfman, Jernigan, & Themba, 1993; Wallack, Grube, Madden, & Breed, 1990). In this context, mass media can bring attention to a specific alcohol problem, advance the importance of one or more specific policies to reduce the problem, put pressure on decision-makers who can make new policies or change existing policies, and help organize a community effort to bring about a desired policy change.

Media advocacy generally does not target offenders or potential offenders; rather, it appeals to community members to support local agencies (e.g., the police and city council) that support enforcement and educational efforts. As such, media advocacy is a major component of the community programs described hereafter. Media advocacy involves carefully planned news events that attract press attention and cover an important community issue, program, or organization. Such events are usually based on research data that have uncovered an important problem for the community, such as a growing number of teenage fatalities in alcohol-related crashes. A community leader reports the information in a TV interview or at a press conference. The message projected is that local citizens have a problem in their community that requires attention and about which local leaders are concerned. This local relevance of

the message is an important feature that differentiates media advocacy programs from national mass media efforts, which avoid being community specific so they can be used broadly throughout the country (Treno & Holder, 1997).

Community Alcohol Safety Programs

Although national laws and publicity programs have an important influence on impaired driving, DUI enforcement is primarily an activity of local police departments, which are generally overburdened with broad responsibilities for law enforcement. Consequently, drinking and driving may receive relatively low priority among the department's activities. Maintaining a sufficient level of enforcement activity to create strong deterrence to impaired driving requires support from the local government and community residents. Moreover, publicizing enforcement activities requires support from the local news media. Thus, effective DUI enforcement involves a complex community system (Holder, Saltz, Treno, Grube, & Voas, 1997; Voas, Lange, & Treno, 1997). An effective system creates and maintains the public's concern with the impaired-driving problem and supports the police programs directed at reducing impaired driving.

This recognition of the community as the locus of impaired-driving prevention has led to broad support by federal agencies (such as NHTSA and the NIAAA) and private foundations (such as the Robert Wood Johnson Foundation) for alcohol problem-reduction programs in communities. Relatively few of the many community alcohol and other drugs (AOD) reduction efforts have been adequately evaluated. Four comprehensive programs directed at drinking and drink-driving within the community have received relatively extensive evaluations: the *Saving Lives Program* (Hingson et al., 1996), the *Communities Mobilizing for Change Program* (Wagenaar et al., 2000a; Wagenaar, Murray, & Toomey, 2000b), the *Community Trials Program* (Holder et al., 2000), and the *Fighting Back Community Program* (Hingson et al., 2005). In addition, three community efforts in specialized settings have been evaluated, two of which relate to community/college campus programs—the *Matter of Degree Program* (Nelson, Weitzman, & Wechsler, 2005) and the *College Community Environmental Prevention Program* (Clapp, Johnson, Voas, & Lange, 2005)—and a third related to a border community, *Operation Safe Crossing* (Voas, et al., 2002).

The ***Communities Mobilizing for Change Program*** (Wagenaar, et al., 2000a) was directed at changing the liquor sales environment to reduce underage drinking and impaired driving by enforcing minimum legal drinking age (MLDA) laws prohibiting sales to those aged 20 and younger. Fifteen communities were randomly assigned to the intervention or control condition for 2½ years. The treated communities, compared with the untreated communities, demonstrated reduced sales to underage youth, as well as reduced alcohol consumption and DUI arrests among 15- to 20-year-olds.

The ***Community Trials Program*** (Holder et al., 2000) was a multifaceted environmental program designed to reduce alcohol-involved injuries and fatalities among all age groups. The program, which was implemented in three communities (with three comparison sites), featured five mutually reinforcing environmental strategies: (a) community mobilization, (b) responsible beverage service, (c) drinking-and-driving enforcement, (d) underage drinking enforcement, and (e) limiting alcohol access. This national community prevention trial presented clear evidence that the use of local environmental strategies not only reduced alcohol-involved traffic crashes, but also reduced the violence associated with alcohol. Heavy drinking was reduced by 13%, alcohol-related assaults appearing in emergency rooms were

reduced by 43%, nighttime injuries from crashes were reduced by 10%, and DUI crashes were reduced by 6% (Holder et al., 1998, 2000). In the treated communities, self-reported driving after drinking too much decreased significantly.

The ***Saving Lives Project*** (Hingson et al., 1996b), conducted in six communities in Massachusetts, was designed to reduce alcohol-impaired driving and related problems (such as speeding, red-light running, and low belt use) by applying a broad range of traditional traffic safety program activities. The activities involved media campaigns, business information programs, speeding and drunk-driving awareness days, speed-watch telephone hotlines, police training, high-school peer-led education, Students Against Destructive Decisions chapters, college prevention programs, and a host of other activities. Results of the evaluation indicated that, during its 5 years in operation, cities with the Saving Lives intervention had a 25% greater decline in fatal crashes than did cities in the rest of Massachusetts.

The ***Fighting Back Community Program*** awarded grants to 12 communities from 1992 to 1997. Five of the 12 communities that displayed the most concentrated effort to expand substance abuse treatment and reduce alcohol availability were selected for evaluation by Hingson et al. (2005a). Sites established consortiums to conduct problem assessments and develop programs to reduce alcohol availability and increase substance abuse treatment. The programs supported both individually oriented traditional treatment programs and environmental initiatives to reduce alcohol availability. The results indicated that the *Fighting Back* communities experienced a 22% lower ratio of drinking drivers (BAC>.00) in fatal crashes than did the control communities.

The ***Matter of Degree Program*** (Nelson, et al., 2005) is directed at changing the student-drinking environment by bringing together "key stakeholders" in the university and in the surrounding community to implement a variety of programs, including RBS training, keg registration, parental notification of alcohol-related offenses, increased supervision of Greek organization-sponsored social events, substance-free residence halls, and increased alcohol-free campus activities. Self-reported drinking and drink-driving data were collected from 1997 to 2001 through student telephone surveys at 10 program sites. No significant reductions in driving after drinking were obtained.

Operation Safe Crossing (Voas, et al., 2002) involved the organization of a community coalition to reduce cross-border binge drinking in Mexico by young Americans. The coalition (a) used media advocacy to support the planned increased enforcement efforts at the border and in the Tijuana bars; (b) pressured bar owners to train staff on responsible beverage serving (RBS) strategies; (c) educated the public on the risks of cross-border binge drinking; and (d) supported college and military efforts to limit underage-targeted advertising of cross-border bars on campuses and military bases (Baker, 1997; Lange, Lauer, & Voas, 1999). This environmental strategy led to three significant outcomes: a 31.6% reduction in late-night weekend border crossers, a 39.8% reduction in underage pedestrian crossers who were legally intoxicated (BAC>.08), and a 45% reduction in the number of 16- to 20-year-old drivers in alcohol-related crashes (Voas, et al., 2002).

The ***College Community Environmental Prevention Program*** (Clapp, et al., 2005) was derived from the community trials model (Clapp, Segars, & Voas, 2002) and applied to a college campus. During the program, five interventions were implemented: (a) a reduction in alcohol promotion, (b) a social norms program designed to correct misperceptions regarding student drinking, (c) a DUI enforcement program,

(d) a retail sales-and-availability program to train owners and servers of outlets catering to students, and (e) a program to discourage students from crossing into Mexico to binge drink. Reported drinking and driving was significantly reduced at the program campus relative to the control campus (Clapp, et al., 2005, 2002).

National DUI Enforcement Studies

Erickson et al., (2015) conducted two national surveys of law enforcement agencies, one with state patrol agencies (N=48) and one with a sample of local law enforcement agencies (N=1082). Most state patrol agencies reported conducting sobriety checkpoints (72.9%) and saturation patrols (95.8%), while about half (43.8%) reported enforcement of open container laws. Regarding local law enforcement agencies, 41.5% reported conducting sobriety checkpoints, 62.7% reported saturation patrols and 41.1% reported enforcing open container laws. These DUI enforcement strategies are certainly underutilized by local agencies. In a follow up study, Sanen et al., (2015) found that sobriety checkpoints, saturation patrols and enforcement of open container laws were associated with a lower prevalence of reported alcohol-impaired driving. In addition, a combination of those three enforcement strategies was associated with a greater decrease in alcohol-impaired driving than any individual enforcement activity.

Safe Ride and Designated Driver Programs

Among the most popular methods for separating drinking and driving is the designated-driver concept in which one member of a group traveling to a drinking location agrees to drive and not to drink. Merchants can support such efforts by providing free nonalcoholic drinks to the individual acting as the designated driver. A complementary concept to the Designated Driver program that does not require planning by individuals patronizing drinking establishments is the Safe Ride program, in which the proprietor or community organization provides a sober driver for individuals too impaired to drive safely. Safe Ride and Designated Driver programs have been studied with some promising results (Caudill, Harding, & Moore, 2000; Meier, Brigham, & Gilbert, 1998; Simons-Morton & Cummings, 1997). The designated-driver concept has gained momentum in the United States, with most Americans endorsing it as a strategy to reduce driving under the influence (Winsten, 1994). Additionally, many community and national organizations have vigorously promoted the use of Designated Driver programs (Apsler, Harding, & Goldfein, 1987; Caudill, Harding, & Moore, 2001; DeJong & Wallack, 1992; Harding, Caudill, & Moore, 1998).

