I-95 Corridor Coalition

Ten Percenters

Final Report

July 2010

Ten Percenters

Final Report

Prepared for:

I-95 Corridor Coalition

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1.0 INTRODUCTION

This project focuses on small groups of persistent traffic violators who are responsible for a significant portion of the serious injury and fatal collisions on the highways. The primary goal of the project is to identify effective means for addressing these high-risk offenders to improve safety for the motoring public across highway I-95 (referred to as the I-95 Corridor).

These high-risk offenders have been labeled the “ten percenters” because there is some evidence that such a small percent of violators accounts for a major portion of the traffic safety problem. Although the actual percent represented by this group in a particular traffic safety problem – e.g., drinking and driving, speeding, non-use of seat belts – varies somewhat, the proportion is not sufficiently different to justify changing the highly communicative phrase “ten percenter”.

1.1 Background

The past several decades have witnessed significant declines in the number of deaths and injuries on the highways. These changes have resulted from improvements in vehicle design, the structure and performance of the highway infrastructure, and changes in driver attitudes and behavior.

There is no more powerful example to illustrate how changes in public attitudes have occurred than in the area of drinking and driving. During the 1980s and early 1990s the public’s attitude shifted from acceptance and complacency to one of intolerance and even outrage. Of greatest importance, this change in attitudes was accompanied by a change in behavior – the prevalence of drinking and driving and the incidence of alcohol-related crashes declined at unprecedented rates.

Most experts agree that these positive gains were driven primarily by the more socially responsible individuals who were drinking and driving less often and consuming less alcohol if they did drink and drive. However, by the end of the 90s and into the early part of the new millennium, progress slowed and eventually halted.

1.1.1 The hard core drinking driver. A widely accepted explanation for the fact that progress in dealing with the problem of drinking and driving halted is that the characteristics of the problem had changed. We were successful in "harvesting the low hanging fruit" but what remained was a group of drivers who did not get the message and did not change their attitudes or behavior. And, of added importance, this was the very group that posed the greatest danger on the highways because they frequently drove after drinking, usually with very high blood alcohol concentrations (BACs).

The Traffic Injury Research Foundation (TIRF) labeled this group "The Hard Core Drinking Driver" – a term and a concept that is now universally accepted in the traffic safety and criminal justice communities. Of particular pertinence to the "ten percenter program", it was demonstrated through research by TIRF and other research agencies that the hard core offender represented a small proportion of drivers but accounted for a very substantial portion of serious injury collisions.

It was also recognized that further progress in the fight against impaired driving would require programs and policies that targeted this group very specifically. They pose a special challenge because many of the traditional methods of dealing with drinking and driving do not work with them – for example, most of the hard core are impervious to measures such as license suspension. Accordingly, much of the attention of agencies dealing with drinking and driving has shifted away from traditional measures to those that will work with the hard core – measures such as vehicle impoundment, alcohol interlocks, and treatment.

In more recent years, researchers have stated that non-hard core drinking drivers contribute considerably to the problem as well and should also be a priority (Williams et al., 2007). Nevertheless, the key point is that the focus of program and policy attention has appropriately shifted toward a relatively small group of offenders who continue to violate safety and cause a disproportionate amount of the damage on the roadways – the hard core or persistent traffic offender.

Of considerable importance, the situation is not unique to drinking and driving. A similar problem appears to exist with respect to numerous other traffic safety issues including non-use of seat belts, speeding and red light running.

1.1.2 Non-use of seat belts. Efforts to increase seat belt usage have been very successful in recent years with many states achieving rates as high as 80% and even 90% in a few cases. However, getting beyond that point has proven to be very difficult; the 10%-20% who do not comply with the law are very resistant to change and vastly overrepresented in collisions. For example, although belt wearing rates might be as high as 80%, only 55% of people killed in road crashes are belted. In this context, it is important to note that wearing a seat belt does not decrease the likelihood of a collision but failing to wear a seat belt increases the risk of injuries. Not wearing a seatbelt is a behavioral problem that speaks volumes about this type of driver, i.e., drivers who are prone to risk-taking behavior.

1.1.3 Speeding. Typically, speeding is defined as traveling in excess of 15 mph over the posted limit and at least 5 mph faster than the surrounding traffic (this definition recognizes the inherent dangers of excess speed and the dangers of speed inequities). Research has demonstrated that about 5-10% of drivers fit this definition of speeding. Once again, it has also been shown that these drivers are overrepresented in crashes – indeed it has been estimated that each 6 mph (10 kph) increase above the speed limit doubles the risk of being in a crash (Evans, 2004).

1.1.4 Red light running. Although the actual prevalence of this behavior is not well documented at this time, the available research suggests that the prevalence of the behavior is about 1% which, given the large volume in traffic, represents a substantial problem. Estimates also suggest that 7% of fatalities and 8% of serious injuries take place at controlled intersections. Again, although the evidence is limited, there is a belief that the problem is mostly accounted for by a small group of persistent offenders.

1.1.5 Unlicensed drivers. Prior history of traffic violations can be a good predictor of the future risk of being involved in a crash. Many studies have shown that drivers with poor driving records have a greater risk of being involved in a crash. License suspensions and revocations typically occur as a form of punishment for more serious traffic offenses or repeat offenses, and thus, serve as an indicator of high-risk driving behaviour (Beirness and Simpson, 1997; CCMTA, 2006). According to NHSTA (2008b), when license status was known, 13.4% of drivers and motorcycle riders involved in fatal crashes in 2008 had an invalid license.

There is no reason to assume that this situation does not hold with respect to other unsafe driving practices – a small core of offenders do not comply with the law and account for a majority of the serious injuries and fatalities.

1.1.6 The ten percenter problem. In summary, a relatively small group of individuals consistently cause a very large portion of the damage on the highways (Simpson et al., 2004; Mayhew et al., 2010; Beirness and Simpson, 1997; Simpson and Mayhew, 1991; Williams et al., 2007). Although the proportion of persistent offenders varies as a function of the safety issue (for example, the group of hard core drinking drivers is actually less than 1%; the group of non-seat belt wearers is in excess of 10%), it is convenient from a communication perspective to refer to them collectively as the ten percenters. This label efficiently captures the concept.

This group of persistent offenders has not, until recently, received the attention needed, so data on the dimensions of the problem are limited. This project seeks to overcome such shortcomings and to determine how to deal effectively with this group. There is little doubt they will be a challenge to deal with – they are hard to reach and hard to change – but it is essential that they are dealt with effectively because of their contribution to the road toll.

1.2 Goals and Objectives

The major goal of this project is to address the problem of the ten percenters or high-risk drivers, in order to improve safety for the traveling public. The ultimate objective is to produce a set of best practices for State Departments of Transportation (DOTs), criminal justice agencies and other safety organizations for dealing effectively with the persistent high-risk drivers. The rationale for this objective is that significant reductions in deaths, injuries, and traffic infractions can result with the implementation of effective best practices, thus protecting the public and improving the efficient flow of transportation within the I-95 Corridor.

The project tasks were organized to answer the following set of key questions:

- Who are the high-risk drivers and to what extent do they contribute to traffic safety problems?
- Are there differences in the extent and characteristics of the high-risk drivers across jurisdictions in the I-95 Corridor?

- What safety strategies and programs are currently in place to deal with high-risk drivers, both within I-95 Coalition states and the District of Columbia as well as other states and countries?
- What are the best practices for dealing effectively with these high-risk drivers?

1.3 Problem Definition

The first task in this project was to develop a working definition of the ten percenters to guide the remainder of the project. It is essential that a definition is established in advance of efforts to determine the magnitude and characteristics of the problem.

The definition(s) selected for use in this project are provided below. They are derived from the reports listed in the bibliography. Each definition draws most heavily on three documents – a report from the High-Risk Driver Taskforce of the Canadian Council of Motor Transport Administrators (CCMTA), a "Study of the profile of high-risk drivers" by Beirness and Simpson (1997), and a report on "High Risk Drivers: A Literature Review", by Vezina (2001).

1.3.1 Working definition of high-risk driving behavior: any driving-related behavior that significantly increases the risk of being involved in a crash, or increases the risk of injury in the event of a crash. Major risk behaviors include: drinking and driving, speeding, non-use of seat belts, running of red lights or stop signs.

1.3.2 Working definition of high-risk drivers (aka the ten percenters): drivers who persistently engage in one or more of the dangerous, risky and illegal driving behaviors, and are not easily affected by persuasive or deterrent measures. They are at the higher, more deviant end of the spectrum of the high-risk driving behaviors, creating a greater risk on the road.

1.3.3 Operational definition of high-risk drivers: a driver who had a BAC of 0.16% or above at the time of the crash, or refused to provide a breath sample, or has been involved in three distinct events (violations or crashes) in the previous 3-year period**.** These events include:

- impaired driving offenses;
- speed violations;
- other types of moving violations;
- previously recorded crash(es); or,
- license suspensions.

2.0 METHODOLOGY

To gain a better understanding of the magnitude and characteristics of the ten percenters or high-risk driver problem, state crash data files and state driver record data were analyzed. It was originally anticipated that the driver record files and collision files of several member jurisdictions of the I-95 Corridor Coalition could be obtained and merged to permit TIRF to determine whether drivers fit the working definition of a “ten percenter”. However, this proved to be unworkable because considerable difficulty was encountered in obtaining state crash and driver record information (for example due to privacy issues). In particular, the crash data received from select states lacked sufficient detail to permit the identification of high-risk drivers, and driver record data were received from only three member states – Florida, Virginia and Georgia.

Accordingly, an alternative analytic strategy was developed. This strategy involved three separate sets of analyses (described in Sections 3, 4, and 5 of this report). The first took advantage of data that are available for each of the coalition states by using the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS). These analyses examined the magnitude of the problem of high-risk drivers by determining how many of the fatal crashes were accounted for by this group. As well, drivers in the data base were divided into two groups on the basis of the operational definition of a high-risk driver, and comparisons were made between the collisions involving high-risk drivers and those involving non high-risk drivers.

The difficulty with this first analysis was that drivers could be identified as high-risk using all the agreed-to criteria except BAC at the time of arrest (much of these data are missing in FARS). As a consequence, the first analysis would not identify as many high-risk drivers as there actually were since many would be excluded because no BAC data were available. To overcome this problem, the second analysis created a BAC value where it was missing using a well established imputation procedure (StataCorp, 2009; NHSTA, 2008a; Dang, 2008). This inclusion of BAC data effectively increased the number of high-risk drivers. Again, this group was compared to non high-risk drivers in terms of the characteristics of their collisions.

Finally, it is recognized that using a fatal crash database is different than looking at all licensed drivers and then determining what percentage of them are high-risk. Accordingly, the third analysis relied on driver record data from Florida, Virginia and Georgia to estimate the magnitude of the high-risk driver problem.

2.1 Primary Features and Characteristics of Databases

As described above, two types of databases were used in the analyses for the I-95 Ten Percenters Project – the FARS data and state driver record data from Florida, Virginia and Georgia. The FARS data system documents fatal crashes occurring within the 50 states, the District of Columbia, and Puerto Rico. However, only states in the I-95 Corridor and the District of Columbia were included in the FARS analyses. The state driver record databases document the driving history of drivers.

2.1.1 Fatality Analysis Reporting System (FARS). NHTSA has been collecting information regarding fatal crashes occurring in the United States since 1975. This FARS database, which is essentially a census of all fatal crashes occurring on public roads in the U.S. was downloaded from the NHTSA website (http://www-fars.nhtsa.dot.gov/). The FARS data are categorized by all 50 states as well as the District of Columbia. All collisions in which at least one vehicle occupant or non-occupant (i.e., pedestrian, bicyclist) was killed are included in the FARS database (NHTSA, 2008a).

The FARS database contains three principal files, namely the Accident, Vehicle, and Person files. These files include information about the crash (e.g., road characteristics, time, weather), the vehicles involved (e.g., type of vehicle, year of manufacture), and the persons involved (e.g., age, gender, belt use, driver condition). Also included in the Person file are driver record data on previous collisions, offenses, and suspensions in the three years prior to the fatal collision. These three files were merged to form one database for the purposes of this project. Data from the years 2005, 2006 and 2007 were appended and used in the analyses.

Table 2.1.1.1 shows the percentage of fatal crashes that occurred in each of 2005, 2006 and 2007 for five regions (jurisdictions along the I-95 Corridor were grouped into five regions for the purposes of the analysis — see Table 3.1.1 for an overview of jurisdictions). In four of the regions, the percentage of total fatal crashes declined slightly with each year indicating that

the number of fatal crashes declined over this period. The only exception was the South region where the percentage decreased in 2006 and then increased somewhat in 2007 (but it was still lower than 2005). Since the three years were still fairly similar in numbers of fatal crashes for all regions, it was considered reasonable to combine the three years of data.

Table 2.1.1.1: Percentage of fatal collisions by year and region

Year	New England	North	Central	South	Florida	Total	Overall %
2005	35.09%	34.14%	33.53%	33.65%	35.15%	31572	34.24%
2006	33.88%	33.58%	33.28%	32.95%	33.54%	30764	33.36%
2007	31.03%	32.28%	33.19%	33.40%	31.31%	29871	32.40%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	92207	100.00%

Total	7151	23587	10565	28263	22641	92207
Overall %	7.76%	25.58%	11.46%	30.65%	24.55%	100.00%

There are some limitations associated with the FARS database. The FARS data only record information for fatal crashes, in other words, crashes that have resulted in the death of a person, either a vehicle occupant or non-motorist, within 30 days of the crash. It should be noted that there is a relatively high percentage of missing data or “Don’t knows” for some of the variables in the database. This, to some extent, undermines the quality and usefulness of these variables. In particular, alcohol data in FARS are often missing due to the low testing rates of fatally injured drivers in many jurisdictions. To address this limitation, NHTSA relies upon Rubin’s multiple imputation process to create sound statistical estimates for the missing BAC values. NHTSA uses a variety of characteristics including police-reported drinking, age, gender, restraint use, type of crash, time of day, and driver of striking or struck vehicle to determine a distribution of alcohol consumption for each missing data point. The distribution of possible BAC values (10 for each missing BAC value) is then used in the analyses. In other words, it is as if the analyses are conducted ten times, each time replacing the missing BAC value with a replacement value coming from the distribution of possible BAC values. This multiple imputation method summarizes the results for each of the ten data runs into one single result, comparable to the outcome of a normal analysis.

Another aspect of these data that can be limiting is that they are based on police reports regarding collisions and, in some cases, the data are based on the investigating officer’s assessment (e.g., estimated vehicle travel speed, driver had been drinking). It should also be noted that state databases sometimes have different variables than FARS and even if they have the same variables, the data are sometimes categorized differently. These differences

make it difficult to directly compare the results obtained from FARS data with those obtained from state databases.

One limitation related specifically to the creation of the high-risk driver (HRD) variable is that the variables recording previous events (i.e., impaired driving conviction, speed violation, another type of traffic violation, collision, or license suspension) only looked back as far as three years, meaning only events in the previous three years are included. Thus, this likely underestimates the percentage of HRDs.

Key variables in FARS analyses

- Collision state (e.g., FL, NY)
- Number of vehicles involved in crash
- Manner of collision (e.g., head-on, angle)
- First harmful event (e.g., rollover, fixed object)
- Number of rollover collisions
- Manner of leaving scene (vehicle towed, driven away)
- Initial collision impact point (clock points; e.g., 12 = front)
- Age
- Gender
- Vehicle maneuver (e.g., passing, negotiating curve)
- Crash avoidance maneuver (e.g., braking, steering)
- Restraint use (e.g., lap belt, helmet)
- Driver drinking (yes/no)
- Driver related factors - up to four different factors (e.g., drugs, physical impairment)
- Drug test results - up to three different drugs (e.g., type of drug present/not present)
- Driver violations charged - up to three different violations (e.g., impairment, speeding)
- Vehicle travel speed
- Driver license type compliance (e.g., not licensed, not valid)
- Previous accident (e.g., within three years prior to crash)
- Previous impaired driving conviction (e.g., within three years prior to crash)
- Previous speeding conviction (e.g., within three years prior to crash)
- Other previous conviction (e.g., within three years prior to crash)
- Previous suspension (e.g., within three years prior to crash)
- Number of travel lanes
- Trafficway flow (not divided, divided)
- Location of collision in relation to road (e.g., on-road, shoulder)
- Roadway function class (e.g., rural minor arterial, urban collector)
- Rural vs. urban area

- Speed limit
- Roadway profile (e.g., level, grade)
- Roadway alignment (e.g., straight, curved)
- Roadway surface condition (e.g., dry, wet)
- Relation to junction (e.g., intersection, non-intersection)
- Presence of traffic controls (e.g., no controls, stop sign)
- Vehicle body type (passenger car, motorcycle)
- Vehicle model year
- Vehicle license plate state
- Day of week
- Time of day (hours: 0-23)
- Time of day (minutes: 0-60)
- Date (month:1-12)
- Light conditions (dawn, daylight, dark)
- Weather condition (e.g., no adverse conditions, rain)

2.1.2 State driver record data. State driver record databases were obtained from Virginia, Florida and Georgia. Each of these databases is described in more detail in their respective sections below. Data from the years 2005, 2006 and 2007 were used in the analyses to maintain consistency with the FARS analyses.

Overall, a general limitation of the state driver record data is that the driver record information varied for each state, limiting possible comparisons.

Florida. The Florida data were provided by the Department of Highway Safety and Motor Vehicles Bureau of Crash Records. This database consisted of two data files, one containing driver records and one containing traffic charge/offense codes and their descriptions. Data from the years 2005, 2006 and 2007 were appended and used in the analyses. This database contained information about charges/offenses and BAC, but did not have any information about crashes limiting comparisons to the other state driver records data as well as the FARS analyses. The Florida data did have variables about speed. However, this would not be comparable to the other states which did not have this information.

Key variables in FL driver record analysis

- Year
- BAC
- Charge/offense code
- Charge/offense description

- Posted speed
- Actual speed

Virginia. The Virginia database was provided by the Virginia Department of Transportation Traffic Engineering Division. This database consisted of 10 files which were merged and used in the analyses. Note that this database contained information prior to 2005 and after 2007, but only information from 2005 to 2007 was included in the analyses to ensure comparability with the other states as well as the FARS analyses. This database contained information about convictions and crashes, but did not have any information about BACs limiting comparisons to the other state driver records data as well as the FARS analyses.

Key variables in VA driver record analysis

- Offense date
- Accident date
- Conviction code
- Conviction description

Georgia. The database was provided by the Georgia Department of Transportation. This database consisted of one file with information about citations for the years 2005, 2006 and 2007 which were appended and used in the analysis. This database only contained information about convictions, but did not have any information about crashes or BACs limiting comparisons to the other state driver records data as well as the FARS analyses.

Key variables in GA driver record analysis

- Year
- Citation code
- Citation description

2.2 Data Analyses

This section first describes the FARS data analyses and the state driver record data analyses. This is followed by a description of the ten percenter definitions used in these analyses. All data were analyzed using the StataCorp (2009) Statistical Software, release 11.