Both the safe-ride and designated-driver strategies may produce unintended consequences for groups of drinkers. Individuals who become passengers rather than drivers may feel freer to drink heavily. This may increase their risk of non-traffic-related trauma (e.g., falls, fires, or violence). Telephone and barroom surveys of drinkers who had been transported by a designated driver have shown small but significantly elevated drinking outside the home when a designated driver was available (Harding & Caudill, 1997). In addition, implementation of the concept may be incomplete or inapropriate. For instance, groups of drinkers may designate a driver after drinking has commenced or at the end of a night of drinking (Fell, Voas, & Lange, 1997; Lange, Voas, & O'Rourke, 1998). Despite these limitations, the designated-driver concept appears to hold substantial promise for reducing the incidences of impaired driving. It is simple, inexpensive, almost universally recognized, and as shown in several national polls, has overwhelming

acceptance by most Americans. There is evidence that simply raising the issue of having a designated driver with young adults heading to bars reduces the BACs of drivers when they return from a night of drinking (Lange, Reed, Johnson, and Voas, 2006; Voas, Johnson, & Miller, 2013).

An alternative transportation program called the "Road Crew" was initiated in three communities in Wisconsin in 2003. It was developed using new product development techniques and implemented by establishing broad coalitions within the communities. A key feature of the program is rides home, and between home and bars or taverns in older luxury vehicles subsidized via fares and tavern contributions. An evalution showed a significant shift in riding/driving behavior among 21- to 34-year-olds and a projected 17% decline in alcohol-related crashes in the first year of operation (Rothschild, Mastin, & Miller, 2006).

Ride-Sharing/Ride-Hailing Programs

Ride-sharing applications on smart phones have substantially changed the landscape on alternative transportation. Uber and Lyft are the two largest ride-sharing programs in the United States. These programs enable passengers to hail nearby private drivers using geolocation technology. Uber and Lyft have introduced flexible pricing, automated payments and shorter wait times than traditional taxi services. Both Uber and Lyft are in several cities and counties and are growing rapidly. While there are potential safety risks to unregulated ride-sharing services, there also appear to be several benefits: convenience, affordability and an alternative to driving impaired.

Three studies have been conducted on the effects of Uber on alcohol-impaired driving. The first study, sponsored by Uber and Mothers Against Drunk Driving (MADD), found that Uber's entry in Seattle, Washington was associated with a 10% decrease in DUI arrests (Uber and MADD Report, January 2015). In Chicago, 45.8% of Uber rides requested within 50 meters of a bar, restaurant or other alcohol outlet came during peak drinking hours (10 PM to 3 AM) compared to only 28.9% at off peak hours. In California, monthly alcohol-related crashes declined 6.5% among drivers under age 30 following the launch of Uber.

Providence College also studied the relationship between Uber, fatal crashes and criminal arrests (Dills & Mulholland, 2016). They examined over 150 cities and counties that introduced Uber between 2010 and 2013, and found that Uber was associated with decreases in fatal vehicular crashes and in arrests for DUI, assaults and disorderly conduct.

A third recent study (Brazil & Kirk, 2016) conversely found that Uber had no association with the number of traffic fatalities, drunk-driving fatalities and weekend and holiday fatalities after Uber entered the county. Brazil & Kirk analyzed the Fatality Analysis Reporting System (FARS) for several Uber counties, but it is unclear how drunk-driving fatalities were defined. It also appears that the alcohol imputation FARS file was not used in that study, which is a standard procedure for researchers using the FARS file.

While alternative transportation programs have had some effect on impaired driving, ride-sharing programs such as Uber and Lyft hold promise to have substantial effects as the market penetration increases. However, very few of the alternative transportation studies are truly scientific. A properly-

designed, scientifically rigorous, controlled study that would be both approved by experts and understood by the public is therefore required.

National Academy of Sciences Consensus Study Report

In January 2018, the National Acedemy of Sciences, Engineering, and Medicine released the most comprehensive report on accelerating progress to reduce alcohol-impaired driving fatalities in the United States (National Academy of Sciences, 2018; see also Teutsch and Naimi, 2018). The report (written by a prestigious committee assembled to review the impaired driving problem) provides a blueprint to solving the problem by identifying evidence-based and promising policies, programs, strategies and system changes to increase nation progress in reducing alcohol-impaired driving traffic fatalities.

Among many other strategies, those pertinent to this report include:

- Local governments should adopt amd/or strengthen laws and dedicate enforcement resources to stop illegal alcohol sales (i.e., sales to already intoxicated adults and sales to underage persons).
- Local law enforcement agencies should conduct sobriety checkpoints in conjunction with widespread publicity to promote awareness of these enforcement initiatives.
- Municipalities should support policies and programs that increase the availability, convenience, affordability and safety of transportation alternatives for drinkers who might drive otherwise. This includes permitting transportation network company ride sharing, enhancing public transportation options (especially during nighttime and weekend hours) and boosting or incentivizing transportation alternatives in rural areas.
- Every state should implement DWI courts and these courts should include available consultation or referral for evaluation by an addiction trained clinician.
- All states should enact all offender alcohol ignition interlock laws. To increase effectiveness, states should consider increased monitoring periods based upon the offender's BAC at the time of arrest and past recidivism.
- States should enact per se laws for alcohol-impaired driving at 0.05 BAC and accompany enactment with media campaigns and robust and visible enforcement efforts.

The Problem

Recent news reports indicate that in Miami Beach and across Miami-Dade County, DUI arrests have decreased. A 2016 article in the Miami Herald, noted that 3,609 DUI arrests were made in Miami-Dade County in 2015, a 57% drop from the 6,321 DUI arrests made in 2010 (Ovalle, 2016). Several reasons are cited for this decline including lack of police staffing and training as well as a possible reduction in drinking and driving in general. In order to study this decline in DUI arrests, NORC at the University of Chicago was engaged to conduct a Miami-Dade County driving-under-the-influence (DUI) project, supported through the Safer and Healthier Communities Fund administered by The Miami Foundation in partnership with the Miami-Dade County State Attorney's Office. The objective is to provide a plan for improving DUI enforcement and prosecution based on the research and analyses which included: (1) the

analysis of existing DUI related data; (2) the analysis of a telephone survey of reported knowledge, attitudes and behaviors concerning impaired driving, (3) the analysis of roadside surveys conducted in Miami-Dade County; (4) information from focus group discussions with police and prosecutors in Miami-Dade County; and (5) a comprehensive review of the best prevention practices and enforcement strategies used across the country and including community policing and planning, transportation options (ride-sharing), DUI sanctions and monitoring.

Approach

Analyze DUI Arrests and Crashes in Miami-Dade County

A count of DUI arrests per month were divided by demographics of the arrestee: age, gender and race. Counts of DUI arrests by ethnicity (e.g., Hispanic) were desired, however, the file lacked sufficient data to conduct such analyses. DUI arrests also fluctuated by year. Neither the BAC test result nor any drug presence were available in the arrest file. The model with minimum root mean square error (RMSE) was selected as the optimum model. After model selection and graphics of both the count of arrests and the trend, a t-test was employed to determine whether the slope of the trend was different than no change (flat) over time. All reported p values are two-sided; $p <= .05$ was considered significant.

Miami-Dade County vs. Florida Crash Data

To determine recent trends in Miami-Dade County crashes to crashes in the rest of the state of Florida, trend analyses for the period from 2007 to 2016 for all crashes, by driver and crash characteristics, were conducted. In addition, data from the National Highway Traffic Safety Administration's Fatality Analysis Reporting System (FARS) were analyzed for the years 2010-2016, isolating those fatal crashes that occurred in Miami-Dade County and calculating the fatalities that had a driver with a BAC$\geq$.08 g/dL. The FARS alcohol imputation file was used for this purpose (Subramanian, 2002) so that BAC data on drivers was estimated when it was missing using an imputation methodology.

Trends were calculated using a SAS Macro (Azimaee, 2012) that automates the testing of stability across time by choosing the most appropriate model for trends over time. As such, the most appropriate model was determined by calculating the RMSE for seven models: simple linear regression, quadratic, exponential, logarithmic, square root, inverse, and negative exponential models. The model with minimum RMSE was selected as the optimum model. After model selection and graphic of both the count of crashes and trend, a t-test was employed to determine whether the slope of the trend was different than no change (flat) over time. All reported p values are two-sided; $p <= .05$ was considered significant. P-values for the H0: $\beta 1=0$ are less than 0.001 unless otherwise indicated.