For the FARS data, bivariate analyses were conducted comparing the ten percenter or high-risk driver group to the non high-risk group on the various fatal collision characteristics. For the multiple imputation crash analysis using FARS, logistic regression was conducted in

addition to bivariate analyses. Unless otherwise noted, only bivariate tables for which a significant difference was found based on a Chi-square test or a two-sample test of proportions are discussed in this report. Given the large number of cases in FARS for the years 2005-2007, a significant difference between the high-risk group and non high-risk group was defined as a result which was statistically significant at the $p<0.001$ level (so at the 0.1% level rather than the 5% level) and there was a difference of at least five percentage points between them on a particular variable category. It should be noted that for a number of variables, the categories were combined to simplify the presentation of the results. Only when it was not possible to identify what category drivers belonged to (high-risk or non-high-risk) in at least 5% of cases, the category "Don't know" is used to report this.

Two ten percenter definitions were applied to the FARS analyses and are described below in sections 2.2.1 and 2.2.2. Drivers were categorized as high-risk (ten percenter), non high-risk (non ten percenter) or "Don't know". The "Don't know" group had missing data on one or more of the components of the definition of a ten percenter, so it was not possible to determine if they were high-risk or not. Note that multiple imputation was used only to impute BAC values. Therefore, in some cases it would still be impossible to know whether someone is a high-risk driver or not simply because other variables may have missing values as well.

For the state driver record data for Florida, Virginia and Georgia, the number of ten percenters was calculated using information about convictions, offenses, charges or citations. Three ten percenter definitions were applied to the state driver record data and are described below in sections 2.2.3, 2.2.4 and 2.2.5. Drivers were categorized as high-risk (ten percenter) or non high-risk (non ten percenter). The number of high-risk drivers was divided by the population of licensed drivers in the respective state averaged for the years 2005, 2006 and 2007 using data from the Federal Highway Administration (FHA).

2.2.1 Operational definition of high-risk drivers used for FARS analyses: A driver who had three or more of the following events in the past three years, as identified in FARS, was considered to be a high-risk driver: impaired driving offense (previously recorded DWI conviction), a speed violation (previously recorded speeding conviction), another type of violation (previously recorded other moving violation conviction), a collision (previously recorded crash), or a license suspension (previously recorded suspensions and revocations).

This is counting only events occurring within three years of the crash, and speeding violations include going too slow as well as going too fast.

Unfortunately actual BAC and/or breath test refusals could not be included as part of the definition since there were many cases where this variable was missing. Accordingly, this variable was not included in the analyses in Section 3 of this report.

2.2.2 Operational definition of high-risk drivers used for FARS analyses with BAC imputations: To address the limitation of having many missing cases for the BAC and/or breath test refusal variable in FARS, NHTSA relies upon Rubin's multiple imputation process to create sound statistical estimates for the missing BAC values. This meant that the operational definition could be amended to include high BAC values and breath test refusals. Thus, a driver who has had three or more of the following events in the past three years, as identified in FARS, was considered to be a high-risk driver: impaired driving offense (previously recorded DWI conviction), a speed violation (previously recorded speeding conviction), another type of violation (previously recorded other moving violation conviction), a collision (previously recorded crash), or a license suspension (previously recorded suspensions and revocations); or they had a BAC of 0.16% or above or refused to provide a breath sample at the time of arrest following the current crash (as opposed to previous events). This definition was employed in Section 4 of this report.

2.2.3 Operational definition of high-risk drivers used for Florida: A driver who had three or more charges for high-risk driving behaviors (e.g., reckless driving, aggressive driving, improperly licensed, etc.) during the three year period from 2005 to 2007 inclusive, or had a BAC of 0.16% or higher was considered to be a HRD. This definition was applied a second time seperately while also including speeding. Therefore this definition was as follows: a driver who had three or more charges for high-risk driving behaviors, or had a BAC of 0.16%, or was speeding. Note that both definitions were applied separately for comparisons with the other state driver record data, as there was no information about speeding for the other states.

2.2.4 Operational definition of high-risk drivers used for Virginia: A driver who had three or more convictions for high-risk driving behaviors, or was involved in three or more

accidents during the three year period from 2005 to 2007 inclusive was considered to be a HRD.

2.2.5 Operational definition of high-risk drivers used for Georgia: A driver who had three or more convictions for high-risk driving behaviors during the three year period from 2005 to 2007 inclusive was considered to be a HRD.

3.0 CRASH ANALYSES USING FARS

The purpose of the FARS analyses was to determine the frequency and characteristics of fatal crashes involving ten percenters that occurred in the member states of the I-95 Corridor Coalition and the District of Columbia. All fatal collisions that occurred in the sixteen I-95 Coalition member states and the District of Columbia were analyzed and also grouped according to five regions (New England, North, Central, South, and Florida).

Three years of data were used to ensure that there was a large enough dataset. There were 59,623 drivers included in the analyses. It should be noted that 2007 was the most recent year for which data were available when the analyses were conducted.

A driver who had three or more of the following events on their driver record for the three years prior to the fatal collision was considered to be a ten percenter: previously recorded crash(es), DWI convictions, speeding convictions, suspensions or revocations, or other moving violation convictions. Since there were many cases with missing BAC and test refusal data, this variable was not included in the definition used in Section 3 of this report (see Section 4 for analyses that imputed multiple replacement values for missing BAC values). It should be noted that although BAC values were not available for determining HRDs, subjective information on the presence of alcohol in collisions (police officer estimates) was available and used for comparing alcohol involvement of high-risk and non high-risk drivers in crashes.

The percentage of drivers identified as meeting the ten percenter or HRD definition is presented both by state and by region. This is followed by a summary description of fatal collisions involving HRDs as compared to non high-risk drivers in terms of the following categories of characteristics: type of collision, driver, road and vehicle, and temporal and environment. Finally, a detailed description of the high-risk driver fatal crash characteristics completes the section.

3.1 Magnitude of Ten Percenters in Fatal Crashes

Table 3.1.1 presents the magnitude of high-risk drivers involved in fatal collisions according to each member state of the I-95 Coalition and the District of Columbia. In total, approximately 14% of drivers involved in fatal collisions were considered to be HRDs. The percentage ranged from a low of 3% in the District of Columbia to a high of 19% in New Jersey. On average, drivers could not be categorized in approximately 15% of cases due to missing data. The issue of missing data was particularly evident in CT and GA, where this problem resulted in some 83% and 80% respectively of the cases being listed as "Don't know". However, the actual number of cases in these jurisdictions was small relative to the total and would not bias the overall result. For the majority of states, the percentage of missing data was around or less than 5%.

Table 3.1.1. Magnitude of HRDs in fatal crashes by state

	High risk driver				
States	% No	% Yes	% Don't Know	Total %	Total #
CT	8.42%	8.34%	83.24%	100.00%	1235
DE	80.72%	13.33%	5.95%	100.00%	555
DC	85.71%	3.25%	11.04%	100.00%	154
FL	81.74%	13.34%	4.92%	100.00%	14345
GA	9.48%	10.83%	79.69%	100.00%	7224
ME	86.34%	10.67%	2.99%	100.00%	703
MD	85.93%	10.31%	3.76%	100.00%	2687
MA	77.05%	16.77%	6.17%	100.00%	1717
NH	87.37%	9.90%	2.73%	100.00%	586
NJ	76.92%	18.70%	4.38%	100.00%	3128
NY	81.37%	13.58%	5.05%	100.00%	5699
NC	81.50%	16.11%	2.39%	100.00%	6450
PA	87.02%	9.58%	3.39%	100.00%	6512
RI	65.86%	14.83%	19.31%	100.00%	290
SC	74.50%	16.96%	8.54%	100.00%	4216
VT	77.74%	15.07%	7.19%	100.00%	292
VA	77.89%	18.49%	3.63%	100.00%	3830
Total #					59623
Overall row %	71.04%	13.60%	15.36%		

The I-95 Coalition states and the District of Columbia were further grouped into five regions: New England (Maine, New Hampshire, Vermont, Rhode Island, Massachusetts, Connecticut), North (New York, Pennsylvania, New Jersey), Central (Delaware, Maryland, District of Columbia, Virginia), South (North Carolina, South Carolina, Georgia) and Florida. Florida was selected as a separate region because approximately 25% of all the fatalities within the I-95 Corridor member jurisdictions occurred in this region.

The magnitude of ten percenters or high-risk drivers involved in fatal crashes by region is presented in Table 3.1.2. There was not much variation in the magnitude of the problem according to region. The extent of the problem ranged from a low of 12.67% in New England up to 14.72% in the Central region. Note that the percent of high-risk drivers is relatively low. The expectation is that this value is underestimated due to the missing BAC values in a large number of cases and that it will be higher in Section 4 when the imputed BAC values will be used.

Table 3.1.2. Magnitude of HRDs involved in fatal crashes by region

High risk driver	New England	North	Central	South	Florida	Total	Overall %
No	61.46%	82.86%	81.26%	50.77%	81.74%	42354	71.04%
Yes	12.67%	12.93%	14.72%	14.18%	13.34%	8108	13.60%
Don't Know	25.88%	4.21%	4.01%	35.05%	4.92%	9161	15.36%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	59623	100.00%
Total	4823	15339	7226	17890	14345	59623	
Overall %	8.09%	25.73%	12.12%	30.01%	24.06%	100.00%	

3.2 Summary of Ten Percenter Fatal Crash Characteristics

This section compares the characteristics of fatal collisions involving HRDs to those involving non-HRDs. The findings are summarized in Table 3.2 and indicate that:

- HRDs were more likely to be involved in collisions with a single vehicle, where the vehicle ran off the road, hit a fixed object, or rolled over;
- consistent with this finding, HRDs' fatal collisions more often occurred on a curve with the vehicle ending up on the roadside, indicative of a run-off road collision; consequently their collisions happened less frequently at an intersection;
- HRDs were more often younger (21-34) males who had been drinking or using drugs prior to the collision;
- HRD collisions occurred more often on the weekend and at night, consistent with the higher incidence of alcohol involvement;
- HRDs were more often involved in a fatal collision when it was dark, again suggesting alcohol involvement;
- HRDs were traveling at higher speeds (estimated speed of the vehicle in the crash by the investigating officer) at the time of the collision and were more often considered by the police to have been speeding (i.e., exceeding speed limit, racing, driving
- too fast for conditions);
- seat belt use was lower among HRDs and hence they were more often ejected from the vehicle;
- not having a valid license was three times more common among the HRDs; and,
- HRDs were more often operating a motorcycle.

Table 3.2. Summary of HRD fatal crash characteristics.[1]

Key Characteristics	No	Yes	Don't Know
Single vehicle	37.04%	48.26%	38.42%
Angle impact	30.14%	23.22%	28.04%
Hit fixed object	21.39%	30.76%	20.91%
Vehicle rollover	15.02%	21.02%	16.83%
Frontal impact	64.74%	69.39%	66.00%
Drivers aged 21-34	27.03%	52.33%	29.65%
Male drivers	72.31%	83.62%	73.04%
Negotiating a curve	11.95%	16.88%	18.71%
No avoidance manoeuvre	61.04%	57.40%	40.62%
Unbelted drivers	28.99%	42.61%	25.77%
Impaired driver (surrogate)	17.83%	32.02%	15.73%
Drugs as contributing factor	7.33%	13.37%	5.35%
Speeding as contributing factor	15.64%	27.18%	11.49%
Not properly licensed	8.78%	30.33%	12.29%
1-2 lane roads	75.32%	74.89%	73.89%
Road not divided	59.69%	60.73%	64.73%
Collision on principal arterials	29.30%	25.40%	26.20%
Collision located on roadside	16.95%	25.36%	20.99%
Curved road	23.52%	28.97%	25.93%
Intersection	36.81%	31.40%	33.65%
Rural area	48.85%	47.11%	44.28%
Motorcycles	9.18%	13.73%	7.07%
Early model vehicles (i.e., <=1997)	36.95%	40.28%	39.75%
Sat-Sun collision	32.37%	36.57%	32.17%
Night time (9pm-5:59am)	29.48%	43.21%	31.83%
Weekend collision	39.31%	44.32%	39.16%
Dark or dark/lighted	40.84%	53.46%	43.35%

Type of collision. HRDs were more often involved than non-HRDs in single vehicle collisions (48% vs. 37% respectively), collisions where the vehicle hit a fixed object (31% vs. 21%) or where one or more of the vehicles rolled over (21% vs. 15%). HRDs were less often involved than non-HRDs in angle collisions (23% vs. 30%) and were somewhat more often involved in collisions with frontal impacts (69% vs. 65%).

Driver characteristics. HRDs involved in fatal collisions were more often male than non-HRDs (84% vs. 72%), aged 21-34 (52% vs. 27%). HRDs were more often negotiating a curve at the time of the collision than non-HRDs (17% vs. 12%) but they took evasive action

[1] Note that percentages for the categories of the HRD variable do not add up to 100%, as it is the total percentage of the collision characteristics that will add up to 100%. For example, 48% of HRDs were involved in single vehicle collisions and 52% were multiple vehicle collisions (see Table 3.3.1.1).

somewhat more often. Seat belts were used less often by HRDs than non-HRDs (39% vs. 58%) and ejection from the vehicle was more common in HRD collisions (16% vs. 9%). HRDs were more often considered to be drinking drivers than non-HRDs (32% vs. 18%). Using a surrogate measure of impaired driving (i.e., single vehicle, male driver, night-time) that was created by TIRF, HRDs were more often considered to be impaired than non-HRDs (17% vs. 10%). Drugs were more often considered a factor contributing to the collisions of HRDs than was the case for non-HRDs (13% vs. 7%). The estimated travel speed of HRDs prior to the crash was more often 56 mph or higher compared to non-HRDs (25% vs. 20%) and speed was considered a contributing factor more often among HRD's collisions than for non-HRDs (27% vs.16%). Not having a proper license was three times more common among HRDs than among non-HRDs (30% vs. 9%).

Road and vehicle characteristics. There were not many differences between high-risk drivers and non high-risk drivers involved in fatal crashes in relation to road characteristics. The exceptions are that HRD collisions more often occurred on the roadside compared to non-HRD collisions (25% vs. 17%). HRD involvement in fatal collisions somewhat less often occurred on a principal arterial road compared to non-HRD collisions (25% vs. 29%). Fatal crashes more often occurred on curved roads for HRDs than for non-HRDs (29% vs. 24%). The fatal collisions of HRDs less often occurred at intersections (31% vs. 37%) and if the collision occurred at an intersection, HRD collisions more often occurred at places that did not have traffic controls compared to collisions of non-HRDs (41% vs. 34%). Similarly, there were not many differences in relation to vehicle characteristics with the exception being that HRDs more often were riding a motorcycle than non-HRDs (14% vs. 9%).

Temporal and environmental characteristics. Fatal collisions involving HRDs were somewhat more common on Saturdays and Sundays (37%) than was the case for non-HRDs (32%) and these crashes were also more common at night (43% vs. 30%). Fatal weekend collisions involving HRDs (i.e., Friday 6:00pm to Sunday 5:59am) were also more common among HRDs compared to non-HRDs (44% vs. 39%). There was no difference regarding the quarter of the year in which the fatal collision occurred between the two groups of drivers nor were there any differences in relation to weather conditions. Fatal collisions involving HRDs occurred more often in the dark, either with or without street lighting, than did those involving non-HRDs (53% vs. 41%).

3.3 Ten Percenter Fatal Crash Characteristics

This section contains a detailed comparison of each of the characteristics of the fatal collisions involving HRDs and non-HRDs that were summarized above. These results are organized according to the following categories: collision type, driver characteristics, road and vehicle characteristics, and temporal and environmental characteristics.

3.3.1 Collision characteristics. Table 3.3.1.1. reveals that HRDs were more commonly involved in single vehicle collisions (48%) compared to non-HRDs (37%) — results in the "Yes" column are for HRDs. Still, 52% of HRDs were involved in multiple vehicle collisions.

Table 3.3.1.1. Number of vehicles by HRD

No. of vehicles	No	Yes	Don't Know	Total	Overall %
Single vehicle	37.04%	48.26%	38.42%	23120	38.78%
Multiple vehicle	62.96%	51.74%	61.58%	36503	61.22%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

Table 3.3.1.2. illustrates that HRDs were more often involved than non-HRDs in single vehicle fatal crashes (51% vs. 41%) but less often involved in angle impact collisions (23% vs. 30%). Note that when the crash did involve another vehicle, the manner of collision was recorded only for the first harmful event between two motor vehicles in transport.

Table 3.3.1.2. Manner of collision by HRD

Manner of collision	No	Yes	Don't Know	Total	Overall %
No other vehicle	40.81%	50.95%	43.57%	25359	42.61%
Front/rear	10.06%	9.07%	9.93%	5898	9.91%
Head-on	14.47%	12.68%	13.19%	8352	14.03%
Angle	30.14%	23.22%	28.04%	17185	28.87%
Sideswipe	4.02%	3.72%	4.77%	2437	4.09%
Other	0.50%	0.36%	0.50%	287	0.48%
Total	100.00%	100.00%	100.00%	59518	100.00%
Total	42296	8091	9131	59518	
Overall %	71.06%	13.59%	15.34%	100.00%	

HRDs in fatal crashes more often crashed into a fixed object as compared to non-HRDs (31% vs. 21%) and less often into other vehicles than non-HRDs (48% vs. 58%), as shown in Table 3.3.1.3.

Table 3.3.1.3. Harmful event by HRD

Harmful event	No	Yes	Don't Know	Total	Overall %
Rollover	5.11%	6.27%	5.50%	3174	5.33%
Peds	9.56%	8.84%	12.47%	5908	9.91%
Vehicle-vehicle collision	58.24%	47.94%	55.66%	33643	56.44%
Fixed object	21.39%	30.76%	20.91%	13463	22.59%
Other	5.70%	6.19%	5.46%	3417	5.73%
Total	100.00%	100.00%	100.00%	59605	100.00%
Total	42342	8104	9159	59605	
Overall %	71.04%	13.60%	15.37%	100.00%	

HRDs were also more often involved than non-HRDs (21% vs. 15%) in fatal collisions where one or more vehicles rolled over (Table 3.3.1.4) but there was no difference between HRDs and non-HRDs (<5%) in whether the vehicles were towed (Table 3.3.1.5).

Table 3.3.1.4. Vehicle rollover by HRD

Rollover	No	Yes	Don't Know	Total	Overall %
No rollover	84.98%	78.98%	83.17%	50014	83.88%
One or more	15.02%	21.02%	16.83%	9609	16.12%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

Table 3.3.1.5. Vehicle towed away by HRD

Towed away	No	Yes	Don't Know	Total	Overall %
Driven	9.41%	7.23%	15.55%	5884	10.06%
Towed	90.59%	92.77%	84.45%	52595	89.94%
Total	100.00%	100.00%	100.00%	58479	100.00%
Total	41489	7963	9027	58479	
Overall %	70.95%	13.62%	15.44%	100.00%	

Most fatal collisions (66%) involved the front of one vehicle impacting another vehicle (see overall row %). These impacts were somewhat more common for the HRDs (69%) than for non-HRDs (65%) as can be seen in Table 3.3.1.6., but this difference was less than 5%.

Table 3.3.1.6. Vehicle impact point by HRD

Impact point	No	Yes	Don't Know	Total	Overall %
Non-collision	2.89%	3.53%	3.92%	1844	3.13%
Front	64.74%	69.39%	66.00%	38584	65.57%
Right	10.17%	9.31%	8.20%	5742	9.76%
Rear	7.87%	5.49%	8.68%	4511	7.67%
Left	12.07%	9.53%	9.62%	6683	11.36%
Other	2.25%	2.76%	3.57%	1484	2.52%
Total	100.00%	100.00%	100.00%	58848	100.00%
Total	41958	8016	8874	58848	
Overall %	71.30%	13.62%	15.08%	100.00%	

In summary, HRDs were more often involved than non-HRDs in single vehicle collisions (48% vs. 37% respectively), collisions where the vehicle hit a fixed object (31% vs. 21%) or where one or more of the vehicles rolled over (21% vs. 15%). HRDs were less often involved than non-HRDs in angle collisions (23% vs. 30%) and were somewhat more often involved in collisions with frontal impacts (69% vs. 65%).

3.3.2 Driver characteristics. HRDs were more often than non-HRDs aged 21-34 (52% vs. 27%) and male (84% vs. 72%) as shown in Tables 3.3.2.1. and 3.3.2.2.

Table 3.3.2.1. Age of driver by HRD

Age	No	Yes	Don't Know	Total	Overall %
<15	0.31%	0.00%	0.78%	194	0.33%
16-20	12.07%	12.73%	12.63%	7173	12.24%
21-24	9.51%	23.10%	10.01%	6716	11.46%
25-34	17.52%	29.23%	19.63%	11387	19.43%
35-44	18.45%	18.58%	18.53%	10828	18.48%
45-54	16.86%	10.30%	16.12%	9286	15.85%
55-64	11.80%	4.16%	11.26%	6252	10.67%
65-74	6.58%	1.17%	5.89%	3360	5.73%
75+	6.90%	0.73%	5.15%	3400	5.80%
Total	100.00%	100.00%	100.00%	58596	100.00%
Total	42306	8100	8190	58596	
Overall %	72.20%	13.82%	13.98%	100.00%	

Table 3.3.2.2. Gender of driver by HRD

Gender	No	Yes	Don't Know	Total	Overall %
Male	72.31%	83.62%	73.04%	43450	73.98%
Female	27.69%	16.38%	26.96%	15285	26.02%
Total	100.00%	100.00%	100.00%	58735	100.00%
Total	42339	8102	8294	58735	
Overall %	72.08%	13.79%	14.12%	100.00%	

Table 3.3.2.3 indicates that it was more common for HRDs to have been negotiating a curve at the time of the crash (17%) than it was for non-HRDs (12%).

Table 3.3.2.3. Vehicle manoeuvre by HRD

Vehicle Manoeuvre	No	Yes	Don't Know	Total	Overall %
Going straight/starting in traffic lane	69.82%	69.30%	64.84%	40985	68.99%
Slowing/stopped	4.44%	2.32%	4.02%	2429	4.09%
Passing	1.69%	2.71%	1.73%	1090	1.83%
Turning left	7.18%	3.97%	6.51%	3946	6.64%
Negotiating a curve	11.95%	16.88%	18.71%	8113	13.66%
Other	4.91%	4.82%	4.19%	2844	4.79%
Total	100.00%	100.00%	100.00%	59407	100.00%
Total	42252	8091	9064	59407	
Overall %	71.12%	13.62%	15.26%	100.00%	

Although the difference is not large (<5%), HRDs failed to make an avoidance manoeuvre somewhat less often (57%) than did non-HRDs (61%) as shown in Table 3.3.2.4. However, given the relatively high percent of "not reported" cases (27%), it is difficult to interpret these results.

Table 3.3.2.4. Avoidance manoeuvre by HRD

Avoidance manoeuvre	No	Yes	Don't Know	Total	Overall %
No avoid manoeuvre	61.04%	57.40%	40.62%	34229	57.41%
Braking	6.20%	7.18%	7.07%	3858	6.47%
Steering	9.51%	8.57%	6.96%	5362	8.99%
Other	0.32%	0.20%	0.15%	164	0.28%
Not reported	22.92%	26.65%	45.19%	16010	26.85%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

Driver belt use is presented in Table 3.3.2.5. High-risk drivers wore seat belts less often (39%) than non-HRDs (58%). Conversely, the non-use of restraints was more common for HRDs (43%) compared to non-HRDs (29%). The use of helmets is somewhat elevated among HRDs (9% vs. 6%), although this can probably be explained by the fact that more HRDs ride a motorcycle compared to non-HRDs (see Table 3.3.3.12).

Table 3.3.2.5. Restraint use by HRD

Restraint use	No	Yes	Don't Know	Total	Overall %
No restraint	28.99%	42.61%	25.77%	18096	30.35%
Seat belt	57.59%	38.96%	49.55%	32089	53.82%
Helmet	5.79%	9.15%	4.45%	3604	6.04%
Don't know	7.62%	9.27%	20.23%	5834	9.78%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

Table 3.3.2.6. indicates that HRDs involved in fatal crashes were more often ejected from the vehicle (16%) than non-HRDs (9%). This finding is consistent with the lower belt use found among HRDs.

Table 3.3.2.6. Ejected from vehicle in fatal crashes by HRD

Ejected	No	Yes	Don't Know	Total	Overall %
No	90.60%	84.17%	90.48%	53364	89.71%
Yes	9.40%	15.83%	9.52%	6122	10.29%
Total	100.00%	100.00%	100.00%	59486	100.00%
Total	42279	8088	9119	59486	
Overall %	71.07%	13.60%	15.33%	100.00%	

A variable from the FARS data system was used to distinguish between drivers who had been drinking at the time of the current crash versus drivers who had not been drinking. This variable uses alcohol involvement as reported by police or a positive BAC based on a blood or breath test (note that BAC results were not used in this section to classify drivers as HRDs, effectively avoiding introducing a tautology). Looking at the relationship between the independent variable (high-risk driver vs. non high-risk driver) and the dependent variable (drinking vs. non-drinking), HRDs were considered to be drinking drivers almost twice as often (32%) as non-HRDs (18%), as shown in Table 3.3.2.7.

Table 3.3.2.7. Drinking driver in fatal crashes by HRD

Driver Drinking	No	Yes	Don't Know	Total	Overall %
No	82.17%	67.98%	84.27%	48036	80.57%
Yes	17.83%	32.02%	15.73%	11587	19.43%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

A surrogate measure of impaired driving created by TIRF identified those male drivers who were involved in single vehicle crashes at night-time (9:00pm-5:59am). Based on this surrogate measure, HRDs were considered to have been impaired at the time of the collision more often (17%) than non-HRDs (10%) as shown in Table 3.3.2.8.

Table 3.3.2.8. Impaired driver (surrogate) by HRD

Impaired driver	No	Yes	Don't Know	Total	Overall %
No	90.22%	82.64%	91.30%	53180	89.35%
Yes	9.78%	17.36%	8.70%	6337	10.65%
Total	100.00%	100.00%	100.00%	59517	100.00%
Total	42276	8092	9149	59517	
Overall %	71.03%	13.60%	15.37%	100.00%	

Table 3.3.2.9. shows that almost twice as many high-risk drivers involved in fatal collisions were considered by the police to have been using drugs (13%) as compared to non-HRDs (7%).

Table 3.3.2.9. Drug use by HRD

Drugs	No	Yes	Don't Know	Total	Overall %
Yes	7.33%	13.37%	5.35%	4492	7.83%
No	92.67%	86.63%	94.65%	52894	92.17%
Total	100.00%	100.00%	100.00%	57386	100.00%
Total	40825	7657	8904	57386	
Overall %	71.14%	13.34%	15.52%	100.00%	

Estimated travel speeds of 56 mph or higher were somewhat more common among HRDs (25%) involved in fatal collisions than non-HRDs (20%), as can be seen in Table 3.3.2.10. However, there was a large number of "don't knows" (46%) making it difficult to interpret this result.

Table 3.3.2.10. Estimated travel speed by HRD

Travel speed	No	Yes	Don't Know	Total	Overall %
<=30	11.42%	6.18%	2.79%	5592	9.38%
31-55	30.02%	24.21%	6.48%	15272	25.61%
56-69	8.14%	9.44%	2.93%	4481	7.52%
70+/no limit	11.79%	15.55%	5.27%	6738	11.30%
Don't know	38.63%	44.62%	82.52%	27540	46.19%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

Collisions involved speed (i.e., exceeding speed limit, racing, too fast for conditions) as a contributing factor more often among HRDs (27%) compared to non-HRDs (16%) as can be seen in Table 3.3.2.11.

Table 3.3.2.11. Speeding by HRD

Speeding	No	Yes	Don't Know	Total	Overall %
Yes	15.64%	27.18%	11.49%	9300	16.53%
No	84.36%	72.82%	88.51%	46962	83.47%
Total	100.00%	100.00%	100.00%	56262	100.00%
Total	40005	7502	8755	56262	
Overall %	71.10%	13.33%	15.56%	100.00%	

Not having a valid driver's license at the time of the fatal collision (i.e., never had one, suspended, revoked) was over three times more common among HRDs (30%) compared to non-HRDs (9%) as shown in Table 3.3.2.12. Of importance, note that only previous license-related events were used to identify HRDs as used in the independent variable (columns) and that only current license status is used in the dependent variable (rows) — meaning no tautology is introduced.

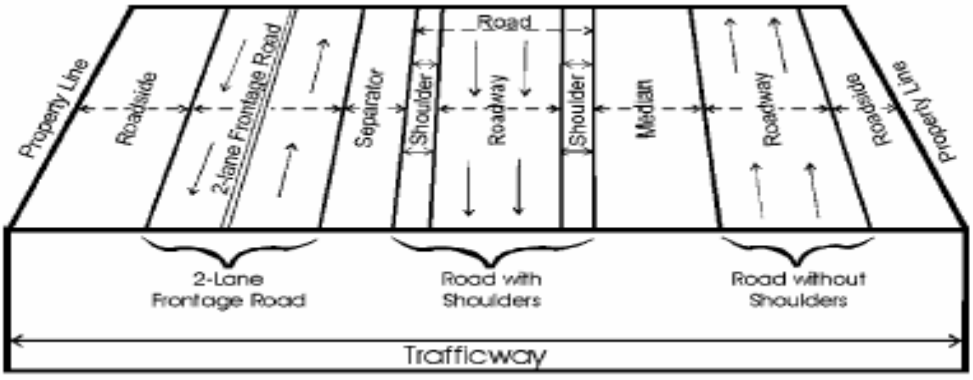
Table 3.3.2.12. License status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	3.25%	1.12%	8.09%	2072	3.58%
Licensed	91.22%	69.67%	87.71%	50784	87.75%
Not valid	5.53%	29.21%	4.20%	5016	8.67%
Total	100.00%	100.00%	100.00%	57872	100.00%
Total	42300	8094	7478	57872	
Overall %	73.09%	13.99%	12.92%	100.00%	

In summary, HRDs involved in fatal collisions, were more often male than non-HRDs (84% vs. 72%), aged 21-34 (52% vs. 27%). HRDs were more often negotiating a curve at the time of the collision than non-HRDs (17% vs. 12%) but they took evasive action somewhat more often. Seat belts were used less often by HRDs than non-HRDs (39% vs. 58%) and ejection from the vehicle was more common in HRD collisions (16% vs. 9%). HRDs were more often considered to be drinking drivers than non-HRDs (32% vs. 18%). Using a surrogate measure of impaired driving (i.e., single vehicle, male driver, night-time) that was created by TIRF, HRDs were more often considered to be impaired than non-HRDs (17% vs. 10%). Drugs were more often considered a factor contributing to the collisions of HRDs than was the case for non-HRDs (13% vs. 7%). The estimated travel speed of HRDs prior to the crash was more often 56 mph or higher compared to non-HRDs (25% vs. 20%) and speed was considered a contributing factor more often among HRD's collisions than for non-HRDs (27% vs.16%). Not having a proper license was three times more common among HRDs than among non-HRDs (30% vs. 9%).

3.3.3 Road and vehicle characteristics. The traffic way can be separated into different components as shown in Figure 3.3.3.1 below. The roadway is the part of the traffic way, usually paved, on which vehicles typically travel. The shoulder is a strip of paved or unpaved surface immediately next to the roadway. Beyond the shoulder is the roadside on the right side of the traffic way which may include ditches, culverts, trees, poles, and other fixed objects. For those roads that are divided there is either a strip of unpaved open space between the opposing lanes of traffic or there is a concrete barrier that separates the opposing lanes.

Figure 3.3.3.1 Description of traffic way components



It was more common for high-risk drivers to end up driving off the road onto the roadside in fatal collisions than was the case for the non-HRDs (25% vs. 17%) as shown in Table 3.3.3.1. Conversely, it was less common for HRDs to end up on the road in fatal collisions compared to non-HRDs (61% vs. 72%).

Table 3.3.3.1. Road location by HRD

Road location	No	Yes	Don't Know	Total	Overall %
On-road	72.10%	61.08%	72.53%	42101	70.66%
Shoulder	8.45%	10.46%	4.29%	4818	8.09%
Median/left turn	2.50%	3.10%	2.20%	1509	2.53%
Roadside	16.95%	25.36%	20.99%	11151	18.72%
Total	100.00%	100.00%	100.00%	59579	100.00%
Total	42333	8098	9148	59579	
Overall %	71.05%	13.59%	15.35%	100.00%	

There were no differences of 5% or more between HRDs and non-HRDs involved in fatal crashes regarding the type of road (e.g., the number of lanes on the road, divided road) as can be seen in Tables 3.3.3.2. and 3.3.3.3.

Table 3.3.3.2. Number of lanes by HRD

No. of lanes	No	Yes	Don't Know	Total	Overall %
1-2	75.32%	74.89%	73.89%	44144	75.04%
3	11.07%	10.56%	8.38%	6228	10.59%
4+	13.61%	14.54%	17.73%	8452	14.37%
Total	100.00%	100.00%	100.00%	58824	100.00%
Total	41798	7990	9036	58824	
Overall %	71.06%	13.58%	15.36%	100.00%	

Table 3.3.3.3. Divided road by HRD

Divided road	No	Yes	Don't Know	Total	Overall %
Not divided	59.69%	60.73%	64.73%	35868	60.61%
Divided/no barrier	24.02%	21.54%	18.71%	13535	22.87%
Divided/barrier	13.70%	14.74%	13.55%	8177	13.82%
Other	2.59%	2.99%	3.01%	1601	2.71%
Total	100.00%	100.00%	100.00%	59181	100.00%
Total	42049	8039	9093	59181	
Overall %	71.05%	13.58%	15.36%	100.00%	

HRD involvement in fatal collisions somewhat less often occurred on a principal arterial road compared to non-HRD collisions (25% vs. 29%) as shown in Table 3.3.3.4, but this difference was less than 5%.

Table 3.3.3.4. Road function by HRD

Road function	No	Yes	Don't Know	Total	Overall %
Principal arterial interstate	11.43%	12.04%	14.75%	6973	11.99%
Principal arterial other frwy/exprwy	4.13%	4.50%	2.41%	2287	3.93%
Principal arterial	29.30%	25.40%	26.20%	16470	28.32%
Minor arterial	18.91%	18.91%	25.04%	11508	19.79%
Collector	15.06%	16.64%	17.08%	9054	15.57%
Local rd. or st.	21.17%	22.51%	14.53%	11863	20.40%
Total	100.00%	100.00%	100.00%	58155	100.00%
Total	41893	7907	8355	58155	
Overall %	72.04%	13.60%	14.37%	100.00%	

Table 3.3.3.5 shows that traveling on curved roads at the time of the crash was more common among HRDs (29%) than it was for non-HRDs (24%) but there was not much difference regarding the presence of a grade on the road (Table 3.3.3.6).

Table 3.3.3.5. Road alignment by HRD

Road alignment	No	Yes	Don't Know	Total	Overall %
Straight	76.48%	71.03%	74.07%	44818	75.37%
Curved	23.52%	28.97%	25.93%	14646	24.63%
Total	100.00%	100.00%	100.00%	59464	100.00%
Total	42255	8088	9121	59464	
Overall %	71.06%	13.60%	15.34%	100.00%	

Table 3.3.3.6. Road grade by HRD

Road profile	No	Yes	Don't Know	Total	Overall %
Level	74.93%	73.55%	56.89%	42700	71.99%
Grade	22.43%	23.47%	39.49%	14936	25.18%
Hill crest/sag	2.64%	2.97%	3.62%	1681	2.83%
Total	100.00%	100.00%	100.00%	59317	100.00%
Total	42185	8073	9059	59317	
Overall %	71.12%	13.61%	15.27%	100.00%	

Fatal collisions involving HRDs less often occurred at intersections (31%) than non-HRDs (37%) as shown in Table 3.3.3.7. If the collisions were at intersections, collisions involving HRDs more often occurred at places that did not have traffic controls compared to collisions involving non-HRDs (41% vs. 34%) as shown in Table 3.3.3.8.

Table 3.3.3.7. Intersection by HRD

Intersection	No	Yes	Don't Know	Total	Overall %
No	63.19%	68.60%	66.35%	38380	64.41%
Yes	36.81%	31.40%	33.65%	21209	35.59%
Total	100.00%	100.00%	100.00%	59589	100.00%
Total	42331	8104	9154	59589	
Overall %	71.04%	13.60%	15.36%	100.00%	

Table 3.3.3.8. Intersection traffic controls by HRD

Traffic controls	No	Yes	Don't Know	Total	Overall %
No controls	33.89%	41.32%	39.99%	7515	35.67%
Traffic signal	31.93%	29.40%	26.64%	6500	30.85%
Stop/yield	28.40%	24.29%	30.32%	5938	28.19%
Other	5.78%	4.99%	3.06%	1114	5.29%
Total	100.00%	100.00%	100.00%	21067	100.00%
Total	15472	2524	3071	21067	
Overall %	73.44%	11.98%	14.58%	100.00%	

The majority of fatal collisions (85%) occurred when the road conditions were dry (see overall column %). There was little difference between HRDs and non-HRDs (<5%) relating to road conditions in fatal crashes (Table 3.3.3.9).

Table 3.3.3.9. Road conditions by HRD

Road conditions	No	Yes	Don't Know	Total	Overall %
Dry	84.06%	85.79%	85.57%	50224	84.53%
Wet	13.33%	12.70%	13.18%	7856	13.22%
Snow/slush/ice	2.39%	1.30%	1.06%	1213	2.04%
Other	0.21%	0.21%	0.19%	124	0.21%
Total	100.00%	100.00%	100.00%	59417	100.00%
Total	42229	8070	9118	59417	
Overall %	71.07%	13.58%	15.35%	100.00%	

As shown in Table 3.3.3.10, over three-quarters (76%) of fatal crashes occurred on roads with speed limits between 31 and 55mph (see overall %). There were no notable differences across categories of speed limits between HRDs and non-HRDs. Although a difference was found between HRDs and non-HRDs in terms of vehicle travel speed, there was no difference in terms of the speed limit. This can be explained by drivers ignoring the speed limit, resulting in higher travel speeds among HRDs.

Table 3.3.3.10. Speed limit by HRD

Speed limit	No	Yes	Don't Know	Total	Overall %
<=30	10.64%	11.60%	10.09%	6141	10.68%
31-55	76.22%	75.60%	76.74%	43811	76.22%
56-69	9.06%	8.82%	8.57%	5145	8.95%
70+	4.08%	3.98%	4.60%	2384	4.15%
Total	100.00%	100.00%	100.00%	57481	100.00%
Total	40807	7767	8907	57481	
Overall %	70.99%	13.51%	15.50%	100.00%	

Table 3.3.3.11. shows that 48% of fatal crashes occurred in a rural area and 52% occurred in an urban area (see overall %) and there was little difference between HRDs and non-HRDs for this variable.