Conduct and Analyze a Telephone Survey

Sampling Frame

The objective of the telephone survey was to gather driver characteristics (those who report DUI and those who do not), and attitudes and perceptions on DUI and enforcement. A second goal was to assess community awareness of DUI prevention and enforcement strategies. The sample design of the telephone survey is best described as a single frame cellular random digit dialing (RDD) survey supplemented with a targeted list of cell phone numbers from residents in Miami-Dade County. The targeted cell phone list was sampled from a Consumer Cell database maintained by Marketing Systems Group. The Consumer Cell database is a database of cell phone numbers from various sources including public records, phone directories, U.S. Census data, consumer surveys, and other proprietary sources. This database is updated monthly. These sources allow cell phone numbers to be appended to address records, which should result in a higher geographic accuracy rate for sampled cell phone numbers. As such, all records in the Consumer Cell database with an address in Miami-Dade County had a chance of selection no matter the area code of the phone number associated with the address. Usage of this database allowed us to better target males between the ages of 18 and 44 for inclusion in the targeted list.

Telephone Survey

The survey questions were programmed into a CATI (Computer Assisted Telephone Interviewing) system, which was tested to ensure accuracy in programming. Interviewers were trained on the consent process, gaining cooperation, refusal aversion and the survey questions. A total of 787 interviews were completed with Miami-Dade County residents from May-July 2017. To be eligible for the survey persons must be living in Miami-Dade County at the time of the interview and a drive a car. Males between the ages of 18-44 were prioritized when conducting interviews. The survey took 15.4 minutes to complete on average for cell phone cases. The final response rate was 28.1 percent based on the American Association of Public Opinion Research (AAPOR) Response Rate 3 method. The sample size of 787 drivers was sufficient to draw reasonable conclusions. For example, a finding that 40% of respondents think the police are doing a good job enforcing impaired driving means that 40% (+ or – 4%) is an accurate measure at a 95% confidence interval. The true percentage would fall between 36% and 44%. We conducted bivariate analyses to determine significant differences between drivers who self-report DUI and those who self-report not driving under the influence. In some cases, the findings are compared to national statistics on reported drinking and driving from the 2008 National Survey of Drinking and Driving Attitudes and Behaviors (Moulton, et al., 2010).

Roadside Surveys of Miami-Dade County Drivers

Roadside surveys were conducted on four weekend nights in the Fall of 2017 to meet a minimum goal of 200 drivers. Surveys were conducted on both Friday and Saturday night of each weekend at one location between 10:00 p.m. and 12:00 a.m. and again at a different nearby location from 1:00 a.m. to 3:00 a.m, for a total of four survey locations per weekend. A team of 5 field interviewers and a lead supervisor was utilized. Although there were practical considerations for selecting a location, such as sufficient traffic flow and safety, the locations were randomly chosen within the boundaries of cooperating local law enforcement agencies in Miami-Dade County. This approach provided, as much as possible, a

representative sample of drivers for Miami-Dade County. Importantly, locations were not selected based on assumptions of where there would be a high percentage of impaired drivers. The objective of this roadside survey was to estimate the alcohol and other drug prevalence of all drivers "on the roads in Miami-Dade County" during the given time periods. Drivers were eligible to participate in the study if they were at least 18 years old, spoke English or Spanish, were not commercial drivers, and were not so intoxicated that they could not provide consent. Participation in the study was voluntary and anonymous. No identifying information was collected from participants. Each driver who entered the survey location was given a case study number. Survey responses, breath samples and saliva samples were all matched using the case study number.

Using an off-duty police officer, drivers were randomly selected from the roadway to enter the survey location, usually an empty parking lot with enough space for five survey bays. Once inside the survey location, a trained field interviewer described the project and offered a $20 cash incentive for participation. Drivers were informed that participation was anonymous and voluntary and that they were free to leave at any time. If the driver agreed to participate, field interviewers asked drivers several questions about their driving behavior and perceptions of area enforcement (to develop rapport). Responses were entered in a tablet. Drivers were then asked to provide breath and oral fluid samples. In this 2017 roadside survey, 339 drivers were directed into the bay for initial screening, 252 drivers were eligible and consented to the survey, and 215 drivers completed the survey. The sample of completes skewed young and male, with 53% of respondents under age 35 and 69% of the respondents being male. Out of the 215 participating drivers, 197 drivers (91.6%) provided a breath sample for measuring their BrAC and 183 drivers (85.1%) consented to providing a saliva sample for drug testing.

Categories of drugs tested included: marijuana, opioids, sedatives, stimulants, antidepressants, and narcotic analgesics. Oral fluid was used because it can be analyzed to indicate recent cannabis use by identification of the psychoactive substance, delta9-tetrahydrocannabinol (THC). The oral fluid was tested using immunoassay for an initial screening test with a cut-off of 4 nanograms per milliliter (ng/mL) and, if positive, quantitatively confirmed using liquid chromatography with tandem mass spectral detection (LC-MS-MS) at a cutoff level of 2 ng/mL. At these test levels, THC is detectable for a few hours after marijuana use. After each drug analysis, the saliva sample was destroyed.

The results from this roadside survey provided objective biological information on the prevalence of impaired driving on Miami-Dade County roads on weekend nights and the prevalence rates of DUI by alcohol, THC, other drugs, and by a combination of drugs. This information is needed to understand whether DUI has decreased over the time period in which DUI arrests have decreased. If DUI on the roads has decreased, it stands to reason that DUI arrests would also decrease.

Focus Group Discussions with Police and Prosecutors

Focus group discussions are generally held with key informants in an effort to tease out attitudes, opinions and descriptions of strategies to solve a problem or a number of problems. The problem in this study is the substantial decline in DUI arrests in Miami-Dade County over the past 3-7 years. The premise is that police officers who enforce DUI laws should be aware of some of the reasons and should have opinions on how to deal with the problem. The goal of the focus groups was to talk with 5-7 participants at the same time to discuss the problem and to ask general and specific questions about the issue. This

allowed for comments to be shared with all participants as points of agreement or disagreement and as a reminder of personal experiences that were shared with the group. Participants were told that their names and any other identifying information would not be documented in the focus group report. This is to elicit honest, blunt and critical remarks. The common agreed upon focus group remarks were translated into constructive recommendations.

In two different sessions, we held focus group discussions with Miami-Dade police officers and Miami-Dade DUI prosecutors.

Each participant was recommended to attend this focus group session by officials from the State Attorney's Office or a retired Sergeant in the Miami-Dade County Police Department via an e-mail invitation or a telephone call from NORC with detailed information. They were assured that information discussed would not be associated with anyone attending the session and participants were asked to also keep comments confidential. Attendees received a meal and parking reimbursement, if needed, for their participation. They were told that notes would be taken and that comments would be summarized with no identifying information included in the summary reports.

Results

DUI Arrests and DUI Crashes

DUI arrests and DUI crashes in Miami-Dade County were examined over several years (Fell, Tanenbaum & Chelluri, 2018). While there is a general declining trend, the abrupt decline in DUI arrests in Miami-Dade County needs further exploration. DUI arrests declined from 5,410 in the county in 2009 to 1,974 in 2016, a 64% decline. This decline was statistically significant ($p<0.001$). The coefficient for the trend line was -39.735. This was an unprecedented decline and the basic reason for this study. In contrast, the decline in DUI arrests in the State of Florida as a whole went from 53,004 in 2009 to 35,042 in 2016, a 34% decline. The difference in differences analyses shows a 4.64% decrease in the overall DUI arrests made in Miami-Dade County relative to the state of Florida, which was statistically significant (p-value=0.002). Nationally, DUI arrests decreased from 1,440,409 in 2009 to 1,017,808 in 2016, a 29% decrease. There was also a 4.04% decrease in the overall DUI arrests made in Miami-Dade County relative to the rest of the United States, which was also statistically significant (p-value=0.001). So while the actual number of DUI arrests in the data used for this project do not match the Miami Herald article arrest numbers, the trend in the decline of DUI arrests was found to be very similar. See Table 2.

Table 2. DUI Arrests for 2009-2016

Year	Miami-Dade County	Florida	United States
2009	5,410	53,004	1,440,409
2010	4,339	52,346	1,412,223
2011	3,490	43,784	1,215,077
2012	3,142	44,894	1,282,957
2013	2,656	41,994	1,166,824
2014	2,620	42,745	1,117,852
2015	2,222	31,783	1,089,171
2016	1,974	35,042	1,017,808

Alcohol-impaired driving related fatal crashes have increased as can be seen in Table 3.

Table 3. Miami-Dade Fatality Analysis Reporting System Analyses

	2010	2011	2012	2013	2014	2015	2016
Fatal crashes	227	223	217	212	268	316	279
Fatal crashes BAC >= 0.08	66 (29%)	77 (35%)	73 (34%)	63 (30%)	81 (30%)	100 (32%)	76 (27%)
Traffic fatalities	246	247	235	225	280	340	294
Traffic fatalities BAC >= 0.08	69 (28%)	89 (36%)	82 (35%)	65 (29%)	90 (32%)	111 (33%)	80 (27%)

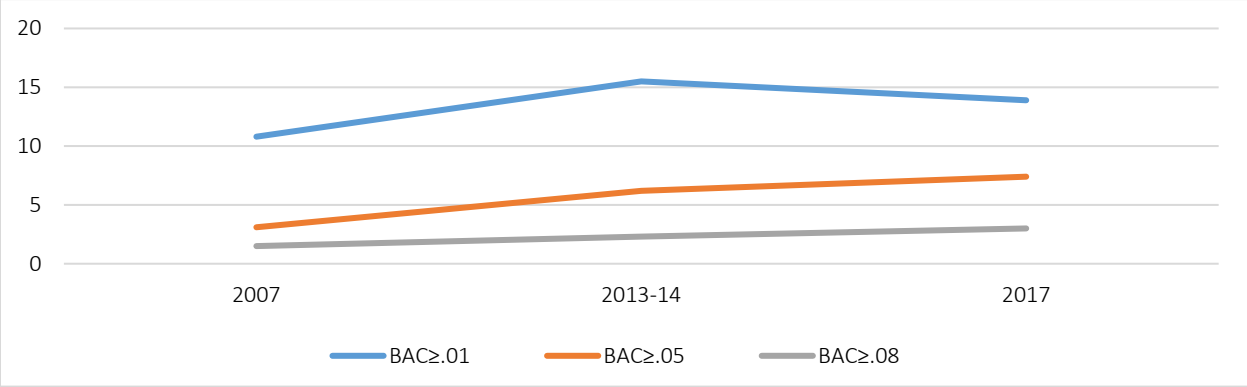
Roadside Surveys

To determine the percent of drivers out driving in Miami-Dade County on Friday and Saturday nights who had alcohol and/or other drugs in their system, roadside surveys with approximately 200 drivers were analyzed. The 2017 roadside survey findings were compared with prior roadside surveys conducted in Miami-Dade County in 2007 and 2013-2014 to explore the trend in actual impaired driving over that time period (Fell, 2018). The percent of drivers impaired by alcohol (breath alcohol concentration (BrAC)>.05 grams per deciliter (g/dL)) in these roadside surveys increased from 3.1% in 2007 to 6.2% in 2013-2014 to 7.4% in 2017. See Table 4 and Figure 3.

Table 4. Percent Drivers in Miami-Dade Roadside Surveys with Alcohol by Year

	2007	2013-2014	2017
Some Alcohol (BrAC≥.01)	10.8%	15.5%	14.2%
Impairment (BrAC≥.05)	3.1%	6.2%	7.6%
Illegal (BrAC≥.08)	1.5%	2.3%	3.0%

Figure 3. Percent Drivers in Miami-Dade Roadside Surveys with Alcohol by Year



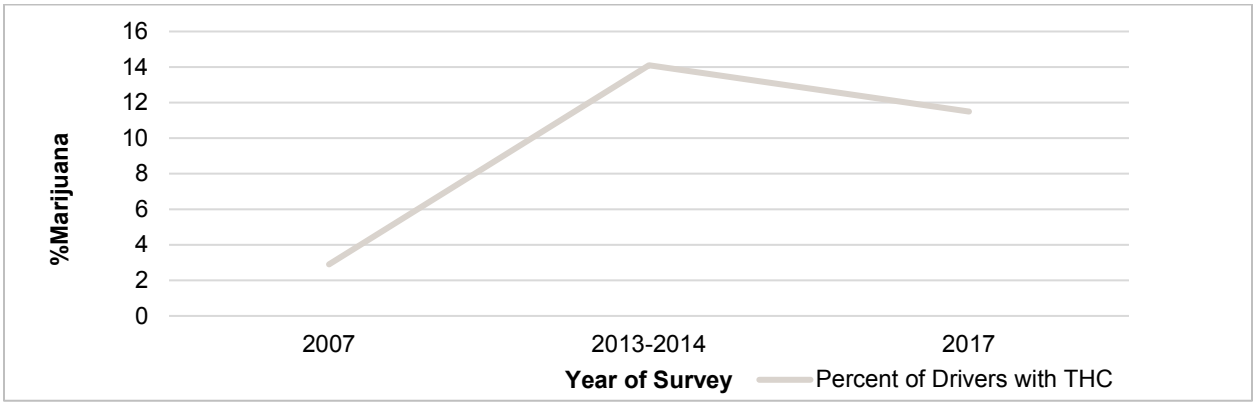
The percent of drivers with marijuana in their systems also increased from 2.9% in 2007 to 14.1% in 2013-2014, but decreased slightly to 11.5% in 2017. See Table 5 and Figure 4.

Of the drivers who tested positive for marijuana, none were found to test positive for marijuana and alcohol in previous roadside surveys. However, in the 2017 roadside survey, 5 out of the 21 drivers (24%) testing positive for marijuana had also ingested alcohol (2 drivers with BrACs>.08; 2 drivers with BrACs>.05, but <.08, and 1 driver with BrAC<.05). Alcohol-impaired drivers in the roadside 2017 survey tended to be young (aged 24-35), male and White with a greater percent of Latino drivers with BACs≥.08. Drivers with THC in their systems tended to be even younger (aged 18-24), male, White and Latino. Therefore, this roadside survey determined from biological specimens that impaired driving from alcohol and marijuana is increasing in Miami-Dade County.

Table 5. Percent of Nighttime Drivers in Miami-Dade County Roadside Surveys with Marijuana by Year

	2007	2013-2014	2017
Percent Drivers with Marijuana	2.9%	14.1%	11.5%

Figure 4. Percent of Nighttime Drivers in Miami-Dade Roadside Surveys with Marijuana by Year



Concerning drugs other than alcohol and marijuana, Table 5a shows the percent of drivers in the roadside surveys with various other drugs. No trends were discerned from these percentages and the percentages of drivers with drugs other than marijuana and alcohol were very small.

Table 5a: Percent of Nighttime Drivers in Miami-Dade County Roadside Surveys with Drugs by Year

	2007	2013-2014	2017 (n=183)
Percent Drivers with Marijuana only	4.0%	14.81%	9.29%
Percent Drivers with Stimulants only	3.0%	2.47%	2.73%
Percent Drivers with Opioids only	0.0%	1.2%	0.55%
Percent Drivers with More than One Drug	0.5%	3.7%	2.73%
Percent Drivers with All Other Drugs	0.0%	3.7%	1.64%
Percent Drivers with Antidepressants only	0.0%	1.2%	0.0%
Percent Drivers Testing Negative	93.0%	74.1%	83.06%

Telephone Survey

From the telephone survey, of those who reported drinking alcohol (406), 39% of males reported drinking and driving compared to 24% of females while 30% of Latinos reported drinking and driving compared to 47% of non-Latinos. Respondents who reported drinking and driving were significantly more likely to be male, non-Latino, and younger than respondents who did not report this behavior. Almost 5% of respondents reported driving within 2 hours of using marijuana which included 14% of respondents aged 18-24. Respondents were asked if they thought driving under the influence of drugs other than alcohol was a problem in Miami-Dade County: 52% said it was a problem equal to alcohol; 29% said it was a greater problem than alcohol; 14% said it was not a problem or a smaller problem than alcohol. When asked how important it was for Miami-Dade County to enforce drinking and drugged driving more strictly, 82% said it was very important. These results indicate that most drivers in Miami-Dade County think drugged and drunk driving are a problem and that it is important to enforce this DUI behavior. See Table 6.

Table 6. Respondents who find it is very important for Miami-Dade County to enforce drinking and drugged driving more strictly.

Category	N	Percent (%)
Male	358	77%
Female	248	87%
Latino	433	80%
Non-Latino	167	85%
18-24 years old	62	72%
25-34 years old	115	77%
35 to 39 years old	62	81%
40 to 49 years old	118	81%
50 to 54 years old	62	90%
55 to 64 years old	94	83%
65 years or older	93	86%

Focus Group Discussions with Miami-Dade County Police Officers and Prosecutors

After reviewing the results of the DUI arrest analyses, the roadside survey alcohol and drug percentages, and the telephone survey attitudes, opinions and reported behaviors, focus group discussions with Miami-Dade County police officers and prosecutors were analyzed to document their opinions on why DUI arrests have decreased so substantially in the past few years and their recommendations to improve the enforcement of alcohol and other drug impaired driving.

The law enforcement officers and the prosecutors who participated in the focus group discussions were very much aware of the substantial drop in DUI arrests over the past few years in Miami-Dade County, but they were not aware of the fatal crash data analyses, the roadside survey results, or most of the telephone survey results. They were not aware that impaired driving by these other measures was increasing or at least not going down in Miami-Dade County.