Table 3.3.3.11. Rural/urban by HRD

Rural/urban	No	Yes	Don't Know	Total	Overall %
Rural	48.85%	47.11%	44.28%	28027	47.96%
Urban	51.15%	52.89%	55.72%	30410	52.04%
Total	100.00%	100.00%	100.00%	58437	100.00%
Total	42088	7971	8378	58437	
Overall %	72.02%	13.64%	14.34%	100.00%	

Overall, the majority of fatal crashes involved a passenger car (45%); however there was no difference in the percentage of passenger cars between HRDs and non-HRDs. Table 3.3.3.12. indicates that the only difference greater than 5% pertains to motorcycles, which are a more commonly used vehicle type among HRDs (14%) than among non-HRDs (9%).

Table 3.3.3.12. Vehicle type by HRD

Type of vehicle	No	Yes	Don't Know	Total	Overall %
Car	44.95%	44.41%	43.50%	26231	44.67%
Utility	15.39%	14.20%	15.08%	8918	15.19%
Van	6.86%	4.27%	6.60%	3799	6.47%
Truck	14.62%	14.37%	17.93%	8842	15.06%
Heavy truck/bus	8.03%	8.02%	8.62%	4764	8.11%
Motorcycle	9.18%	13.73%	7.07%	5584	9.51%
Other	0.97%	1.00%	1.20%	590	1.00%
Total	100.00%	100.00%	100.00%	58728	100.00%
Total	42232	8089	8407	58728	
Overall %	71.91%	13.77%	14.32%	100.00%	

No differences greater than 5% were found in relation to the model year of the vehicles driven by HRDs and non-HRDs in fatal crashes (Table 3.3.3.13.) nor in the state where the vehicle was licensed (Table 3.3.3.14.).

Table 3.3.3.13. Model year by HRD

Model year	No	Yes	Don't Know	Total	Overall %
<=1997	36.95%	40.28%	39.75%	22061	37.81%
1998-2000	19.88%	19.64%	21.93%	11751	20.14%
2001-2003	21.11%	19.59%	18.96%	12016	20.59%
2004+	22.06%	20.50%	19.36%	12522	21.46%
Total	100.00%	100.00%	100.00%	58350	100.00%
Total	42038	8026	8286	58350	
Overall %	72.04%	13.75%	14.20%	100.00%	

Table 3.3.3.14. State license status by HRD

State license	No	Yes	Don't Know	Total	Overall %
In state	88.38%	91.21%	86.29%	51731	88.48%
Out of state	11.62%	8.79%	13.71%	6733	11.52%
Total	100.00%	100.00%	100.00%	58464	100.00%
Total	42346	8108	8010	58464	
Overall %	72.43%	13.87%	13.70%	100.00%	

In summary, there were not many differences between high-risk drivers and non high-risk drivers involved in fatal crashes in relation to road characteristics. The exceptions are that HRD collisions more often occurred on the roadside compared to non-HRD collisions (25% vs. 17%). HRD involvement in fatal collisions somewhat less often occurred on a principal arterial road compared to non-HRD collisions (25% vs. 29%). Fatal crashes more often occurred on curved roads for HRDs than for non-HRDs (29% vs. 24%). The fatal collisions of HRDs less often occurred at intersections (31% vs. 37%) and if the collision occurred at an intersection, HRD collisions more often occurred at places that did not have traffic controls compared to collisions of non-HRDs (41% vs. 34%). Similarly, there were not many differences in relation to vehicle characteristics with the exception being that HRDs more often were riding a motorcycle than non-HRDs (14% vs. 9%).

3.3.4 Temporal and environmental characteristics. Fatal collisions involving HRDs were somewhat more common on Saturdays and Sundays (37%) than was the case for non-HRDs (32%) as can be seen in Table 3.3.4.1.

Table 3.3.4.1. Day of week by HRD

Day of week	No	Yes	Don't Know	Total	Overall %
Sunday	15.00%	17.51%	15.53%	9197	15.43%
Monday	13.02%	11.56%	13.42%	7682	12.88%
Tuesday	12.44%	11.57%	12.16%	7320	12.28%
Wednesday	12.81%	12.14%	12.07%	7517	12.61%
Thursday	13.43%	12.27%	13.73%	7941	13.32%
Friday	15.93%	15.90%	16.45%	9542	16.00%
Saturday	17.37%	19.06%	16.64%	10424	17.48%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

As shown in Table 3.3.4.2, approximately 43% of HRDs involved in fatal collisions occurred at night (9:00pm-5:59am), which was much more common than non-HRDs (30%), particularly in the 12:00am-2:59am time period (17% vs. 10%).

Table 3.3.4.2. Time of day by HRD

Time	No	Yes	Don't Know	Total	Overall %
12am-2:59am	9.83%	17.03%	10.72%	6504	10.95%
3am-5:59am	6.59%	10.10%	7.81%	4312	7.26%
6am-8:59am	10.41%	8.70%	11.62%	6158	10.36%
9am-11:59am	11.11%	8.46%	10.26%	6309	10.62%
12pm-2:59pm	15.21%	10.46%	14.08%	8550	14.39%
3pm-5:59pm	17.85%	13.97%	16.35%	10156	17.09%
6pm-8:59pm	15.93%	15.20%	15.87%	9401	15.82%
9pm-11:59pm	13.06%	16.09%	13.30%	8025	13.51%
Total	100.00%	100.00%	100.00%	59415	100.00%
Total	42208	8081	9126	59415	
Overall %	71.04%	13.60%	15.36%	100.00%	

NHTSA (2008b) has found that the incidence of impaired driving (i.e., BAC is 0.08% or higher) is more common among drivers during the weekend. Therefore, TIRF created a variable based on a combination of time of day and day of week to examine the distribution of fatal crashes involving HRDs during weekdays and weekends (i.e., Friday from 6:00pm to Monday 5.59am). HRDs more often were involved in fatal collisions on the weekend compared to non-HRDs (44% vs. 39%) as shown in Table 3.3.4.3.

Table 3.3.4.3. Weekday/end by HRD

Weekday/end	No	Yes	Don't Know	Total	Overall %
Weekday	60.69%	55.68%	60.84%	35779	60.03%
Weekend	39.31%	44.32%	39.16%	23820	39.97%
Total	100.00%	100.00%	100.00%	59599	100.00%
Total	42336	8104	9159	59599	
Overall %	71.03%	13.60%	15.37%	100.00%	

There was no difference greater than 5% among drivers regarding the quarter of the year in which the fatal collision occurred (Table 3.3.4.4.).

Table 3.3.4.4. Quarter of year by HRD

Quarter of year	No	Yes	Don't Know	Total	Overall %
Jan-Mar	22.90%	21.58%	22.80%	13536	22.70%
Apr-Jun	25.56%	26.15%	25.86%	15316	25.69%
Jul-Sep	25.68%	27.00%	25.40%	15393	25.82%
Oct-Dec	25.86%	25.27%	25.94%	15378	25.79%
Total	100.00%	100.00%	100.00%	59623	100.00%
Total	42354	8108	9161	59623	
Overall %	71.04%	13.60%	15.36%	100.00%	

It was more common among HRDs than non-HRDs to have been involved in fatal collisions when it was dark (31% vs. 24%) as shown in Table 3.3.4.5. HRD involvement in fatal collisions also occurred more often when it was dark but the roadway had street lights (22% vs. 17%).

Table 3.3.4.5. Light conditions by HRD

Light conditions	No	Yes	Don't Know	Total	Overall %
Daylight	54.81%	42.97%	52.92%	31463	52.91%
Dark	24.01%	31.31%	27.53%	15189	25.54%
Dark & lighted	16.83%	22.15%	15.82%	10345	17.40%
Dawn/dusk	4.35%	3.57%	3.73%	2469	4.15%
Total	100.00%	100.00%	100.00%	59466	100.00%
Total	42243	8087	9136	59466	
Overall %	71.04%	13.60%	15.36%	100.00%	

There was no difference greater than 5% between HRDs and non-HRDs involved in fatal crashes in relation to weather conditions (Table 3.3.4.6.).

Table 3.3.4.6. Weather conditions by HRD

Weather conditions	No	Yes	Don't Know	Total	Overall %
No adverse weather	88.90%	90.04%	89.81%	52990	89.19%
Rain	8.15%	7.72%	8.00%	4794	8.07%
Sleet/snow	1.72%	0.93%	0.82%	876	1.47%
Other	1.23%	1.31%	1.37%	752	1.27%
Total	100.00%	100.00%	100.00%	59412	100.00%
Total	42218	8071	9123	59412	
Overall %	71.06%	13.58%	15.36%	100.00%	

In summary, fatal collisions involving HRDs were somewhat more common on Saturdays and Sundays (37%) than was the case for non-HRDs (32%) and these crashes were also more common at night (43% vs. 30%). Fatal weekend collisions involving HRDs (i.e., Friday 6:00pm to Sunday 5:59am) were also more common among HRDs compared to non-HRDs (44% vs. 39%). There was no difference regarding the quarter of the year in which the fatal collision occurred between the two groups of drivers nor were there any differences in relation to weather conditions. Fatal collisions involving HRDs occurred more often in the dark, either with or without street lighting, than did those involving non-HRDs (53% vs. 41%).

4.0 MULTIPLE IMPUTATION CRASH ANALYSES USING FARS

The purpose of the FARS analyses described in the previous section was to determine the frequency and characteristics of ten percenters involved in fatal crashes occurring in the sixteen Coalition states and the District of Columbia. All fatal collisions occurring in the sixteen I-95 Coalition member states and the District of Columbia were analyzed and also grouped according to five regions (New England, North, Central, South, and Florida).

Three years of data were used to ensure that there was a large enough dataset. There were 59,623 drivers included in the analyses. It should be noted that 2007 was the most recent year for which data were available when the analyses were conducted.

In this section of the report, a ten percenter is now defined as either a hard core drinking driver (having a BAC of 0.16% or higher or refused a breath test at the time of arrest following the current crash); or a driver who was involved in at least three of the following events in the last three years prior to the fatal collision: previously recorded crash(es), DWI conviction(s), speeding conviction(s), suspension(s) or revocation(s), or other moving violation conviction(s). This is different from Section 3 of the report where BAC was not included in the definition since there were many cases with missing values. To address the limitation of having many missing cases for the BAC and/or breath test refusal variable in FARS, Rubin's multiple imputation process which NHTSA relies upon, was used in this section to create sound statistical estimates for the missing BAC values. In other words, the operational definition has been amended in section 4 by including high BAC values and breath test refusals.

The percentage of drivers identified as meeting the ten percenter or HRD definition is presented both by state and by region. This is followed by a summary description of fatal collisions involving HRDs as compared to non-HRDs in terms of the following characteristics: type of collision, driver, road and vehicle, and temporal and environment. Finally, a detailed description of the high-risk driver fatal crash characteristics completes the section.

4.1 Magnitude of Ten Percenters in Fatal Crashes

Table 4.1.1 presents the magnitude of HRDs involved in fatal collisions according to the sixteen Coalition states and the District of Columbia comparing the results using multiple imputation (MI) data to those not using MI data (the non-imputed results are also shown in Table 3.1.1). For each jurisdiction, the percentage in the "Don't know" category is lower for the results using MI data compared to those without the MI data and the percentage of HRDs is consistently and considerably higher.

Table 4.1.1. Magnitude of HRDs involved in fatal crashes by region with multiple imputation vs. without multiple imputation

	High risk driver (with MI)				High risk driver (without MI)			
States	No	Yes	Don't Know	Total %	No	Yes	Don't Know	Total %
CT	11.26%	33.51%	55.23%	100.00%	8.42%	8.42%	83.24%	100.08%
DE	71.82%	24.03%	4.15%	100.00%	80.72%	13.33%	5.95%	100.00%
DC	75.92%	15.33%	8.75%	100.00%	85.71%	3.25%	11.04%	100.00%
FL	73.59%	22.63%	3.78%	100.00%	81.74%	13.34%	4.92%	100.00%
GA	11.24%	24.45%	64.31%	100.00%	9.48%	10.83%	79.69%	100.00%
ME	78.81%	20.93%	0.26%	100.00%	86.34%	10.67%	2.99%	100.00%
MD	78.43%	18.70%	2.87%	100.00%	85.93%	10.31%	3.76%	100.00%
MA	68.21%	27.34%	4.45%	100.00%	77.05%	16.77%	6.17%	100.00%
NH	76.86%	22.11%	1.03%	100.00%	87.37%	9.90%	2.73%	100.00%
NJ	71.35%	26.12%	2.53%	100.00%	76.92%	18.70%	4.38%	100.00%
NY	73.23%	22.88%	3.89%	100.00%	81.37%	13.58%	5.05%	100.00%
NC	73.62%	24.46%	1.92%	100.00%	81.50%	16.11%	2.39%	100.00%
PA	75.62%	22.06%	2.32%	100.00%	87.02%	9.58%	3.39%	100.00%
RI	58.53%	29.37%	12.10%	100.00%	65.86%	14.83%	19.31%	100.00%
SC	62.34%	32.57%	5.09%	100.00%	74.50%	16.96%	8.54%	100.00%
VT	72.03%	25.02%	2.95%	100.00%	77.74%	15.07%	7.19%	100.00%
VA	69.06%	28.44%	2.50%	100.00%	77.89%	18.49%	3.63%	100.00%

As before, the I-95 Coalition states were grouped into five regions: New England (Maine, New Hampshire, Vermont, Rhode Island, Massachusetts, Connecticut), North (New York, Pennsylvania, New Jersey), Central (Delaware, Maryland, District of Columbia, Virginia), South (North Carolina, South Carolina, Georgia) and Florida.

The magnitude of ten percenters or high-risk drivers involved in fatal crashes by region is presented Table 4.1.2 comparing the results using MI data to those not using MI data (the non-imputed results are also shown in Table 3.1.2). There was not much variation in the magnitude of the problem according to region. The extent of the problem ranged from a low of 22.63% in Florida up to 26.77% in New England. The percentage of cases in the "Don't know" category is lower for each of the regions when using multiple imputation methods. In addition,

the percentage of HRDs is higher and the percentage of non-HRDs is lower in each region when using MI data compared to the results without the MI data. The average with MI (approximately 25%) is now relatively close to findings from other research about the hard core drinking driver (Simpson et al., 1996) showing that almost one third (27%) of all fatally injured drivers (in 1995) were hard core drinking drivers (BACs of 0.15% or above). The average without MI (approximately 14%) was much lower and greatly differed from these research findings.

Table 4.1.2. Magnitude of HRDs involved in fatal crashes by region with multiple imputation vs. without multiple imputation

High risk driver (with MI)	New England	North	Central	South	Florida
No	59.95%	73.86%	72.90%	48.94%	73.59%
Yes	26.77%	23.19%	24.20%	26.52%	22.63%
Don't Know	13.28%	2.95%	2.90%	24.54%	3.78%
Total	100.00%	100.00%	100.00%	100.00%	100.00%
High risk driver (without MI)					
No	61.46%	82.86%	81.26%	50.77%	81.74%
Yes	12.67%	12.93%	14.72%	14.18%	13.34%
Don't Know	25.88%	4.21%	4.01%	35.05%	4.92%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

4.2 Fatal Crash Characteristics of Ten Percenters: Summary

This section compares the characteristics of fatal collisions involving high-risk drivers to those involving non high-risk drivers. The findings are summarized in Table 4.2 and indicate that:

- HRDs were more commonly involved in collisions with a single vehicle, where the vehicle ran off the road, hit a fixed object, or rolled over;
- consistent with this finding, HRDs' fatal collisions more often occurred on a curve with the vehicle ending up on the roadside, indicative of a run-off road collision; consequently their collisions happened less frequently at an intersection;
- HRDs were more often younger (21-34) males who had been drinking or using drugs prior to the collision;
- HRD collisions occurred more often on the weekend and at night, consistent with the higher incidence of alcohol involvement;
- HRDs were more often involved in a fatal collision when it was dark, again suggesting alcohol involvement;
- HRDs were traveling at higher speeds (estimated speed by the investigating officer of the vehicle in the crash) at the time of the collision and were more often considered by the police to have been speeding (i.e., exceeding speed limit, racing, too fast for conditions);
- seat belt use was lower among HRDs and hence they were more often ejected from the vehicle;
- not having a valid license was almost four times more common among HRDs; and,

- HRDs were more often operating earlier model vehicles (<=1997).

For the most part the differences between HRDs and non-HRDs are more pronounced when using MI data. These include the difference for single vehicle crashes, collisions with fixed objects and drinking drivers among others. However, there are a few cases where the differences were the same or smaller including frontal collisions, invalid licenses and dry road conditions. For cases where the difference was smaller using MI data, the difference was no more than 3% smaller. The only other differences between the above results and those in Section 3 is that when using MI data no difference was found between the percentage of HRDs and non-HRDs who operated a motorcycle, whereas without using MI data, it was found that HRDs more often operated a motorcycle; and a difference was found in terms of early model vehicles (<=1997) with the MI data but there was no difference when not using MI data (see Section 3.2).

Table 4.2 Summary of ten percenter fatal crash characteristics.[2]

	High Risk Driver		
Key Characteristics	No	Yes	Don't Know
Single vehicle	32.90%	57.05%	32.39%
Angle impact	32.54%	18.21%	30.75%
Hit fixed object	17.58%	39.01%	13.49%
Vehicle rollover	12.86%	25.73%	11.92%
Frontal impact	64.53%	68.11%	66.88%
Drivers aged 21-34	25.35%	47.54%	27.11%
Male drivers	70.97%	83.44%	69.87%
Negotiating a curve	10.43%	20.43%	14.73%
No avoidance manoeuvre	61.24%	56.95%	41.90%
Unbelted drivers	25.06%	49.14%	17.23%
Drinking driver	9.74%	51.49%	1.89%
Drugs as contributing factor	5.22%	25.63%	1.45%
Speeding as contributing factor	15.85%	35.34%	9.53%
Not properly licensed	7.46%	26.15%	9.53%
1-2 lane roads	74.37%	78.12%	71.05%
Road not divided	58.67%	63.90%	61.66%
Collision on principal arterials	30.15%	24.03%	28.44%
Collision located on roadside	13.80%	32.76%	13.45%
Curved road	21.47%	33.60%	21.24%
Intersection	38.98%	26.47%	37.01%
Rural area	47.99%	50.01%	42.26%
Motorcycles	8.92%	12.42%	4.82%
Early model vehicles (i.e., <=1997)	36.08%	42.01%	37.48%
Sat-Sun collision	30.55%	40.71%	30.07%
Night time (9pm-5:59am)	25.15%	51.34%	27.33%
Weekend collision	36.97%	49.72%	36.60%
Dark or dark/lighted	36.59%	61.81%	39.28%

Type of collision. HRDs were more often involved than non-HRDs in single vehicle collisions (57% vs. 33%), collisions where the vehicle hit a fixed object (39% vs. 18%) or where one or more of the vehicles rolled over (26% vs. 13%). HRDs were less often involved than non-HRDs in angle collisions (18% vs. 32%) and were somewhat more often involved in collisions with frontal impacts (68% vs. 64%).