The police officers expressed more frustration with the issue of declining DUI arrests than the prosecutors. The police officers felt that lack of leadership from the agency chiefs, new priorities and officer reluctance to arrest DUIs and the "Back on Track" diversion program were the leading reasons for the decline in DUI arrests. The prosecutors felt more like lack of police training, officer apathy, the dislike of the "Back on Track" program, and the attitudes of jurors played a key role.

While there were many suggestions on how to improve the DUI arrest issue, there were no "silver bullets" that emerged. That is, no one solution was evident.

There was a consensus opinion on some issues. Regarding reasons for the decline in DUI arrests:

1. Law enforcement apathy
2. No leadership from the top
3. Lack of DUI investigation training

4. The "Ferguson" effect (reluctance to make traffic stops)

Other plausible reasons discussed included:

1. Lack of the number of police officers in each agency
2. Change in strategy from being "proactive" to "reactive"
3. Lack of federal and state grant funding
4. Lack of confidence in the DUI arrest process
5. Perception by officers that the "Back on Track" program is a mere "slap on the wrist."
6. Lack of well-trained and up-to-date DREs

These are not insurmountable barriers. Officers will make DUI arrests and conduct sobriety checkpoints if required by the agency police chiefs. The State Attorney's Office could help by developing DUI arrest training programs for officers. If DUI recidivism for program participants is low, the "Back on Track" program might be perceived in a better light by police.

Recommendations emanating from these discussions include:

1. Brief all Miami-Dade County police chiefs on the results of this study. Demonstrate that DUI is a big public health problem in the county and deserves their attention.
2. Recommend that police chiefs organize an interagency DUI Task Force of 5-7 officers who are dedicated solely to DUI enforcement.
3. Encourage and provide incentives for officers to take DUI trainings (e.g., SFST; ARIDE) and also to become DREs.
4. Discuss the "Back on Track" program with law enforcement agencies so that they understand the purpose of the program.
5. Determine the recidivism rate of the DUI offenders who complete the "Back on Track" program and, if recidivism is low, inform police agencies. However, if recidivism is high or the same, look to make improvements to the program. Continually evaluate the program as laws change and marijuana is legalized.
6. Miami-Dade County police agencies should apply for federal and state grants for increasing DUI enforcement and conducting sobriety checkpoints.
7. Increase the number of sobriety checkpoints in the county to make up for the lack of traffic stops ("Ferguson Effect"). Checkpoints are safer for both the drivers going through them and the police officers conducting them.
8. Adopt legislation that makes the sanctions for a BAC test refusal more severe so offenders will stop opting for that choice.
9. Increase dialogue between those making DUI arrests and those prosecuting DUI cases so that officers include key factors needed for prosecution in all DUI arrest reports.
10. Provide additional community education informing the public that a BAC of .08 is severely impaired. A BAC of .08 is not from one or two drinks, it is from four or five drinks.

If DUI arrests can increase in the future in Miami-Dade County, studies show that a 10% increase in the DUI arrest rate is associated with a 1% decrease in alcohol-related crashes (Fell, et al., 2014) and that increases in the DUI arrest rate per 10,000 population are associated with fewer impaired drivers on the roads (Fell et al., 2015).

Conclusions

It is clear that DUI arrests have decreased significantly in Miami-Dade County over the past 8 years (64%), much more than the decrease in DUI arrests in Florida and the United States. It is also clear from crash analyses and roadside surveys that alcohol-impaired and drug-impaired driving have increased over that time period. Instead of decreasing, DUI arrests should be increasing. An overwhelming majority of Miami-Dade County drivers (82%) believe it is very important for law enforcement to enforce DUI laws.

From the data analyses and the roadside surveys, there is no evidence that ridesharing has reduced impaired driving in Miami-Dade County. Impaired driving is actually increasing. Therefore, the decrease in DUI arrests is not due to fewer impaired drivers out on Miami-Dade County roads or involved in crashes.

Miami-Dade County drivers who report driving while impaired tend to be non-Latino males and younger than drivers who do not report DUI. The perception of Miami-Dade drivers is that it is very likely they will be stopped and arrested for DUI if they drive impaired by alcohol or other drugs. This implies that an increase in visible DUI (sobriety checkpoints) and visible traffic stops (for speeding, running red lights, weaving) will increase the general deterrent effect of this enforcement.

Only about half of the drivers surveyed by telephone thought that marijuana impairs the ability to drive. Certainly more public education and media announcements will increase this perception. Publicizing marijuana impaired driving arrests will also help in this regard. The 2017 roadside survey indicated that a large percent of young Latinos are driving with marijuana in their systems (10%) and that 13% of female drivers had drugs of some sort other than alcohol.

Focus group discussions with law enforcement officers and prosecutors indicated that four factors played a role in the substantial decrease in DUI arrests since 2009: (1) lack of priority and leadership from the police chiefs regarding enforcing DUI; (2) law enforcement apathy toward making DUI arrests; (3) a lack of DUI arrest procedures training; and (4) reluctance of police to make traffic stops (the "Ferguson effect"). Other reasons brought out in focus groups include:

- Loss of the numbers of police officers in some agencies
- A change in law enforcement strategy from "proactive" to "reactive"
- Lack of state and federal grant funding
- Lack of confidence by many officers in the DUI arrest process
- Perception that the "Back on Track" program is a mere "slap on the wrist" sanction for DUI
- Lack of well-trained and up-to-date Drug Recognition Experts (DREs)

Recommendations

1. As DUI by alcohol and marijuana continues to occur at high rates in Miami-Dade County, leaders of law enforcement agencies and in the State Attorney' Office should be made aware of the data in this report. DUI arrests have declined while DUI on the roads and in crashes in the county have increased over the past 7 years. Annual impaired driving fatalities in the county have ranged from 65 to 111 during the past 7 years. These numbers certainly rival deaths in the county due to other crime and should signal an important public safety problem.
2. Increase the number of sobriety checkpoints in the county to initially make up for the lack of traffic stops and DUI arrests. Sobriety checkpoints are a proven effective general deterrent to impaired driving. Checkpoints are safer for both the drivers going through the checkpoint and the police officers conducting them. Their conduct will counter the so-called "Ferguson Effect."
3. The State Attorney's Office, in conjunction with veteran DUI enforcement police officers, should offer training on DUI enforcement to all police agencies in the county.
4. Miami-Dade police agencies should apply for federal and state grants in order to gain additional funding for DUI enforcement, sobriety checkpoints and DUI enforcement equipment (e.g., breath testing equipment).
5. Organize an inter-agency DUI task force of 5-7 officers who are dedicated solely to DUI enforcement. This has been effective in Washington State and Maryland.
6. Provide more information and education on the "Back on Track" diversion program to law enforcement officers so there is better understanding of the purpose and the criteria for eligibility.
7. Any DUI enforcement in the county should be accompanied by publicity concerning the enforcement (saturation patrols, sobriety checkpoints, special DUI task force) especially using social media (Facebook, Twitter, etc.). This will especially reach young drivers who are overrepresented as alcohol and drug impaired drivers.
8. About half the drivers in Miami-Dade County surveyed by telephone or by roadside surveys did not think marijuana impaired driving performance. Marijuana (THC) has been shown in numerous laboratory experiments to affect alertness, concentration, coordination, judgement and reaction time. More education for drivers in terms of public service announcements and websites on the internet may change that perception.

Future Research

In order to keep track of any changes in impaired driving in Miami-Dade County and determine if any countermeasures are working, the following future research is recommended:

- Conduct another telephone and another roadside survey in 2020 or 2021 in Miami-Dade County to determine any changes and any progress.
- Compare DUI arrest rates, roadside survey alcohol and drug prevalence rates, and reported attitudes and behaviors via telephone surveys in one or two other large counties in Florida to compare to the Miami-Dade County rates. If there are differences, determine why.

- Evaluate the "Back on Track" program to determine if the recidivism of offenders assigned to the program has decreased compared to other alternative sanctions.