Driver characteristics. HRDs involved in fatal collisions, were more often than non-HRDs male (83% vs. 71%), aged 21-34 (47% vs. 25%). HRDs were more often negotiating a curve at the time of the collision than non-HRDs (20% vs. 10%), and it was less common for HRDs than non-HRDs to be turning left at the time of the collision (3% vs. 8%). Seat belts were used

[2] Note that percentages for the categories of the HRD variable do not add up to 100%, as it is the total percentage of the collision characteristics that will add up to 100%. For example, 57% of HRDs were involved in single vehicle collisions and 43% were multiple vehicle collisions (see Table 4.3.1.1).

less often by HRDs than non-HRDs (33% vs. 62%) and ejection from the vehicle was more common in HRD collisions (21% vs. 7%). Using a surrogate measure of impaired driving (i.e., single vehicle, male driver, night-time) that was created by TIRF, HRDs were more often considered to be impaired than were non-HRDs (23% vs. 7%) — note that the variable used in section three to identify drinking drivers can no longer be used because it is partially based on BAC, which is also used to identify HRDs so investigating this relationship using this variable would constitute a tautology. Drugs were more often considered a factor contributing to the collisions of HRDs than was the case for non-HRDs (26% vs. 5%). The estimated travel speed of HRDs prior to the crash was more often 56 mph or higher compared to non-HRDs (26% vs. 18%) and speed was considered a contributing factor more often among HRD collisions than non-HRD collisions (35% vs.16%). Not having a proper license was almost four times more common among HRDs than among non-HRDs (26% vs. 7%).

Road and vehicle characteristics. HRD collisions more often occurred on the roadside compared to non-HRD collisions (33% vs. 14%), and it was also more common for HRDs to end up on the shoulder of the road than non-HRDs (13% vs. 7%). HRD involvement in fatal collisions somewhat less often occurred on principal arterial roads compared to non-HRD collisions (24% vs. 30%). In addition, it was somewhat more common for HRDs to be involved in fatal collisions on collector roads compared to non-HRDs (18% vs. 14%) and on local roads or streets (24% vs. 20%). Fatal crashes more often occurred on curved roads for HRDs than for non-HRDs (34% vs. 21%). The fatal collisions of HRDs less often occurred at intersections (26% vs. 39%) and if the collision occurred at an intersection, HRD collisions more often occurred at places that did not have traffic controls compared to non-HRD collisions (78% vs. 68%). Heavy trucks or buses were somewhat less common among HRDs (5%) than among non-HRDs (9%). It was more common for HRDs to drive earlier model vehicles (<=1997) than non-HRDs (42% vs. 36%). Conversely, it was somewhat less common for HRDs to drive later model vehicles (2004+) than non-HRDs (19% vs. 23%).

Temporal and environmental characteristics. Fatal collisions involving HRDs were more common on Saturdays and Sundays (41%) than was the case for non-HRDs (31%) and these crashes were also more common at night (51% vs. 22%). Fatal weekend collisions involving HRDs (i.e., Friday 6:00pm to Sunday 5:59am) were also more common among HRDs compared to non-HRDs (50% vs. 37%). There was no difference regarding the quarter of the year in which the fatal collision occurred between the two groups of drivers nor were there any

differences in relation to weather conditions. Fatal collisions involving HRDs occurred more often in the dark, either with or without street lighting, than did those involving non-HRDs (62% vs. 37%).

4.3 Fatal Crash Characteristics of Ten Percenters: Detailed Comparisons

This section contains a detailed comparison of each of the characteristics of the fatal collisions involving HRDs and non-HRDs that were summarized above. These results are organized according to the following categories: collision type, driver characteristics, road and vehicle characteristics, and temporal and environmental characteristics.

4.3.1 Collision characteristics. Table 4.3.1.1. reveals that HRDs were more commonly involved in single vehicle collisions (57%) compared to non-HRDs (33%) — results in the "Yes" column are for HRDs. Note that this difference is 13% larger than was the case in Table 3.3.1.1 (the difference was 11% and is now 24%).

Table 4.3.1.1. Number of vehicles by HRD

No. of vehicles	No	Yes	Don't Know
Single vehicle	32.90%	57.05%	32.39%
Multiple vehicle	67.10%	42.95%	67.61%
Total	100.00%	100.00%	100.00%

Table 4.3.1.2. illustrates that HRDs were more often involved than non-HRDs in fatal crashes where there was no other vehicle involved (59% vs. 37%), but less often in angle impact collisions (18% vs. 32%). These differences are 12% and 7% larger respectively than that found in Table 3.3.1.2. Note that when the crash did involve another vehicle, the manner of collision was recorded only for the first harmful event between two motor vehicles in transport.

Table 4.3.1.2. Manner of collision by HRD

Manner of collision	No	Yes	Don't Know
No other vehicle	36.99%	59.31%	38.97%
Front/rear	10.56%	7.79%	11.54%
Head-on	15.11%	11.30%	13.15%
Angle	32.54%	18.21%	30.75%
Sideswipe	4.27%	3.07%	5.03%
Other	0.53%	0.32%	0.56%
Total	100.00%	100.00%	100.00%

HRDs in fatal crashes more often crashed into a fixed object as compared to non-HRDs (39% vs. 18%) and less often crashed into other vehicles than non-HRDs (39% vs. 62%), as shown in Table 4.3.1.3. Note that both of these differences are 11% and 13% larger compared to Table 3.3.1.3.

Table 4.3.1.3. Harmful event by HRD

Harmful event	No	Yes	Don't Know
Rollover	4.62%	7.38%	4.50%
Peds	10.19%	7.48%	16.31%
Vehicle-vehicle collision	62.11%	39.52%	60.28%
Fixed object	17.58%	39.01%	13.49%
Other	5.50%	6.61%	5.42%
Total	100.00%	100.00%	100.00%

HRDs were also more often involved than non-HRDs (26% vs. 13%) in fatal collisions where one or more vehicles rolled over (Table 4.3.1.4). This difference is 7% larger than in Table 3.3.1.4.

Table 4.3.1.4. Vehicle rollover by HRD

Rollover	No	Yes	Don't Know
No rollover	87.14%	74.27%	88.08%
One or more	12.86%	25.73%	11.92%
Total	100.00%	100.00%	100.00%

As shown in Table 4.3.1.5, fatal collisions in which the vehicle was towed were somewhat more common for HRDs (94%) compared to non-HRDs (90%) and this difference is 2% larger than in Table 3.3.1.5.

Table 4.3.1.5. Vehicle towed away by HRD

Towed away	No	Yes	Don't Know
Driven	10.25%	5.97%	21.68%
Towed	89.75%	94.03%	78.32%
Total	100.00%	100.00%	100.00%

Fatal collisions involving the front of one vehicle impacting another vehicle were somewhat more common for the HRDs (68%) than for non-HRDs (64%) as can be seen in Table 4.3.1.6., but this difference was less than 5%. This difference was also not larger than that found in Table 3.3.1.6.

Table 4.3.1.6. Vehicle impact point by HRD

Impact point	No	Yes	Don't Know
Non-collision	2.62%	4.25%	3.11%
Front	64.53%	68.11%	66.88%
Right	10.06%	9.85%	7.54%
Rear	8.47%	4.61%	10.44%
Left	12.26%	9.85%	8.74%
Other	2.06%	3.33%	3.29%
Total	100.00%	100.00%	100.00%

In summary, HRDs were more often involved than non-HRDs in single vehicle collisions (57% vs. 33%), collisions where the vehicle hit a fixed object (39% vs. 18%) or where one or more of the vehicles rolled over (26% vs. 13%). HRDs were less often involved than non-HRDs in angle collisions (18% vs. 32%) and were somewhat more often involved in collisions with frontal impacts (68% vs. 64%).

4.3.2 Driver characteristics. HRDs were more often aged 21-34 (47% vs. 25%) and male (83% vs. 71%) than non-HRDs as shown in Tables 4.3.2.1. and 4.3.2.2. Although more HRDs were male compared to non-HRDs, still 17% of HRDs are female. The difference between HRDs and non-HRDs in terms of age was 3% smaller in Table 3.3.2.1, and in terms of gender was no different from Table 3.3.2.2.

Table 4.3.2.1. Age of driver by HRD

Age	No	Yes	Don't Know
<15	0.33%	0.07%	0.76%
16-20	12.62%	10.80%	12.41%
21-24	8.77%	19.94%	8.28%
25-34	16.58%	27.60%	18.83%
35-44	17.85%	20.33%	18.87%
45-54	16.75%	13.19%	16.33%
55-64	12.35%	5.48%	11.79%
65-74	7.12%	1.66%	6.74%
75+	7.63%	0.93%	5.99%
Total	100.00%	100.00%	100.00%

Table 4.3.2.2. Gender of driver by HRD

Gender	No	Yes	Don't Know
Male	70.97%	83.44%	69.87%
Female	29.03%	16.56%	30.13%
Total	100.00%	100.00%	100.00%

Table 4.3.2.3. indicates that it was more common for HRDs to have been negotiating a curve at the time of the crash (20%) than it was for non-HRDs (10%). In addition, it was less common for HRDs than non-HRDs to be turning left at the time of the collision (3% vs. 8%). These differences were 5% and 1% larger than those in Table 3.3.2.3.

Table 4.3.2.3. Vehicle manoeuvre by HRD

Vehicle Manoeuvre	No	Yes	Don't Know
Going straight/starting in traffic lane	70.11%	67.92%	66.82%
Slowing/stopped	4.92%	1.67%	5.52%
Passing	1.64%	2.43%	1.33%
Turning left	7.83%	3.22%	7.17%
Negotiating a curve	10.43%	20.43%	14.73%
Other	5.07%	4.33%	4.43%
Total	100.00%	100.00%	100.00%

Although the difference is not large (<5%), HRDs failed to make an avoidance manoeuvre somewhat less often (57%) than did non-HRDs (61%) as shown in Table 4.3.2.4. This difference was the same as that found in Table 3.3.2.4. However, given the relatively high percent of “not reported” cases, it is difficult to interpret these results.

Table 4.3.2.4. Avoidance manoeuvre by HRD

Avoidance manoeuvre	No	Yes	Don't Know
No avoid manoeuvre	61.24%	56.95%	41.90%
Braking	6.19%	6.88%	6.62%
Steering	9.33%	9.35%	6.21%
Other	0.33%	0.19%	0.12%
Not reported	22.91%	26.63%	45.15%
Total	100.00%	100.00%	100.00%

Driver belt use is presented in Table 4.3.2.5. High-risk drivers wore seat belts less often (33%) than non-HRDs (62%). Conversely, the non-use of restraints was more common for HRDs (49%) compared to non-HRDs (25%). These differences were both 10% larger than those in Table 3.3.2.5.

Table 4.3.2.5. Restraint use by HRD

Restraint use	No	Yes	Don't Know
No restraint	25.06%	49.14%	17.23%
Seat belt	61.58%	33.49%	55.58%
Helmet	5.85%	7.44%	3.25%
Don't know	7.51%	9.93%	23.94%
Total	100.00%	100.00%	100.00%

Table 4.3.2.6. indicates that HRDs involved in fatal crashes were more often ejected from the vehicle (21%) than non-HRDs (7%). This finding is consistent with the lower belt use found among HRDs. Note that this difference is 7% larger than that found in Table 3.3.2.6.

Table 4.3.2.6. Ejected from vehicle in fatal crashes by HRD

Ejected	No	Yes	Don't Know
No	92.47%	79.00%	94.12%
Yes	7.53%	21.00%	5.88%
Total	100.00%	100.00%	100.00%

A surrogate measure of impaired driving created by TIRF[3] identified those male drivers who were involved in single vehicle crashes at night-time (9:00pm-5:59am). Based on this surrogate measure, HRDs were considered to have been impaired at the time of the collision more often (23%) than non-HRDs (7%) as shown in Table 4.3.2.7. This difference is 9% larger than that found in Table 3.3.2.8.

Table 4.3.2.7. Impaired driver (surrogate) by HRD

Impaired driver	No	Yes	Don't Know
No	92.99%	77.19%	95.24%
Yes	7.01%	22.81%	4.76%
Total	100.00%	100.00%	100.00%

Table 4.3.2.8. shows that more than five times as many HRDs involved in fatal collisions were considered by the police to have been using drugs (26%) as compared to non-HRDs (5%). This difference is 15% larger than was the case in Table 3.3.2.9.

Table 4.3.2.8. Drug use by HRD

Drugs	No	Yes	Don't Know
Yes	5.22%	25.63%	1.45%
No	94.78%	74.37%	98.55%
Total	100.00%	100.00%	100.00%

Estimated travel speeds of 56 mph or higher were more common among HRDs (26%) involved in fatal collisions than non-HRDs (18%), as can be seen in Table 4.3.2.9. This

[3] Note that the variable used in section three to identify drinking drivers can no longer be used because it is partially based on BAC, which is also used to identify HRDs so investigating this relationship using this variable would constitute a tautology. Therefore only the surrogate measure created by TIRF is used.

difference is 3% larger than that found in Table 3.3.2.10. However, there was a large percentage of “Don’t knows” making it difficult to interpret this result.

Table 4.3.2.9. Estimated travel speed by HRD

Travel speed	No	Yes	Don't Know
<=30	12.36%	5.13%	3.01%
31-55	30.78%	23.00%	6.65%
56-69	7.51%	10.29%	2.88%
70+/no limit	10.85%	16.08%	5.51%
Don't know	38.50%	45.50%	81.95%
Total	100.00%	100.00%	100.00%

Collisions involved speed (i.e., exceeding speed limit, racing, driving too fast for conditions) as a contributing factor more often among HRDs (35%) compared to non-HRDs (16%) as can be seen in Table 4.3.2.10. This difference is 9% larger than the difference found in Table 3.3.2.11.

Table 4.3.2.10. Speeding by HRD

Speeding	No	Yes	Don't Know
Yes	15.85%	35.34%	9.53%
No	84.15%	64.66%	90.47%
Total	100.00%	100.00%	100.00%

Not having a valid driver’s license at the time of the fatal collision (i.e., never had one, suspended, revoked) was almost four times more common among HRDs (26%) compared to non-HRDs (7%) as shown in Table 4.3.2.11. This difference was 2% smaller than that found in Table 3.3.2.12. Of importance, note that only previous license-related events were used to identify HRDs as used in the independent variable (columns) and that only current license status is used in the dependent variable (rows) — meaning no tautology is introduced.

Table 4.3.2.11. License status by HRD

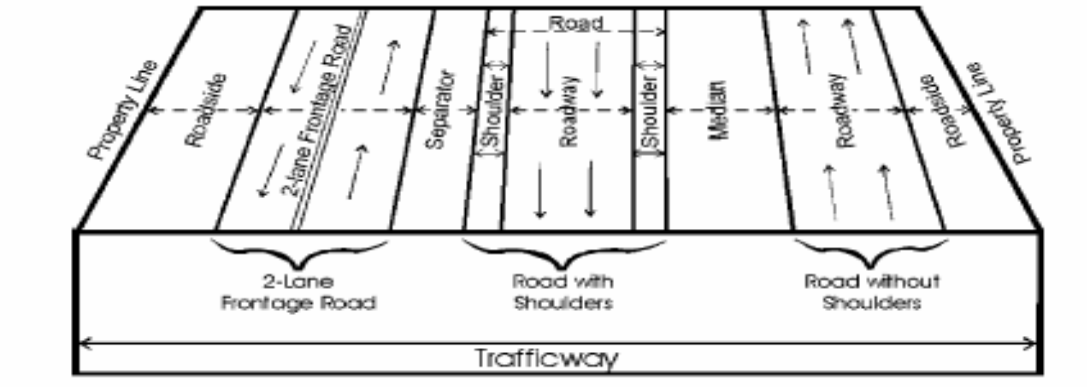
Licensed	No	Yes	Don't Know
Not licensed	2.83%	4.13%	6.72%
Licensed	92.54%	73.85%	90.47%
Not valid	4.63%	22.02%	2.81%
Total	100.00%	100.00%	100.00%

Logistic regression was used to further investigate the profile of HRDs. Control variables used in the analysis include age and gender. It was found that being older significantly decreases the chances of being a HRD with an odds ratio of 0.97 (s.e.=0.0007; p=0.000). These results were re-scaled such that an increase in the independent variable (i.e., age) would represent an increase of five years; the corresponding odds ratio was 0.85. Thus, with every 5 year increase in age the chances of being a HRD decreases by 15% ((1-0.85)*100). It was also found that being female decreases the chances of being a HRD (odds ratio=0.51; s.e.=0.014137; p=0.000). This corresponds to a 49% decrease in the chances of being a HRD for females ((1-0.51)*100).

In summary, HRDs involved in fatal collisions, were more often male than non-HRDs to be male (83% vs. 71%), aged 21-34 (47% vs. 25%). HRDs were more often negotiating a curve at the time of the collision than non-HRDs (20% vs. 10%), and it was less common for HRDs than non-HRDs to be turning left at the time of the collision (3% vs. 8%). Seat belts were used less often by HRDs than non-HRDs (33% vs. 62%) and ejection from the vehicle was more common in HRD collisions (21% vs. 7%). Using a surrogate measure of impaired driving (i.e., single vehicle, male driver, night-time) that was created by TIRF, HRDs were more often considered to be impaired than were non-HRDs (23% vs. 7%). Drugs were more often considered a factor contributing to the collisions of HRDs than was the case for non-HRDs (26% vs. 5%). The estimated travel speed of HRDs prior to the crash was more often 56 mph or higher compared to non-HRDs (26% vs. 18%) and speed was considered a contributing factor more often in HRD collisions than in non-HRD collisions (35% vs.16%). Not having a proper license was almost four times more common among HRDs than among non-HRDs (26% vs. 7%).

4.3.3 Road and vehicle characteristics. The traffic way can be separated into different components as shown in Figure 4.3.3.1. below. The roadway is the part of the traffic way, usually paved, on which vehicles typically travel. The shoulder is a strip of paved or unpaved surface immediately next to the roadway. Beyond the shoulder is the roadside on the right side of the traffic way which may include ditches, culverts, trees, poles, and other fixed objects. For those roads that are divided there is either a strip of unpaved open space between the opposing lanes of traffic or there are concrete barriers that separate the opposing lanes.

Figure 4.3.3.1 Description of traffic way components



It was more common for high-risk drivers to end up driving off the road onto the roadside in fatal collisions than was the case for the non-HRDs (33% vs. 14%), and it was also more common for HRDs to end up on the shoulder of the road than non-HRDs (13% vs. 7%) as shown in Table 4.3.3.1. Conversely, it was less common for HRDs to end up on the road in fatal collisions compared to non-HRDs (51% vs. 77%). These differences were 11%, 4% and 15% larger respectively compared to those found in Table 3.3.3.1.

Table 4.3.3.1. Road location by HRD

Road location	No	Yes	Don't Know
On-road	76.63%	51.13%	81.10%
Shoulder	7.25%	12.78%	3.60%
Median/left turn	2.32%	3.33%	1.85%
Roadside	13.80%	32.76%	13.45%
Total	100.00%	100.00%	100.00%

Table 4.3.3.2 shows that it was somewhat more common for HRDs to be involved in fatal collisions on one or two lane roads compared to non-HRDs (78% vs. 74%). This difference is 4% larger when compared to Table 3.3.3.2.

Table 4.3.3.2. Number of lanes by HRD

No. of lanes	No	Yes	Don't Know
1-2	74.37%	78.12%	71.05%
3	11.45%	9.43%	9.24%
4+	14.18%	12.45%	19.71%
Total	100.00%	100.00%	100.00%

As shown in Table 4.3.3.3, it was more common for collisions involving HRDs to occur on un-divided roads (64%) compared to non-HRDs (59%) and it was less common for HRD

collisions to occur on roads that are divided with no barrier than was the case for non-HRDs (20% vs. 25%). These differences are 4% and 3% larger respectively compared to Table 3.3.3.3.