Action Plan

1. The State Attorney's Office, the Miami Foundation or another appropriate Miami-Dade County agency should organize a one-day meeting with police chiefs or their designated leaders from all law enforcement agencies and key prosecutors who handle DUI arrest cases to present the important parts of this report and discuss plans to address the DUI issue. DUI is an important public safety problem in the county, the public believes that DUI enforcement is important, and the data indicate that DUI is increasing. Police chiefs need to deal with law enforcement apathy toward DUI and persuade their traffic enforcement officers to be proactive rather than reactive when it comes to impaired driving. There is an average of almost 2 traffic crash fatalities per week in the county due to impaired driving. If DUI arrest rates can increase 10%, there is evidence that DUI crashes can be decreased 1%.
2. To help overcome the so-called "Ferguson Effect", the reluctance of police to make traffic stops, police agencies in Miami-Dade County should join forces to conduct more sobriety checkpoints. Checkpoints are safer for both the police and the drivers going through them. The checkpoints are also better general deterrents to impaired driving than traffic stops or saturation patrols. Checkpoints can be conducted efficiently if law enforcement officers from several agencies send one or two officers to help conduct them. If passive alcohol sensors are used to assess if the drivers are drinking in the checkpoints, more impaired drivers will be detected. The police chiefs in each agency in the county can make this happen. The Florida State Police should take the lead.
3. Since many police officers in Miami-Dade County are not familiar with the DUI detection and arrest process, the State Attorney's Office, in conjunction with the Miami-Dade County DRE officers, should design and offer training on DUI enforcement to all traffic enforcement officers in the proper procedures. Veteran DUI enforcement officers should help with this training also. As officers gain more confidence in their DUI enforcement abilities, more drivers will be detected and arrested who drive impaired. The "Visual Detection of DWI Motorists" pamphlet can help in this regard (see Appendix A).
4. In order to gain more DUI enforcement resources, Miami-Dade County police agencies should apply for grants from the Florida Highway Safety Office, or from the National Highway Traffic Safety Administration (NHTSA), or from the International Association of Chiefs of Police (IACP) during their "Chiefs Challenge", or from the Florida Highway Patrol. The purchase of passive alcohol sensors, sobriety checkpoint signs and equipment, alcohol breath testers, lap top computers and other equipment can be procured via these grants. The individual police agencies do not have to take on the entire burden when DUI enforcement increases.

5. Similar to the TZT program in the State of Washington and the SPIDRE program in Maryland, an interagency DUI task force or team of 5 to 7 officers should be established. These officers would be solely dedicated to DUI enforcement and paid for by each individual agency or under a grant from the state or federal government. The Florida Highway Patrol and several individual police chiefs should take the lead on this action. The programs in Washington and Maryland have been highly effective and cost beneficial.
6. A seminar or workshop on how the "Back on Track" program works should be developed and conducted by the State Attorney's Office for the DUI enforcement officers in Miami-Dade County. DUI Officers need a better understanding of the eligibility criteria, the components of the program and the offender completion rate. There are misconceptions by many of the county police officers on how the program works and which offenders are assigned to it and no information on how successful the program is in reducing DUI recidivism.
7. As DUI enforcement increases in Miami-Dade County, it should be accompanied by publicity, especially using social media (e.g. Facebook and Twitter). It has been shown in the research that public information about DUI enforcement strategies (sobriety checkpoints; saturation patrols, special DUI task forces) enhances the general deterrent effect of the enforcement. The public must see the enforcement (visibility), and/or hear about the enforcement (publicity), and/or experience the enforcement (go through a checkpoint) if their perception of being caught if they drive impaired increases to the point where they stop the behavior.
8. An education program about the impairing effects of marijuana (THC) on driving performance should be developed and delivered as a public service announcement (PSA) for Miami-Dade County drivers. This could be accomplished by the Florida Public Health Department, and/or the Florida Department of Transportation, and/or the Florida agency that deals with drug abuse. Almost half of Florida drivers in the telephone survey and roadside survey believe that marijuana does not impair driving performance.
9. The State Attorney's Fund for a Safer and Healthier Community at The Miami Foundation funded drug recognition and evaluation (DRE) training for 20 Miami-Dade County law enforcement officers in 2016 and 10 more officers in 2017. Miami-Dade police agencies should make every effort to increase the number of trained and certified drug recognition experts in their agency. As the number of people in Florida who use medical marijuana increases and as the number of recreational users of marijuana increases, more and more drivers on the roads in Miami-Dade County are going to be marijuana impaired. The use of DREs when a suspected marijuana impaired driver is stopped by a non-DRE officer is going to inevitably increase.
10. If DUI enforcement is going to increase significantly in Miami-Dade County, then drivers who do drink are going to need better and more convenient alternatives. The Florida Highway Safety Office and the State Attorney's Office in the county should support policies and programs that increase the availability, convenience, affordability and safety of transportation alternatives for drinkers who might drive otherwise. This includes transportation ride sharing e.g., Uber and Lyft), enhancing other public transportation options (especially during nighttime and weekend hours) and boosting or incentivizing transportation alternatives in the densely populated bar districts of the county.

In summary, DUI arrests have decreased 64% in Miami-Dade County since 2009. This is a significantly larger decrease than has occurred in the State of Florida as a whole (34%) and in the United States (29%) over the same time period. This decline is not due to any decline in DUI behavior in the county. In fact, the data indicate an increase in impaired driving on county roads, in crashes, and in fatal crashes.

Discussions with police and prosecutors in the county reveal police apathy toward DUI enforcement, lack of DUI enforcement training, and lack of leadership from the top. Police officers need to become proactive rather than reactive toward DUI in the county. The above actions, if implemented, promise to change the culture in Miami-Dade County and get DUI enforcement "back on track."

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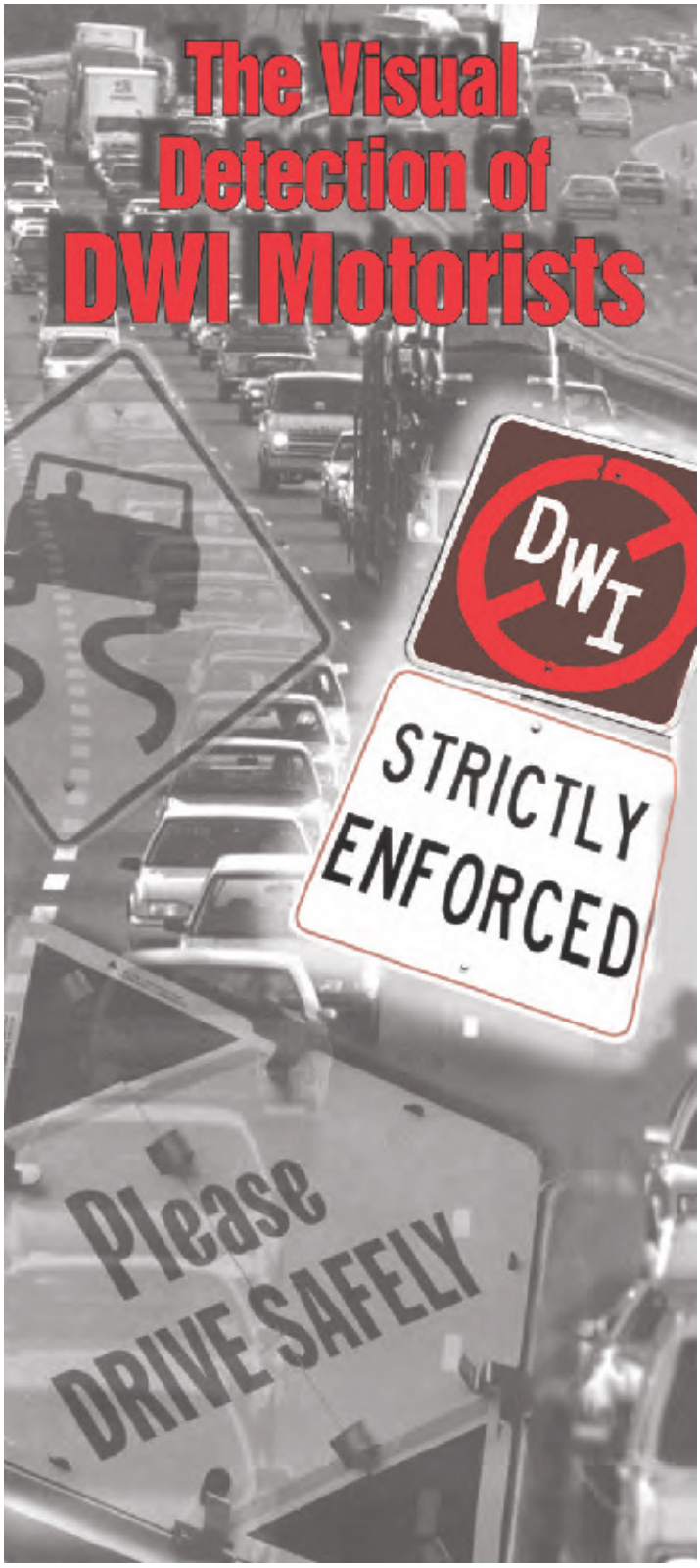
Appendix A. Visual Detection of DWI



The Visual Detection of DWI Motorists

U.S. Department of Transportation
National Highway Traffic Safety Administration

DOT HS 808 677

INTRODUCTION

More than a million people have died in traffic crashes in the United States since 1966, the year of the National Traffic and Motor Vehicle Safety Act, which led to the creation of the National Highway Traffic Safety Administration (NHTSA).

During the late 1960's and early 1970's more than 50,000 people lost their lives each year on our nation's streets, roads and highways. Traffic safety has improved considerably since that time: the annual death toll has declined substantially, even though the numbers of drivers, vehicles, and miles driven all have increased. When miles traveled are considered, the likelihood of being killed in traffic during the 1960's was three to four times what it is today.

The proportion of all crashes in which alcohol is involved also has declined. The declines in crash risk and the numbers of alcohol-involved crashes are attributable to several factors, including the effectiveness of public information and education programs, traffic safety legislation, a general aging of the population, and law enforcement efforts.

NHTSA research contributed to the improved condition, in part, by providing law enforcement officers with useful and scientifically valid information concerning the behaviors that are most predictive of impairment. Continued enforcement of Driving While Intoxicated (DWI) laws will be a key to saving lives in the future. For this reason, NHTSA sponsored research leading to the development of a new DWI detection guide and training materials, including a new training video. Many things have changed since 1979, but like the original training materials, the new detection guide describes a set of behaviors that can be used by officers to detect motorists who are likely to be driving while impaired.

Building upon the previous NHTSA study, researchers interviewed officers from across the United States and developed a list of more than 100 driving cues that have been found to predict blood alcohol concentrations (BAC) of 0.08 percent or greater. The list was reduced to 24 cues during 3 field studies involving hundreds of officers and more than 12,000 enforcement stops. The driving behaviors identified by the officers are presented in the following four categories:

1) **Problems in maintaining proper lane position**
2) **Speed and braking problems**
3) **Vigilance problems**
4) **Judgment problems**

The cues presented in these categories predict that a driver is DWI at least 35 percent of the time. For example, if you observe a driver to be weaving or weaving across lane lines, the probability of DWI is more than .50 or 50 percent. However, if you observe either of the weaving cues and any other cue listed in this booklet, the probability of DWI jumps to at least .65 or 65 percent. Observing any two cues other than weaving indicates a probability of DWI of at least 50 percent. Some cues, such as swerving, accelerating for no reason, and driving on other than the designated roadway, have single-cue probabilities greater than 70 percent. Generally, the probability of DWI increases substantially when a driver exhibits more than one of the cues.

This booklet contains:

- **The DWI Detection Guide**
- **A summary of the research that led to the guide**
- **Explanations of the 24 driving cues**
- **A description of post-stop cues that are predictive of DWI**

The research suggests that these training materials will be helpful to officers in:

- **Detecting impaired motorists**
- **Articulating observed behaviors on arrest reports**
- **Supporting officers' expert testimony**

DWI DETECTION GUIDE

Weaving plus any other cue: p = at least .65
Any two cues: p = at least .50

Problems Maintaining Proper Lane Position **p = .50–.75**

- Weaving
- Weaving across lane lines
- Straddling a lane line
- Swerving
- Turning with a wide radius
- Drifting
- Almost striking a vehicle or other object

Speed and Braking Problems **p = .45–.70**

- Stopping problems (too far, too short, or too jerky)
- Accelerating or decelerating for no apparent reason
- Varying speed
- Slow speed (10+ mph under limit)

Vigilance Problems **p = .55–.65**

- Driving in opposing lanes or wrong way on one-way
- Slow response to traffic signals
- Slow or failure to respond to officer's signals
- Stopping in lane for no apparent reason
- Driving without headlights at night
- Failure to signal or signal inconsistent with action

Judgment Problems **p = .35–.90**

- Following too closely
- Improper or unsafe lane change
- Illegal or improper turn (too fast, jerky, sharp, etc.)
- Driving on other than the designated roadway
- Stopping inappropriately in response to officer
- Inappropriate or unusual behavior (throwing, arguing, etc.)
- Appearing to be impaired

Post Stop Cues **p ≥ .85**

- Difficulty with motor vehicle controls
- Difficulty exiting the vehicle
- Fumbling with driver's license or registration
- Repeating questions or comments
- Swaying, unsteady, or balance problems
- Leaning on the vehicle or other object
- Slurred speech
- Slow to respond to officer or officer must repeat
- Providing incorrect information, changes answers
- Odor of alcoholic beverage from the driver

p ≥ .50 when combined with any other cue:

- Driving without headlights at night
- Failure to signal or signal inconsistent with action

The probability of detecting DWI by random traffic enforcement stops at night has been found to be about 3 percent (.03).

Problems in Maintaining Proper Lane Position

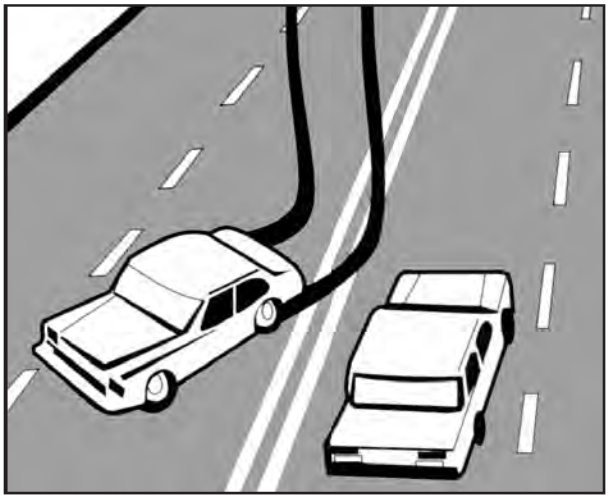
Maintaining proper lane position can be a difficult task for an impaired driver. For example, we have all, at one time, seen vehicles **weaving**. Weaving is when the vehicle alternately moves toward one side of the lane and then the other. The pattern of lateral movement can be fairly regular, as one steering correction is closely followed by another. In extreme cases, the vehicle's wheels even **cross the lane lines** before a correction is made. You might even observe a vehicle **straddling a center or lane line**. That is, the vehicle is moving straight ahead with either the right or left tires on the wrong side of the lane line or markers.

Weaving

Drifting is when a vehicle is moving in a generally straight line, but at a slight angle to the lane. The driver might correct his or her course as the vehicle approaches a lane line or other boundary or fail to correct until after a boundary has been crossed. In extreme cases, the driver fails to correct in time to avoid a collision.

Drifting

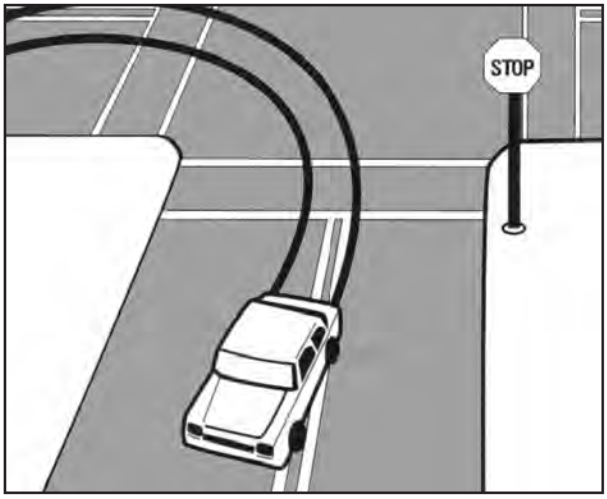
Course corrections can be gradual or abrupt. For example, you might observe a vehicle to **swerve**, making an abrupt turn away from a generally straight course, when a driver realizes that he or she has drifted out of proper lane position or to avoid a previously unnoticed hazard.



Swerving

A related DWI cue is **almost striking a vehicle or other object**. You might observe a vehicle, either at slow speeds or moving with traffic, to pass unusually close to a sign, barrier, building, or other object. This cue also includes almost striking another vehicle, either moving or parked, and causing another vehicle to maneuver to avoid a collision.

Turning with a wide radius or drifting during a curve is the final cue in this category of driver behaviors. A vehicle appears to drift to the outside of the lane or into another lane through the curve or while turning a corner. Watch for this cue, and stop the driver when you see it. Many alcohol-involved crashes are caused by an expanding turn radius or drifting out of lane position during a curve.