Table 4.3.3.3. Divided road by HRD

Divided road	No	Yes	Don't Know
Not divided	58.67%	63.90%	61.66%
Divided/no barrier	24.74%	19.99%	20.79%
Divided/barrier	14.02%	13.22%	14.27%
Other	2.57%	2.89%	3.28%
Total	100.00%	100.00%	100.00%

HRD involvement in fatal collisions less often occurred on a principal arterial road compared to non-HRD collisions (24% vs. 30%) as shown in Table 4.3.3.4. In addition, it was somewhat more common for HRDs to be involved in fatal collisions on collector roads compared to non-HRDs (18% vs. 14%) and on local roads or streets (24% vs. 20%). The differences found for principal arterial and collector roads are both 2% larger than those found in Table 3.3.3.4 and the difference for local roads or streets is 3% larger.

Table 4.3.3.4. Road function by HRD

Road function	No	Yes	Don't Know
Principal arterial interstate	11.68%	11.20%	15.59%
Principal arterial other frwy/exprwy	4.13%	4.27%	2.14%
Principal arterial	30.15%	24.03%	28.44%
Minor arterial	19.16%	18.33%	25.61%
Collector	14.46%	18.23%	14.86%
Local rd. or st.	20.42%	23.94%	13.36%
Total	100.00%	100.00%	100.00%

Table 4.3.3.5 shows that traveling on curved roads at the time of the crash was more common among HRDs (34%) than it was for non-HRDs (21%) but there was not much difference regarding the presence of a grade on the road (Table 4.3.3.6). With regards to curved roads, the difference is 8% larger than was the case in Table 3.3.3.5.

Table 4.3.3.5 Road alignment by HRD

Road alignment	No	Yes	Don't Know
Straight	78.53%	66.40%	78.76%
Curved	21.47%	33.60%	21.24%
Total	100.00%	100.00%	100.00%

Table 4.3.3.6 Road grade by HRD

Road profile	No	Yes	Don't Know
Level	75.29%	71.89%	58.85%
Grade	22.07%	25.24%	37.44%
Hill crest/sag	2.64%	2.87%	3.71%
Total	100.00%	100.00%	100.00%

Fatal collisions involving HRDs less often occurred at intersections (26%) than non-HRDs (39%) as shown in Table 4.3.3.7. If the collisions were at intersections, HRD collisions more often did not have traffic controls compared to non-HRDs (78% vs. 68%) as shown in Table 4.3.3.8. These differences are 7% and 3% larger respectively compared to Tables 3.3.3.7 and 3.3.3.8.

Table 4.3.3.7 Intersection by HRD

Intersection	No	Yes	Don't Know
No	61.02%	73.53%	62.99%
Yes	38.98%	26.47%	37.01%
Total	100.00%	100.00%	100.00%

Table 4.3.3.8 Intersection traffic controls by HRD

Traffic controls	No	Yes	Don't Know
No controls	67.69%	77.92%	74.30%
Traffic signal	12.63%	7.81%	10.75%
Stop/yield	11.72%	6.81%	12.01%
Other	7.96%	7.46%	2.94%
Total	100.00%	100.00%	100.00%

There was little difference between HRDs and non-HRDs (<5%) relating to road conditions in fatal crashes (Table 4.3.3.9). This is no different from the results in Table 3.3.3.9.

Table 4.3.3.9 Road conditions by HRD

Road conditions	No	Yes	Don't Know
Dry	83.85%	85.69%	85.62%
Wet	13.44%	12.75%	13.21%
Snow/slush/ice	2.52%	1.28%	1.02%
Other	0.19%	0.28%	0.15%
Total	100.00%	100.00%	100.00%

As shown in Table 4.3.3.10, there was no significant difference across categories of speed limits between HRDs and non-HRDs ($p<0.05$). Note that although a difference was found

between HRDs and non-HRDs in terms of vehicle travel speed, there was no difference in terms of the speed limit, as drivers may ignore the speed limit, resulting in higher travel speeds. This is no different from the results found in Table 3.3.3.10.

Table 4.3.3.10 Speed limit by HRD

Speed limit	No	Yes	Don't Know
<=30	10.52%	11.76%	9.54%
31-55	76.04%	76.30%	76.52%
56-69	9.21%	8.38%	8.89%
70+	4.23%	3.56%	5.05%
Total	100.00%	100.00%	100.00%

Table 4.3.3.11. shows that there was little difference between HRDs and non-HRDs (<5%) in terms of whether the fatal collision occurred in a rural or urban area. This difference is the same as that found in Table 3.3.3.11; however, this difference is in the opposite direction.

Table 4.3.3.11. Rural/urban by HRD

Rural/urban	No	Yes	Don't Know
Rural	47.99%	50.01%	42.26%
Urban	52.01%	49.99%	57.74%
Total	100.00%	100.00%	100.00%

Table 4.3.3.12. indicates that no differences greater than 5% were found between HRDs and non-HRDs in terms of the vehicle type. However, heavy trucks or buses were somewhat less common among HRDs (5%) than among non-HRDs (9%). This difference was 4% larger than that found in Table 3.3.3.12. In addition, in terms of the vehicle type being a motorcycle, the difference between HRDs and non-HRDs is 2% smaller here than in Table 3.3.3.12.

Table 4.3.3.12. Vehicle type by HRD

Type of vehicle	No	Yes	Don't Know
Car	44.73%	45.38%	42.13%
Utility	15.22%	15.17%	16.03%
Van	7.19%	4.42%	7.43%
Truck	14.01%	16.64%	17.82%
Heavy truck/bus	8.99%	4.92%	10.44%
Motorcycle	8.92%	12.42%	4.82%
Other	0.94%	1.05%	1.33%
Total	100.00%	100.00%	100.00%

The model year of the vehicles driven by HRDs and non-HRDs in fatal crashes is shown in Table 4.3.3.13. It was more common for HRDs to drive earlier model vehicles (<=1997) than non-HRDs (42% vs. 36%). Conversely, it was somewhat less common for HRDs to drive later

model vehicles (2004+) than non-HRDs (19% vs. 23%). These differences were both 2% larger compared to the results in Table 3.3.3.13. Studies on vehicle impoundment programs have similarly found that experienced offenders drive older vehicles with little value and abandon them once impounded (Voas and Marques, 2003).

Table 4.3.3.13. Model year by HRD

Model year	No	Yes	Don't Know
<=1997	36.08%	42.01%	37.48%
1998-2000	19.98%	19.64%	21.82%
2001-2003	21.34%	19.19%	19.89%
2004+	22.60%	19.16%	20.81%
Total	100.00%	100.00%	100.00%

No differences greater than 5% were found in relation to the state where the vehicle was licensed (Table 4.3.3.14.). These results were no different from those found in Table 3.3.3.14.

Table 4.3.3.14. State license status by HRD

State license	No	Yes	Don't Know
In state	88.03%	91.01%	85.76%
Out of state	11.97%	8.99%	14.24%
Total	100.00%	100.00%	100.00%

In summary, HRD collisions more often occurred on the roadside compared to non-HRD collisions (33% vs. 14%), and it was also more common for HRDs to end up on the shoulder of the road than non-HRDs (13% vs. 7%). HRD involvement in fatal collisions somewhat less often occurred on a principal arterial road compared to non-HRD collisions (24% vs. 30%). In addition, it was somewhat more common for HRDs to be involved in fatal collisions on collector roads compared to non-HRDs (18% vs. 14%) and on local roads or streets (24% vs. 20%). Fatal crashes more often occurred on curved roads for HRDs than for non-HRDs (34% vs. 21%). The fatal collisions of HRDs less often occurred at intersections (26% vs. 39%) and if the collision occurred at an intersection, HRD collisions more often occurred at places that did not have traffic controls compared to non-HRD collisions (78% vs. 68%). Heavy trucks or buses were somewhat less common among HRDs (5%) than among non-HRDs (9%). It was more common for HRDs to drive earlier model vehicles (<=1997) than non-HRDs (42% vs. 36%). Conversely, it was somewhat less common for HRDs to drive later model vehicles (2004+) than non-HRDs (19% vs. 23%).

4.3.4 Temporal and environmental characteristics. Fatal collisions involving HRDs were more common on Saturdays and Sundays (41%) than was the case for non-HRDs (31%) as can be seen in Table 4.3.4.1. This difference is 5% larger than that in Table 3.3.4.1.

Table 4.3.4.1. Day of week by HRD

Day of week	No	Yes	Don't Know
Sunday	14.15%	19.38%	14.37%
Monday	13.40%	10.89%	14.26%
Tuesday	12.88%	10.54%	12.88%
Wednesday	13.28%	10.88%	11.95%
Thursday	13.87%	11.42%	13.97%
Friday	16.02%	15.56%	16.87%
Saturday	16.40%	21.33%	15.70%
Total	100.00%	100.00%	100.00%

As shown in Table 4.3.4.2, fatal collisions occurring at night (9:00pm-5:59am) were much more common for HRDs (51%) than non-HRDs (22%), particularly in the 12:00am-2:59am time period (21% vs. 7%). These differences are 16% and 7% larger respectively compared to those in Table 3.3.4.2.

Table 4.3.4.2. Time of day by HRD

Time	No	Yes	Don't Know
12am-2:59am	7.49%	21.42%	8.42%
3am-5:59am	5.85%	11.22%	6.79%
6am-8:59am	11.27%	6.74%	12.52%
9am-11:59am	12.19%	6.08%	11.34%
12pm-2:59pm	16.59%	7.93%	15.88%
3pm-5:59pm	18.95%	12.08%	17.17%
6pm-8:59pm	15.85%	15.83%	15.76%
9pm-11:59pm	11.81%	18.70%	12.12%
Total	100.00%	100.00%	100.00%

NHTSA (2008b) has found that the incidence of impaired driving (i.e., BAC is 0.08% or higher) is more common among drivers during the weekend. Therefore, TIRF created a variable based on a combination of time of day and day of week to examine the distribution of fatal crashes involving HRDs during weekdays and weekends (i.e., Friday from 6:00pm to Monday 5.59am). HRDs more often were involved in fatal collisions on the weekend compared to non-HRDs (50% vs. 37%) as shown in Table 4.3.4.3. This difference is 8% larger than that in Table 3.3.4.3.

Table 4.3.4.3. Weekday/end by HRD

Weekday/end	No	Yes	Don't Know
Weekday	63.03%	50.28%	63.40%
Weekend	36.97%	49.72%	36.60%
Total	100.00%	100.00%	100.00%

There was no difference greater than 5% among drivers regarding the quarter of the year in which the fatal collision occurred (Table 4.3.4.4.) as was the case in Table 3.3.4.4.

Table 4.3.4.4. Quarter of year by HRD

Quarter of year	No	Yes	Don't Know
Jan-Mar	22.91%	22.09%	23.08%
Apr-Jun	25.41%	26.43%	25.43%
Jul-Sep	25.55%	26.70%	24.94%
Oct-Dec	26.13%	24.78%	26.55%
Total	100.00%	100.00%	100.00%

It was more common for HRDs to have been involved in fatal collisions when it was dark without street lights than non-HRDs (38% vs. 21%) as shown in Table 4.3.4.5. HRD involvement in fatal collisions also occurred more often when it was dark but the roadway did have street lights (24% vs. 16%). These differences were 4% and 3% larger respectively than those found in Table 3.3.4.5.

Table 4.3.4.5. Light conditions by HRD

Light conditions	No	Yes	Don't Know
Daylight	58.94%	34.64%	57.04%
Dark	20.99%	38.19%	23.60%
Dark & lighted	15.61%	23.62%	15.68%
Dawn/dusk	4.46%	3.55%	3.68%
Total	100.00%	100.00%	100.00%

Table 4.3.4.6 shows there was no difference greater than 5% between HRDs and non-HRDs involved in fatal crashes in relation to weather conditions as was the case in Table 3.3.4.6.

Table 4.3.4.6. Weather conditions by HRD

Weather conditions	No	Yes	Don't Know
No adverse weather	88.67%	90.23%	89.79%
Rain	8.27%	7.54%	8.01%
Sleet/snow	1.84%	0.91%	0.83%
Other	1.22%	1.32%	1.37%
Total	100.00%	100.00%	100.00%

In summary, fatal collisions involving HRDs were more common on Saturdays and Sundays (41%) than was the case for non-HRDs (31%) and these crashes were also more common at night (51% vs. 22%). Fatal weekend collisions involving HRDs (i.e., Friday 6:00pm to Sunday 5:59am) were also more common among HRDs compared to non-HRDs (50% vs. 37%). There was no difference regarding the quarter of the year in which the fatal collision occurred between the two groups of drivers nor were there any differences in relation to weather conditions. Fatal collisions involving HRDs occurred more often in the dark, either with or without street lighting, than did those involving non-HRDs (62% vs. 37%).

5.0 STATE DRIVER RECORD ANALYSES

The purpose of the state driver record analyses was to estimate the magnitude of the high-risk driver problem by examining persistent traffic offenders in Florida, Virginia and Georgia and then determining what percentage of them are high-risk. The focus of the analyses was on all licensed drivers (used in the denominator when calculating the proportion of HRDs). However, the definition of ten percenters (used to calculate the numerator) includes convictions, charges or citations which may have included license related traffic offenses. Thus, unlicensed drivers would have been captured in the numerator, but not in the denominator. This may have led to an over-estimation of the proportion of high-risk drivers (if unlicensed drivers would have been included in the denominator, the result would have been smaller), although it can be argued that this bias would be nominal given that the number of HRDs compared to the total number of licensed drivers is small.

In this section of the report, a ten percenter is defined as a driver who had three or more convictions, offenses, charges or citations during the years 2005, 2006 and 2007. Where other indicators of high-risk driving behaviors were available (i.e., BAC, speeding, crashes), these were included in the definition as well.

For each state included in the driver record analysis, the number of HRDs was divided by the population of licensed drivers in the respective state averaged for the years 2005, 2006 and 2007 using data from the Federal Highway Administration (FHA). In doing this, three years of data (the numerator is equal to the number of HRDs within a three year period, i.e., 2005, 2006 and 2007) are essentially being divided by one year of data (the denominator is equal to the population of licensed drivers in one year). To measure both numerator and denominator on the same scale, the numerator will also be divided by three.

The percentage of drivers identified as meeting the ten percenter or HRD definition is presented separately for each state as each state data system contains different variables which were used to identify HRDs. It warrants mentioning that the differences between the available data systems are considerable and precluded the use of one common definition of

HRDs. It can be argued that this detracts from the comparability of results coming from those different data systems.

5.1 Magnitude of Ten Percenters in Florida

The magnitude of HRDs in the state of Florida was calculated as follows. A driver who had three or more charges for high-risk driving behaviors (e.g., reckless driving, aggressive driving, improperly licensed, etc.) during the three year period from 2005 to 2007 inclusive, or had a BAC of 0.16% or higher was considered to be a HRD. This number (divided by three) was then divided by the population of licensed drivers in Florida averaged for the years 2005, 2006 and 2007. The percentage of HRDs using this definition was 2.35%. It should be noted that the BAC variable was missing 92% of the time which may have underestimated the magnitude of HRDs.

This definition was applied again while also including speeding in the definition. A driver was considered to be speeding if the actual speed of the vehicle was 20 mph or higher than the posted speed limit. Therefore the HRD definition was amended as follows: a driver who had three or more charges for high-risk driving behaviors, or had a BAC of 0.16%, or was driving 20 mph or more above the posted speed limit. The percentage of HRDs using this definition was nearly 16.92%.

Since speeding is a common behavior, this result should be interpreted with caution. Perhaps if a higher threshold for speeding was used, i.e., a larger difference between the posted speed and actual speed, it would provide a different representation of high-risk driving behavior. Unfortunately, there was no information about speeding for the other states, so no comparable data were available.

5.2 Magnitude of Ten Percenters in Virginia

In Virginia, a driver who had three or more convictions for high-risk driving behaviors, or was involved in three or more accidents during the three year period from 2005 to 2007 inclusive was considered to be a HRD. This number (divided by three) was then divided by the

population of licensed drivers in Virginia averaged for the years 2005, 2006 and 2007[4]. The percentage of HRDs using this definition was 0.08%.

5.3 Magnitude of Ten Percenters in Georgia

In Georgia a driver who had three or more convictions for high-risk driving behaviors during the three year period from 2005 to 2007 inclusive was considered to be a HRD. This number (divided by three) was then divided by the population of licensed drivers in Georgia averaged for the years 2005, 2006 and 2007. The percentage of HRDs in Georgia using this definition is 0.35%.

5.4 Conclusions

Each state data system contains different variables which were used to identify HRDs. Because of this, it is difficult to make very accurate comparisons between States. Florida's state driver record data contained information about charges for high-risk driving behaviors. However, for Virginia and Georgia, the data contained information about convictions rather than charges for high-risk driving behaviors. It is possible that the percentage of HRDs was higher in Florida (2.35%) than in Virginia and Georgia (0.08% and 0.35% respectively) because its database contains charges and not all charges result in convictions. Thus, a higher number of charges compared to convictions would be expected. Furthermore, Florida also contained information pertaining to BAC, whereas the other two states' driver record systems did not.

While the results from the state data systems are difficult to compare, they can be compared to the results regarding the magnitude of the HRD problem based on the FARS crash data. When doing this, it becomes clear that the magnitude of the problem is much smaller when looking at all HRDs on the road as opposed to only those involved in crashes. To illustrate, the percentage of HRDs was found to be 13.6% in the FARS analysis using information about previous crashes or convictions and 24.6% when BAC was also included (based on the MI procedure). This is quite high compared to the 2.35% of HRDs found in Florida and even higher than the 0.35% found in Georgia and 0.08% in Virginia. This suggests that the percentage of HRDs is smaller when examining all licensed drivers, whether involved in a

[4] Note that for Virginia the number of licensed drivers according to the FHA was slightly lower than the number from the Virginia DMV, but the impact of this difference on the results is nominal.

crash or not, than the percentage involved in fatal crashes alone. As such, generally speaking, HRDs represent a small proportion of drivers but account for a very substantial portion of fatal injury collisions.

Overall, the analyses of HRDs have found that small groups of persistent traffic violators are responsible for a significant portion of the fatal collisions on the highways. These finding are in line with other research showing a relatively small group of offenders causing a disproportionate amount of the damage on the roadways (Simpson et al., 2004; Mayhew et al., 2010; Beirness and Simpson, 1997; Simpson and Mayhew, 1991; Williams et al., 2007). In conclusion, the label “ten percenters” appropriately conveys that a small percent of violators account for a major portion of the traffic safety problem.

6.0 HIGH-RISK DRIVER PROGRAM SURVEY RESULTS

As described in the previous section, results of the crash analyses revealed that HRDs were more commonly involved in single vehicle collisions where the vehicle ran off the road and hit a fixed object. Drivers in these collisions tended to be male, aged 21-34, unbelted, speeding, under the influence of alcohol or drugs, and were likely to have an invalid license. Collisions most often occurred on weekends, at night, and when it was dark.

Based on these results, an international survey was constructed to identify programs focusing on high-risk drivers who are responsible for a significant portion of serious injury and fatal collisions, as revealed by the crash analyses. Examples that highlight some of the most promising and/or unique programs that were identified are presented.