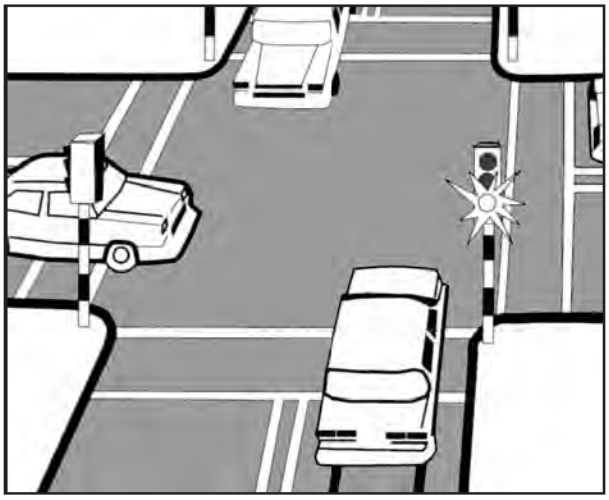


Turning With a Wide Radius

Speed and Braking Problems

The research showed that braking properly can be a difficult task for an impaired driver. For example, there is a good chance the driver is DWI if you observe any type of **stopping problem**. Stopping problems include:

- **Stopping too far from a curb or at an inappropriate angle**
- **Stopping too short or beyond a limit line**
- **Jerky or abrupt stops**



Stopping Beyond a Limit Line

Impaired drivers also can experience difficulty maintaining an appropriate speed. There is a good chance the driver is DWI if you observe a vehicle to:

- **Accelerate or decelerate rapidly for no apparent reason**
- **Vary its speed, alternating between speeding up and slowing down**
- **Be driven at a speed that is 10 miles per hour (mph) or more under the limit**

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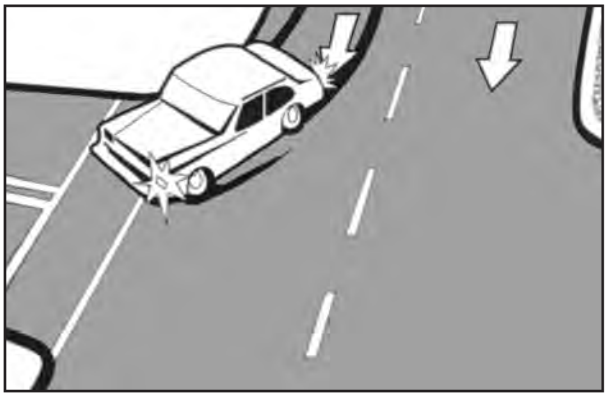
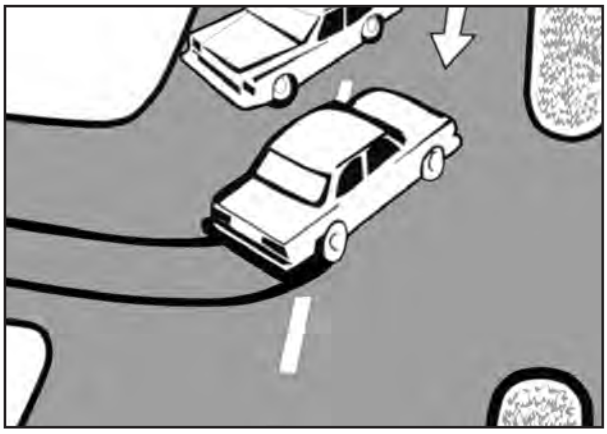
Vigilance Problems

Vigilance concerns a person's ability to pay attention to a task or notice changes in surroundings. A driver whose vigilance has been impaired by alcohol might forget to turn on his or her headlights when required. Similarly, impaired drivers often forget to signal a turn or lane change, or their signal is inconsistent with their maneuver, for example, signaling left but turning right.



Signaling Inconsistent With Driving Actions

Alcohol-impaired vigilance also results in motorists driving into opposing or crossing traffic and turning in front of oncoming vehicles with insufficient headway.



Driving Into Opposing or Crossing Traffic

Driving is a complex task that requires accurate information about surrounding traffic conditions. Failing to yield the right of way and driving the wrong way on a one way street are dangerous examples of vigilance problems.

A driver whose vigilance has been impaired by alcohol also might respond more slowly than normal to a change in a traffic signal. For example, the vehicle might remain stopped for an unusually long period of time after the signal has turned green. Similarly, an impaired driver might be unusually slow to respond to an officer's lights, siren, or hand signals.

The most extreme DWI cue in the category of vigilance problems is to find a vehicle stopped in a lane for no apparent reason. Sometimes when you observe this behavior the driver will be just lost or confused, but more than half of the time the driver will be DWI—maybe even asleep at the wheel.

Judgment Problems

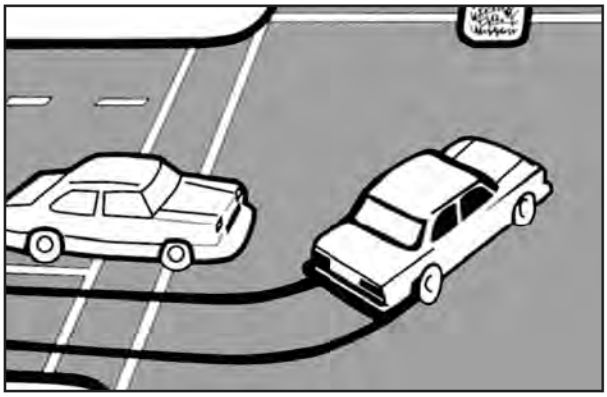
Operating a motor vehicle requires continuous decision making by the driver. Unfortunately, judgment abilities can be affected by even small amounts of alcohol. For example, alcohol-impaired judgment can cause a driver to follow another vehicle too closely, providing an unsafe stopping distance.

Alcohol-impaired judgment also can result in a driver taking risks or endangering others. If you observe a vehicle to make improper or unsafe lane changes, either frequently or abruptly or with apparent disregard for other vehicles, there is a good chance the driver's judgment has been impaired by alcohol.

Similarly, impaired judgment can cause a driver to turn improperly. For example, misjudgments about speed and the roadway can cause a driver

to take a turn too fast or to make sudden corrections during the maneuver. These corrections can appear to the observer as jerky or sharp vehicle movements during the turn.

Alcohol-impaired judgment can affect the full range of driver behaviors. For example, the research found that impaired drivers are less inhibited about making illegal turns than unimpaired drivers.



Turning Illegally

Driving on other than the designated roadway is another cue exhibited by alcohol-impaired drivers. Examples include driving at the edge of the roadway, on the shoulder, off the roadway entirely, and straight through turn-only lanes.

In some cases, impaired drivers stop inappropriately in response to an officer, either abruptly as if they had been startled or in an illegal or dangerous manner.

In fact, the research has shown that there is a good chance a driver is DWI if you observe the person exhibit *any* **inappropriate or unusual behavior**. Unusual behavior includes throwing something from the vehicle, drinking in the vehicle, urinating at the roadside, arguing with another motorist, or otherwise being disorderly. If you observe inappropriate or unusual behavior, there is a good probability that the driver is DWI.

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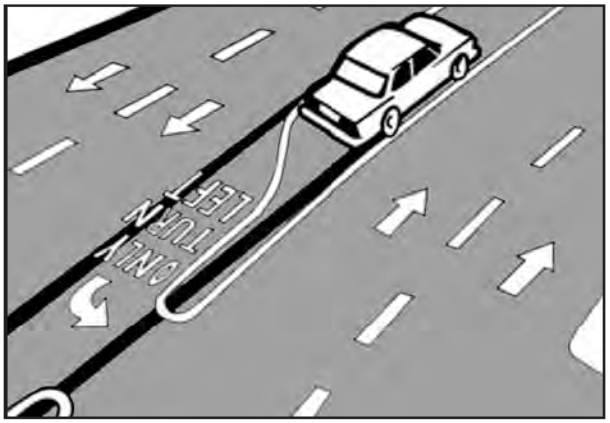

Driving on Other Than the Designated Roadway

The final cue is actually one or more of a set of indicators related to the personal behavior or appearance of a driver. These indicators include, gripping the steering wheel tightly, driving with one's face close to the windshield, slouching in the seat, and staring straight ahead with eyes fixed. Some officers routinely scrutinize the faces of drivers in oncoming traffic, looking for the indicators of impairment. If you observe a driver who **appears to be impaired**, the research showed that there is an excellent probability that you are correct in your judgment.

Appearing To Be Impaired

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SUMMARY

To summarize, the DWI cues related to **problems in maintaining proper lane position** include:

- **Weaving**
- **Weaving across lane lines**
- **Straddling a lane line**
- **Drifting**
- **Swerving**
- **Almost striking a vehicle or other object**
- **Turning with a wide radius or drifting during a curve**

The DWI cues related to **speed and braking problems** include:

- **Stopping problems (too far, too short, too jerky)**
- **Accelerating for no reason**
- **Varying speed**
- **Slow speed**

The DWI cues related to vigilance problems include:

- **Driving without headlights at night**
- **Failure to signal a turn or lane change or signaling inconsistently with actions**
- **Driving in opposing lanes or the wrong way on a one-way street**
- **Slow response to traffic signals**
- **Slow or failure to respond to officer's signals**
- **Stopping in the lane for no apparent reason**

The DWI cues related to judgment problems include:

- **Following too closely**
- **Improper or unsafe lane change**
- **Illegal or improper turn (too fast, jerky, sharp, etc.)**
- **Driving on other than the designated roadway**
- **Stopping inappropriately in response to an officer**
- **Inappropriate or unusual behavior**
- **Appearing to be impaired**

Post-Stop Cues

In addition to the driving cues, the following post-stop cues have been found to be excellent predictors of DWI.

- **Difficulty with motor vehicle controls**
- **Difficulty exiting the vehicle**
- **Fumbling with driver's license or registration**
- **Repeating questions or comments**
- **Swaying, unsteady, or balance problems**
- **Leaning on the vehicle or other object**
- **Slurred speech**
- **Slow to respond to officer or officer must repeat questions**
- **Providing incorrect information or changes answers**
- **Odor of alcoholic beverage from the driver**

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