The survey was distributed to lead transportation and law enforcement professionals from various jurisdictions along the I-95 Corridor, in other US jurisdictions and several other countries. The survey consisted of 32 questions that focused on laws and enforcement, educational and rehabilitation programs, and innovative measures.

All jurisdictions in the I-95 Corridor received a copy of the survey and 15 of the 17 jurisdictions subsequently responded to it – a response rate of 88%. In addition, to expand on information about relevant programs and policies, the survey was also distributed to a select number of contacts in other U.S. states, provinces and territories in Canada. A total of 22 surveys were distributed outside of the Corridor and 14 responded. This resulted in a response rate of 64%. The overall response rate was 74%; 29 out of 39 jurisdictions responded to the surveys.

This section contains the survey results and is structured in two parts. The first part describes programs targeted towards high-risk impaired drivers and the second part describes programs targeted towards high-risk drivers with multiple convictions and collisions. The types of programs discussed in each part may include relevant laws and enforcement strategies, education and awareness programs, rehabilitation programs, sanctions and other innovative measures.

Each part is discussed separately and includes a summary of the key features of programs (e.g., program purpose, program authority, eligibility criteria, content delivery mechanism, incentives to participate, and funding strategies) which are reported first, and is followed by a breakdown of responses between the I-95 Corridor jurisdictions and other jurisdictions. Some of the most interesting and unique programs and policies that were identified by the survey are also briefly discussed in relation to both topics in order to provide a snapshot of the variety of programs that are available. A more detailed summary of key programs mentioned in this section can be found in Appendix A. Due to space constraints, it was not possible to include a description of each individual program that was identified in the survey, many of which were similar.

6.1 High-Risk Impaired Drivers

Overview of Survey Results. Within the I-95 Corridor the programs that are available to address high-risk impaired drivers (i.e., drivers with a BAC of at least 0.16% or who refused to provide a breath test) vary across jurisdictions. The focus of these programs for dealing with HRDs can be categorized as education or awareness, rehabilitation, or sanctions. Of the jurisdictions that responded to the survey, educational and awareness programs are offered in ten jurisdictions; rehabilitation programs are offered in thirteen; sanctions are mandated in eleven jurisdictions. Eleven jurisdictions offer more than one program. The objectives of these programs are rehabilitation, deterrence (recidivism), dual focus of rehabilitation and deterrence, and relicensing.

The authority to impose these programs or sanctions is derived from criminal and/or traffic law and regulations in each jurisdiction. Agencies that are tasked with managing these programs are frequently the Department of Motor Vehicles (or its equivalent), or the Courts or both. Some programs may operate statewide whereas other programs may be limited to specific areas within a jurisdiction. Eligibility criteria also vary by jurisdiction and often include having a conviction of an alcohol related traffic offence, having a high BAC, or refusal to provide a breath or blood sample.

These programs are delivered using different strategies depending on the nature of the program. Six jurisdictions offer one-on-one interactions with offenders (Delaware, Georgia, Maryland, New Hampshire, South Carolina, and Virginia). Four jurisdictions deliver the

program to small groups of two to six offenders (Georgia, New Hampshire, Vermont, and Virginia). Eight jurisdictions accommodate larger groups of offenders involving seven or more individuals (Delaware, Florida, Georgia, Massachusetts, New Hampshire, New York, Rhode Island, and Virginia). The tools used to deliver the program content to offenders also vary. The most common tools include both presentations and interactive discussion groups, which are used in eight jurisdictions (Florida, Georgia, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and Virginia). Maryland's main delivery tool is interactive discussion groups.

The length of these programs ranges from short programs of four to eight hours to longer ones of one year of treatment, depending on the jurisdiction and the characteristics of the offense. Some programs are determined based on the length of the suspension or revocation period that is imposed, whereas the length of others is based on subsequent offenses or the BAC level of the offender. More information about the actual length of individual programs can be found in the appendix (see appendix A).

The benefits or incentives to participate that may be offered as part of the program can be grouped according to four categories: reduced suspension period, reduced demerit points, eligibility for relicensing, and reduced insurance premiums. A reduced suspension period was reported by six jurisdictions (Maine, Maryland, Massachusetts, New Hampshire, New York, and Pennsylvania); reduced demerit points were reported in one jurisdiction (Pennsylvania); and eligibility for relicensing was reported in fourteen jurisdictions (Delaware, Florida, Georgia, Maine, Maryland, Massachusetts, New Hampshire, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Vermont and Virginia). In Delaware, program completion is required for license reinstatement. North Carolina was the only jurisdiction to report a reduced insurance premium.

With regard to how these programs are financially supported, on average 87% of offenders pay for the program themselves among those programs within the I-95 Corridor.

Laws and Enforcement. Almost half (47%) of the I-95 Corridor jurisdictions reported that they have a legal operational definition of a high-risk impaired driver. Seven jurisdictions (Georgia, Maine, Maryland, New Hampshire, New Jersey, Pennsylvania, and Virginia) provided

examples of their law. For example, Georgia's DWI[5] statute states a high-risk impaired driver is a "direct and immediate threat to the welfare and safety of the general public." However, all of the responding Corridor jurisdictions either have high-BAC laws or laws dealing specifically with high-risk impaired drivers. In addition these laws are promoted using enforcement campaigns to identify high-risk impaired drivers in slightly more than half (53%) of the I-95 Corridor jurisdictions.

With regard to sanctions for high-risk drivers, these penalties are mandated by the courts in Delaware, Maryland, Massachusetts, New Hampshire, New York, Georgia, North Carolina, Rhode Island, Pennsylvania, South Carolina, and Virginia. Interlock sanctions are enforced through licensing agencies (e.g., Department of Motor Vehicles, Department of Highway Safety and Motor Vehicles) in Maryland, Florida, Georgia, and Virginia.

A number of I-95 Corridor jurisdictions also reported some type of innovative enforcement measure, beyond traditional enforcement strategies, to reduce high-risk impaired driving. Florida reported that it conducts "Operation Round-Up," which is a selective enforcement program designed to remove convicted multiple DWI offenders from Florida's roadways and permanently revoke their driver's license. Maine reported that it participates in NHTSA's impaired driving enforcement campaigns, specifically "Buzzed Driving is Drunk Driving." New York reported that it conducts saturation patrols which allow all participating law enforcement agencies to maximize their resources and coverage for DWI enforcement during a specific period. Rhode Island's program "You Drink & Drive, you Lose" focuses on high-visibility enforcement and heighted public awareness.

Jurisdictions outside the I-95 Corridor, including Minnesota, Nova Scotia, Ontario, and Saskatchewan also reported a variety of innovative measures to reduce high-risk impaired driving. Minnesota reported that they identify specific enforcement zones to conduct year-long, sustained high visibility DWI enforcement saturation patrols in the thirteen deadliest alcohol-related counties. Nova Scotia is piloting an Integrated Impaired Driving Enforcement unit that specifically targets impaired drivers. Ontario reported it has the Reduced Impaired Driving

[5]The abbreviation DWI (driving while impaired or intoxicated) is used throughout this section as a convenient descriptive label, even though some jurisdictions use other terms such as OUI (operating under the influence) and DUI (driving under the influence), and in some cases these terms refer to the severity of the offense. We have used DWI to maintain consistency throughout the report.

Everywhere (RIDE), an enforcement campaign that runs all year long and involves police spot checks (similar to sobriety checkpoints in the U.S.). The RIDE campaign is delivered in conjunction with a significant public awareness component. Saskatchewan reported that it has Operation Overdrive which provides resources for enforcement agencies to provide targeted stops to check for drinking and driving occurrences.

Educational Programs. Innovative educational programs to reduce high-risk impaired driving are being used in a number of the I-95 Corridor jurisdictions. Florida reported to have a Level II DWI course, which requires 21-hours of classroom time using primarily interactive educational techniques. This course focuses on the problems of the repeat offender and treatment readiness for those referred to treatment.

Maine's Driver Education and Evaluation Programs (DEEP) require all adult offenders (including first time offenders and those with more than one offense within ten years) to complete a 20-hour educational course. The course's curriculum is created by Prime For Life, an organization "designed to gently but powerfully challenge common beliefs and attitudes that directly contributed to high-risk alcohol and drug use" (DiClemente, 2008-2009: p.1). D.E.E.P. is based on education, self assessment, evaluation, treatment, and completion. Education is provided to make clients aware of the differences between use, abuse, and addiction. Clients self-assess using both a prevention and intervention-oriented approach. Assessments are done to determine the extent, or potential of a client's abuse. Evaluations consist of two to four hours with an approved community based provider. Treatment is provided by an approved community based provider.

Maine also has Risk Reduction Programs, which provides in-depth education to assist in identifying and changing high-risk behaviors. Participants complete a preliminary assessment instrument designed to screen for risk factors for substance abuse problems. Individuals found to be at higher risk are referred to D.E.E.P. If there is a substance abuse problem evident, the individual is referred to counseling and required to complete the prescribed treatment services, which are determined according to DEEP's regulatory guidelines and the needs of the individual.

New Jersey has implemented an intoxicated Driving Resource Center (IDRC) in each county for first and third-time offenders and three regional centers for second-time offenders. The

educational programs vary from 12- to 48-hour courses. Offenders attend a series of educational sessions and discussions about impaired driving and the effects of drinking and driving. The education program contains information on social and problem drinking, stages of alcoholism, the family and other relationships, alcohol and drugs and their effects on driving ability, and the New Jersey Intoxicated Driving Law. After the education program, the driver may be referred to a treatment program or self-help group for alcohol or drug problems. If the driver is referred to treatment, it is for a minimum of 16 weeks. The IDRC may require monitored treatment or self-help group attendance for a maximum of one year.

New York reported it operates the Drinking Driver Program, which includes classroom education, screening, and, if warranted, assessment and treatment. The objectives of the program are to provide the offender with the opportunity to seek treatment for substance abuse.

Pennsylvania reported that it has an Intensive Outpatient Program. This is an 18-hour program designed for individuals who have been arrested for two or more DWI offenses.

South Carolina reported it has an Alcohol and Drug Safety Action Program (ADSAP). It is a statewide education and treatment program for individuals who are convicted of impaired driving.

Virginia has the Virginia Alcohol Safety Action Program (VASAP) which includes the Intensive Education program, a 20-hour alcohol/drug program that focuses on behavioral changes of multiple offenders. VASAP also has a Habitual Offender Relapse Prevention program to educate the habitual offenders and reduce the incidence of relapse and recidivism.

Many jurisdictions outside the I-95 Corridor also have some innovative educational measures to reduce high-risk impaired driving. Nova Scotia has a DWI program that is comprised of three components: Screening, Education, and Assessment. The screening component involves screening for the presence of a substance abuse problem and providing information regarding the DWI program. The Education session includes the following topics: federal/provincial legislation, alcohol and the body, levels of harmful involvement (including a discussion of what it means to be a problem drinker), victim impact panel, triggers to impaired driving (attitude, beliefs, and social factors), and strategic planning to avoid future occurrences

of impaired driving. The assessment is the last component which involves assessing the level of risk for having or developing a substance abuse problem. Depending on the outcome of the assessment, offenders may be required to participate in an ignition interlock program, receive some type of individual or group counseling that is either in-patient or out-patient, participate in motivational interviewing, or a range of other more intensive protocols.

Saskatchewan reported that the education portion of its rehabilitation program is a Driving Without Impairment course; a 16-hour course that includes group discussions, videos, presenters and provides information on drinking and driving and stresses the importance of separating the two.

Rehabilitation Programs. Innovative rehabilitation measures to reduce high-risk impaired driving are used in a number of I-95 Corridor jurisdictions. Delaware has a rehabilitation program which is required for individuals who have two or more alcohol-related violations. The program involves therapeutic counseling. The content is determined based on individual assessment and ongoing treatment plan. The program requires 10-hours of attendance over an eight week period.

Massachusetts has a three-phase treatment model. Phase I of the treatment program is a First Offender Driver Alcohol Education (DAE) course. Phase II is the Second Offender 14-day Residential program for those who have a second conviction. This is an alternative to 30-days of incarceration. Phase III is the Second Offender Aftercare program, which continues the treatment efforts. Phase III provides eight weeks of group/individual services in order to assess the risk and needs of the client.

New Hampshire reported an intensive seven day and six night residential program for second time offenders. For third time offenders New Hampshire provides a 28-day residential treatment program. The content of both programs is alcohol and other drug education, group interactions, and self-assessment.

New York has a DWI Treatment program, which is designed to provide the offender the foundation for positive change and assistance in their successful return to the community through assessment, education, counselling, relapse prevention and discharge planning. The program lasts between six to twelve months.

South Carolina reported that it uses a personalized approach. The services provided are based on individual needs. Overall the goal of the education and treatment services provided is to help reduce the risk of committing another violation.

Outside the I-95 Corridor several jurisdictions have some innovative rehabilitation measures to reduce high-risk impaired driving. Saskatchewan's recovery portion is an individual program that was established by addictions counselors to suit an offender's particular needs.

Ontario reported on a remedial measures program called "Back on Track." The program is 16 hours in length. It includes discussions, exercises, group work and personal planning.

The use of websites for programs was reported by 53% of the Corridor jurisdictions. The table below provides website links for all of the jurisdictions that currently have programs for high-risk impaired drivers. Websites for specific programs can be found in appendix A.

Table 6.1.1. Website links to HRD programs

Jurisdiction	Website
Florida	http://www.flhsmv.gov/ddl/dui_county.html
Georgia	www.dds.ga.gov
Maine	www.maine.gov/dhhs/osa/deep
Maryland	www.marylandmva.com
New York	http://www.nysdmv.com/ddpforms.htm
South Carolina	http://www.dppps.sc.gov/ignition_interlock.html
Vermont	http://healthvermont.gov/adap/treatment/crash.aspx
Virginia	www.vasap.virginia.gov

Evaluations of High-Risk Impaired Driver Programs. Five I-95 Corridor jurisdictions (Maine, Virginia, South Carolina, New York, and Florida) reported that evaluations have been competed on their high-risk impaired driving programs. Pennsylvania's evaluations are on-going and therefore unavailable. Virginia reported that an evaluation was conducted in 2004 by the National Center for State Courts; however, the report could not be accessed. New York's evaluation on the NYS Drinking Driver Program was conducted by the Institute for Traffic Safety Management and Research in 1987. The report is not available online. Similarly, Florida reported to have an evaluation; however, the report could not be accessed.

Maine conducted an evaluation of its Driver Education and Evaluation Programs (Reguera, 2009). This report suggests that the available data are inadequate to determine the

effectiveness of the program and provides alternative methods such as changing the curriculum to meet individual needs. The report can be found at: http://students.umf.maine.edu/reguernj/public.www/Thesis%20paper.pdf

In California, warning letters have been shown to be the most effective component in California's program in terms of total number of crashes prevented and net cost benefits. However, they are the least effective component in terms of per driver effect size. The report can be found at http://www.dmv.ca.gov/about/profile/rd/toc.htm.

Nova Scotia began its alcohol interlock program in the fall of 2008 and is still in the process of evaluating the program from both a procedural and effectiveness standpoint. A full evaluation will not occur until a later date. Nova Scotia's DWI program has not received a formal evaluation for effectiveness. Focus groups have been conducted to receive client feedback. The report could not be accessed.

The United Kingdom reported an evaluation was conducted on Drink/driver Rehabilitation courses. The report found that overall the drink/driving rehabilitation courses appear to have reduced reconviction rates by slightly more than 50 per cent. This report can be found at http://www.icadts.org/proceedings/2000/icadts2000-089.pdf.

6.2 High-Risk Multiple Convictions and Collisions

Overview of Survey Results. The I-95 Corridor programs that are available to address high-risk drivers with multiple convictions and collisions vary according to jurisdiction. The focus of these programs can be categorized as defensive driving courses, driver retraining courses, driver retesting, and sanctions. Defensive driving courses are offered in seven jurisdictions; driver retraining courses are offered in five jurisdictions; driver retesting offered in six jurisdictions; and sanctions are mandated in ten jurisdictions. The main objectives of these programs are rehabilitation or behavior/attitude modifications and awareness or prevention. These responses were different from impaired driving which seemed to be more punitive. Other objectives include deterrence and reduction in recidivism, but to a lesser degree than for high-risk impaired drivers.

These programs are delivered through different strategies depending on the nature of the program. Five jurisdictions offer one-on-one sessions with offenders (Maine, Maryland, New York, South Carolina, and Virginia). Four jurisdictions focus the delivery of the programs with small groups of two to six offenders (Georgia, Maine, New Hampshire, Virginia). Ten jurisdictions accommodate larger groups of offenders involving seven or more individuals (Florida, Georgia, Maine, Maryland, New Hampshire, New Jersey, New York, North Carolina, Rhode Island, and Virginia). Five jurisdictions utilized internet courses (Florida, Maryland, New Jersey, New York, and Virginia).

On average the programs range from four to eight hours. The length of these programs varies by jurisdictions and the characteristics of the offense. More information about the actual length of the individual programs can be found in appendix A.

The benefits to participate that may be offered as part of the program can be grouped according to four categories: reduced length of suspension, demerit points reduced, relicensing, and reduced insurance premiums. Reduced length of suspension was reported in four jurisdictions (Georgia, New Hampshire, New Jersey, and New York). Eight jurisdictions reported reduced demerit points (Georgia, Maine, New Hampshire, New Jersey, New York, North Carolina, South Carolina, and Virginia). The most commonly reported benefit was relicensing, which was reported by ten jurisdictions (Delaware, Florida, Georgia, Maine, Maryland, New Hampshire, New Jersey, New York, Rhode Island, and Virginia). Reduced insurance premiums were reported by four jurisdictions (Georgia, New Jersey, New York, and Virginia).

Among those programs within the I-95 Corridor, on average, 67% of offenders pay for the program themselves. Fees range from $10- $350 USD.

Laws and Enforcement. Of the seventeen Corridor jurisdictions only six (Florida, Georgia, Maine, Maryland, New Jersey, and Virginia) reported that they have a legal operational definition of a high-risk driver. However, most of the jurisdictions (80%) reported to have laws which deal specifically with high-risk drivers. For example Georgia's law states "anyone who accumulates fifteen points for traffic convictions accrued within twenty-four months is a habitually dangerous or negligent driver" (O.C.G.A.§ 40-5-57). Virginia Code section 46.2-355.1 "requires interventions for certain offenders known as a Habitual Offender which are

individuals receiving a second conviction for driving while the offenders license, permit or privilege to drive is suspended or revoked." In addition these laws are promoted using enforcement campaigns to identify HRDs in about a third (33%) of the Corridor jurisdictions.

A number of I-95 Corridor jurisdictions also reported some type of innovative enforcement measure, beyond traditional enforcement strategies, to reduce high-risk driving. Georgia and New York reported having campaigns that primarily target speeding or aggressive driving. Georgia was the first state to implement a law severely penalizing drivers who are caught speeding at rates well beyond the posted speed limit. The 'SuperSpeeder Law' is designed to penalize high-risk drivers who have been endangering other motorists and ignoring warnings to slow down (www.safespeedsgeorgia.org).

New Hampshire has speed enforcement details and special enforcement units looking for aggressive drivers. New Jersey has various programs that monitor and manage drivers for current and frequent crash and driving violation events. Primary management process involves a system of points and evaluation of crash events within a defined time period. Pennsylvania State Police uses Ticket the Aggressive Driver (TAG-D) (http://www.nhtsa.dot.gov/people/injury/enforce/aggressdrivers/aggenforce/pennsylvania.html) The TAG-D program also utilizes marked and unmarked law enforcement vehicles, a vehicle that appears disabled, radar, fixed wing aircraft, and pursuit vehicles. Officers are advised what driving behaviors they are targeting for enforcement on the day of the saturation patrol effort. Pennsylvania also participates in NHTSA's highway Safety Mobilization.

Jurisdictions outside the I-95 Corridor also reported innovative enforcement measures to reduce high-risk driving, including Arizona, California, Oregon, Ontario.

Arizona's Department of Public Safety has an aggressive driver program called Operation Chill. It is the longest running aggressive driver program in the country. It focuses both on enforcement and a strong media campaign. Unmarked patrol vehicles, motorcycles and marked patrol vehicles are used. (http://nhtsa.uptracs.com/people/injury/enforce/aggressdrivers/aggenforce/arizona.html)

California reported that it has the California Negligent Operator Treatment System (NOTS), which is based on negligent operator points and consists of a computer-generated series of

warning letters and progressive sanctions against the driving privilege. Also, California is currently implementing a pilot program that utilizes an electronic database of actively suspended repeat offenders. Enforcement vehicles that are equipped with automated license plate readers identify such offenders.

Michigan reported it has the Driver Responsibility Program which encourages traffic safety by deterring potentially dangerous driving behavior. Michigan's Driver Responsibility Law calls for a monetary assessment for drivers who are convicted of specific qualifying offenses or accumulate seven or more qualifying points on their driving records.

Oregon reported it utilizes the “Safe and Courteous Driving Campaign,” which addresses Oregon’s aggressive and unsafe driving issues by aiming messages at work zones, sharing the road with vulnerable road users, extending courtesy to other drivers, and safe driving behaviors. The campaign uses billboards, transit placards, movie theater slides, and radio and television advertising.

Ontario reported that the Provincial Police have a program called Eliminate Racing Activities on Streets Everywhere (E.R.A.S.E). Officers from twelve different police agencies, the Ministry of Transportation and the Ministry of Environment work collaboratively targeting illegal street racing. The goal of this program is to change driver behavior through education and strategic enforcement (http://www.opp.ca/ecms/index.php?id=168).

The Australian state of Victoria reported it utilizes an Automatic Number Plate Recognition system (ANPR). ANPR involves the use of cameras to automatically read the registration plate of a vehicle. Victoria Police and VicRoads have implemented the ANPR program to detect unregistered vehicles and unlicensed drivers.

Defensive driving courses. Innovative programs to reduce high-risk driving are being utilized in a number of the I-95 Corridor jurisdictions. Florida reported to have two courses that focus on driver improvement. Florida’s Traffic Collision Avoidance course is a four-hour online course designed to reduce demerit points, dismiss traffic ticket, and avoid insurance increases. Florida also has an Advanced Driver Improvement course, which explores the reasons for taking the course and answers different questions regarding driving habits and behaviors behind the wheel. This is a twelve-hour course and outlines a different aspect or

approach to driving habits. These programs are delivered by driving school instructors that are employed at private for-profit driving schools.

Maine reported it has a Driving Dynamics course, which is a driver improvement course aimed at improving an offender's defensive driving awareness and abilities.

Massachusetts reported that it has the "Alive at 35" Course. This is a highly interactive four-hour program which encourages young drivers between the ages of 16 and 24 to take responsibility for their driving behavior and teaches them how to do this.

Jurisdictions outside the I-95 Corridor also reported some innovative defensive driving courses and programs. British Columbia reported it has the Driver Improvement Program which identifies and intervenes with high-risk drivers and encourages them to improve their driving habits through various interventions ranging from early warning letters to prohibition from driving. Manitoba's Driver Improvement and Control (DI&C) Program encourages Manitobans to make safe driving their habit for a lifetime. The DI&C Program defines two categories of drivers: novice and experienced. Northwest Territories reported that it is currently developing a driver improvement course/program specifically targeting high-risk drivers.

Ontario has the Collision Repeater Program, which requires drivers who have been involved in three or more collisions in a two year period to attend an interview with a Driver Improvement Counselor. Ontario also has the "Over 70" Collision Program requiring drivers over 70 convicted of a collision-related offence to pass a vision, knowledge, and road test to keep their license. The main objectives of the programs are the reduction of future collision risk and recidivism of drivers subject to the sanctions and remedial programs.

United Kingdom's National Driver Improvement Scheme has been adopted by all police forces in the United Kingdom. Courses involve a mixture of driving theory, utilizing the latest researched thinking on 'low-risk' driving techniques, combined with modern training methods in practical on-road driving.

Victoria, Australia reported it has a Demerit Point Intervention Trial. For a demerit point redemption the offender must attend a behavioral course on road safety awareness. Victoria

also utilizes an Intelligent Speed Assist (ISA) scheme, which uses ISA devices to modify the behavior of speeding drivers. This can be done through an advisory system, where the driver is warned, or through an intervention system where the driving systems of the vehicle are controlled automatically to reduce the vehicle's speed.

Driver Retraining Courses. Innovative driver retraining courses to reduce high-risk driving are being used in a number of the I-95 Corridor jurisdictions. Massachusetts requires offenders to attend its Driver Retraining Program if five or more events occurred within a three year period. This course does not teach driving skills; it helps drivers learn to change their driving behavior. Massachusetts also reported it has the State Courts Against Road Rage (SCARR) program. This program was developed to educate and reduce recidivism among drivers charged with serious motor vehicle violations. It combines the referral resources of the courts with the motor vehicle expertise of the Massachusetts State Police to promote driver and community education on the importance of safe and responsible driving.

Virginia's retraining courses are designed for the rehabilitation of problem drivers, with the goal of creating a lasting and corrective influence on their driving performance.

New York reported it operates the Driver Responsibility Program. The purpose of the program is to prevent the repeated behavior of problem drivers and to improve traffic safety. New York also has Driver Responsibility Assessments, which require offenders to pay a certain amount each year for three years as a result of a traffic conviction.

New Jersey's Driver Improvement Program is offered in lieu of a 30-day suspension for offenders who accumulate 12 to 14 points in more than two years. The purpose is to correct improper or dangerous driving practices.

Many jurisdictions outside the I-95 Corridor also have some innovative driver retraining courses to reduce high-risk driving. Arizona reported that it has a traffic survival school designed to reach offenders who have exhibited a disregard for traffic laws and the safety of others. This program attempts to modify the behavior of these offenders by teaching them how to avoid adverse traffic situations by increasing their knowledge of Arizona traffic laws, defining their responsibilities while driving, and most importantly, improving their attitude toward safe driving.

California's Traffic Violator School educates drivers on safe driving behaviors and traffic laws.

Ohio reported it has an eight-hour adult remedial driving course.

Oregon reported it has a High Risk Driving Course at Emanuel Hospital. This is an eight-hour course that is designed to educate drivers of the very real consequences of high-risk driving behaviors, through presentations on the consequences of high-risk driving, contact with victims of traumatic injuries and their families, and discussions of death as a possible consequence of high-risk driving choices.

The use of websites for programs was reported by 47% of the Corridor jurisdictions. The table below provides website links for all of the jurisdictions that currently have programs for high-risk drivers.

Table 6.2.1. Website links to HRD programs

Jurisdiction	Website
Florida	http://www.flhsmv.gov/ddl/adicphone.html
Georgia	www.dds.ga.gov
Maine	www.maine.gov/dps/bhs/driving-dynamics
New Hampshire	www.nh.gov
New Jersey	http://www.state.nj.us/mvc/Violations/driverImprovement.htm
New York	http://www.nydmv.state.ny.us/pirp.htm
North Carolina	http://www.ncdot.org/dmv/driver_services/drivingpublic/driverclinics/
Virginia	www.dmvNOW.com

Evaluations of High-Risk Drivers with Multiple Collisions/Convictions. Only two jurisdictions (13%) reported they have conducted program evaluations. Both New York and Florida reported to have an evaluation; however, neither of these reports could be accessed.

A meta-analysis was conducted of the literature on driver improvement program effectiveness over the last 60 years (Masten and Peck, 2004). Results showed that, in general, driver improvement intervention was associated with reductions in both crashes and violations. Warning letters, group meetings, individual hearings, and license suspension/revocation were all found to be effective. Of the driver improvement interventions studied, license suspension/revocation was by far the most effective treatment for both crashes and violations. Distributing educational or informational material was not associated with any reductions. This

study also suggests that court-issued traffic violator programs are less effective than interventions issued by licensing agencies (Masten and Peck, 2004).

In California, warning letters have been shown to be the most effective component in California's program in terms of total number of crashes prevented and net cost benefits, even though they are the least effective component in terms of per driver effect size (Masten and Peck, 2004).

The United Kingdom reported an evaluation on effective interventions for speeding (Fylan et al., 2006). The evaluation assessed clients' perceptions of instructions, the quality of the venue, the style of the instructors, and the content of the course sessions. However, it did not assess how effective the course had been in meeting its intended outcome of changing driving behaviour. This report can be found at http://www.dft.gov.uk/pgr/roadsafety/research/rsrr/theme2/effectiveinterventionsforspe.pdf.

A systematic review was conducted in the United Kingdom on the effectiveness of post-license drivers' education for the prevention road traffic crashes. The results provided no evidence that driver education programs in the United Kingdom are effective in preventing road traffic injuries or crashes (Ker et al., 2005).

The United Kingdom also reported an evaluation on the effectiveness of their National Driver Improvement Scheme (Davies et al., 1999). The evaluation found evidence of a modest improvement in attitudes towards safe driving for those who attend the course compared with a similar control group, however, they did not find reliable evidence that this translates into improved driving performance on the road. This report can be found at http://www.dft.gov.uk/pgr/roadsafety/research/rsrr/theme3/evaluationoftheeffectiveness.pdf.

7.0 RECOMMENDATIONS

Based on the findings from this study, some best practices for dealing with the 10 percenters are presented. This list of measures is not exhaustive (for a more complete list, see NHTSA, 2008c) but comprises promising measures that seem appropriate given the findings from this report and for which sufficient knowledge supporting their efficient and effective implementation and delivery is available today. The latter is especially important given that some of these measures may already be used in certain jurisdictions but perhaps there are some opportunities for improvement.

7.1 Driving While Impaired

Alcohol ignition Interlocks. An alcohol ignition interlock device is an alcohol breath screening device connected to the vehicle's ignition system or other onboard computer system to prevent the vehicle from starting if the driver's BAC is above a pre-set limit (typically 0.02% or 0.025%). The driver must blow into the device before the vehicle can be started and will be required to provide further breath samples once the vehicle is running. These modern devices, which are widely available today, are designed to incapacitate drunk driving offenders by preventing them from starting a vehicle when their BAC (measured using the breath alcohol concentration) is in excess of the pre-set limit (see http://aic.tirf.ca for an overview of the history of interlocks). Research shows that alcohol interlocks reduce recidivism among both first offenders and repeat offenders, including hardcore offenders. More than 10 evaluations of interlock applications have reported reductions in recidivism ranging from 35 – 90% (Voas and Marques, 2003; Vezina, 2002; Tippetts and Voas, 1997; Coben and Larkin, 1999) with an average reduction of 64% (Willis et al., 2005). Information about the research, technology, implementation, vendors and legal concerns is available from an on-line curriculum about this technology (http://aic.tirf.ca).

Transdermal alcohol testing. "Testing for alcohol use by measuring the amount of alcohol excreted through the skin – transdermal alcohol testing – is becoming an increasingly popular means for improving public safety by monitoring compliance with court-ordered sanctions among a variety of offenders" (Vanlaar et al., 2007: p. 26), including drinking drivers. There have been significant advances in the technology leading to the manufacturing of transdermal

alcohol bracelets in the 1990s (Hawthorne and Wojcik, 2006) and this has facilitated its use in monitoring a variety of offender populations (Robertson et al., 2006), including impaired driving offenders. Currently, researchers are "confident that transdermal alcohol testing can provide valid and reliable estimates of alcohol consumption, allowing supervision professionals to discriminate between consumption of small, moderate, and large amounts of alcohol" (Robertson et al., 2006: p. 24).

While there is a relatively large body of research that studied the reliability and validity of transdermal alcohol testing, few studies are available about the impact of this measure on recidivism. Flango and Cheesman (2009) found that the use of a transdermal anklet for 90 days or more, decreased recidivism. Along with wearing the device for a minimum of 90 days, the device appeared to be most effective for offenders who had two or more prior DWIs. Within this condition, the recidivism rate became zero, as the intervention reduced the probability of future re-offenses. The researchers concluded that the low re-offense rate of 3.5% while offenders were on the device may suggest it is a useful monitoring tool (Flango and Cheesman, 2009).

Saturation patrols and sobriety checkpoints. A saturation patrol (also called a blanket patrol or dedicated DWI patrol) consists of a large number of law enforcement officers patrolling a specific area for a set time to detect and arrest impaired drivers. The purpose of saturation patrols is to arrest impaired drivers and also to deter driving after drinking by increasing the perceived risk of arrest. To do this, saturation patrols should be publicized extensively and conducted regularly" (NHTSA, 2008c: p. 1-17). These patrols have been shown to be an efficient and effective means of apprehending DWI repeat offenders (Scopatz, 2008).

Also known as a roadblock, a sobriety checkpoint consists of police officials systematically stopping vehicles to assess a driver's level of impairment. Currently, sobriety checkpoints are being used in 40 states and within the District of Columbia. Studies have shown that sobriety checkpoints are the most effective when they are highly publicized (Scopatz, 2008). A review of 23 sobriety checkpoint studies (Shults et al., 2001) found that crashes involving alcohol dropped 20% after the implementation of sobriety checkpoints. A 2002 Traffic Injury Prevention report by the Centers for Disease Control also found that in general the number of alcohol related crashes was reduced by 20% in states that implement sobriety checkpoints

compared to those that did not (http://www.cdc.gov). The same was also concluded in a systematic review of 11 studies on sobriety checkpoints by Elder et al. (2002).

Not all states permit the use of sobriety checkpoints because in some states it is argued that they violate the constitution. These states may use saturation patrols.

Administrative License Revocation or Suspension. If a driver fails, or refuses to take a BAC test, the driver's license can be revoked or suspended using administrative license revocation (ALR) or suspension (ALS) (NHTSA, 2008c). Revocation is a judicial post-conviction action ordered by the court whereas a license can also be suspended by law enforcement on the spot.

A summary of 12 evaluations through 1991 found that ALR and ALS laws reduced crashes of different types by an average of 13% (Wagenaar et al., 2000). Studies by NHSTA (2008c) that evaluated ALR in combination with other laws found similar effects, reducing alcohol related fatal crashes by about 30% (1982-1997).

DWI courts and staggered Sentencing. "A dedicated DWI court provides a systematic and coordinated approach to prosecuting, sentencing, monitoring, and treating DWI offenders. A DWI court's underlying goal is to change offenders' behavior by identifying and treating their alcohol problems and by holding offenders accountable for their actions. Prosecutors and judges in DWI courts specialize in DWI cases" (NHTSA, 2008c: p. 1-25). To date no systematic and rigorous evaluations have been conducted, although there is some evidence suggesting DWI courts are effective (Guerin, 2002).

Staggered sentencing permits the convicted DUI offender not to have to serve the entire term in a consecutive period. Rather, the offender serves a portion of their sentence before periodically appearing before a judge for assessment (http://www.aaaduijusticelink.com). During this assessment, the judge ensures that the offender has complied with the terms of his sentence. If the convicted offender has demonstrated compliance, the court may permit them to complete their sentence through home monitoring instead of in jail (see: http://www.aaaduijusticelink.com). Staggered sentencing is likely best suited for cases with repeat offenders. Staggered sentencing usually does not require the same financial resources

or systematic establishment as DWI Courts (http://www.aaaduijusticelink.com). However, there is a lack of evidence regarding the effectiveness of staggered sentencing.

7.2 Speeding and Red Light Running

Photo enforcement devices such as speed cameras and/or red light cameras are increasingly being used in addition to standard police enforcement techniques in an attempt to reduce speeding and red light violations. The goal of photo enforcement is two-fold: red light and speeding cameras are used in an attempt to reduce both speeding and red light running and in doing so reduce the number of crashes associated with these traffic violations.

Despite the fact that many of the photo enforcement studies available are methodologically flawed in some way, there is plenty of evidence that photo enforcement does have an overall positive effect (Retting and Kyrychenko, 2002; Retting et al., 1999; Chen et al., 2000; Shin and Washington, 2007; Pilkington and Kinra, 2005; Ng et al.,1997; Blakey, 2003; Ministry of Transportation, Ontario1995; Project Summary Report, 2005; Andreassen, 1995). Many of the aforementioned studies found significant decreases in average speed, speeding violations, red light running violations, speeding collisions, and right-angle crashes, with some studies finding minor increases in rear-end crashes (which are often much less severe than right-angle crashes). Although a few studies were unable to produce results that reached statistical significance, overall it appears that photo enforcement is effective in reducing many of the social and economic consequences related to speeding and red light running, especially when coupled with public awareness campaigns. In addition, some studies have found that photo enforcement produces generalized changes in drivers' behaviours extending beyond the enforced intersections.

7.3 Not Wearing Seatbelts

Penalties for most belt use law violations are low (NHTSA, 2008c). Low fines may not convince nonusers to buckle up, as this may send a message that belt use laws are not taken seriously. Data from a national survey by the Automotive Coalition for Traffic Safety (ACTS, 2001) in 2000 discovered that drivers who were not regular belt users considered license points the most effective way to increase their belt use, compared to an increase in fines or increased enforcement. Williams and Wells (2004) also found that 62 % of nonusers said they always would wear their belts if violations led to driver's license points.

As of 2005, all States except New Hampshire required adult passenger vehicle occupants to wear belts. Primary enforcement laws in 22 States and the District of Columbia permit law enforcement to stop and cite all nonusers. The other 27 States have secondary enforcement laws that allow nonusers to be cited only after they first have been stopped for some other traffic violation (Glassbrenner, 2004). For increasing safety-belt use and reducing traffic fatalities Glassbrenner (2004) indicated primary laws are more effective (85% belt use compliance) than secondary (75% belt use compliance).

Houston and Richardson (2006) studied the effects of belt-use laws, fine level, and coverage (front seat only or front and rear seats). Using data from 1991 to 2001 they found that primary belt laws and higher fines increase belt use. In primary law States, belt use averaged 4.1% higher in the 7 States with fines of $30 or more compared to the 15 States who imposed fines of $25 or less (Glassbrenner, 2005).

A national survey in 2000 revealed that 42 % (NHTSA, 2008c) of drivers who did not use belts regularly said they would be more likely to wear belts if the fine were increased. Surveys in North Carolina also found that some nonusers would start to use their seat belts if the fine were doubled to $50 (Williams and Wells, 2004).

APPENDIX A: DETAILED SUMMARY OF KEY PROGRAMS

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
Laws and Enforcement-High Risk Impaired Drivers					
Florida	Operation Round-Up	A selective enforcement program designed to remove convicted multiple DWI offenders from Florida's roadways.	Year-long	Unable to find an evaluation	http://www.flhsmv.gov/fhp/html/story5w.html
Maine	Buzzed Driving is Drunk Driving	A NHTSA's impaired driving enforcement campaign. Special emphasis is placed on reaching high-risk populations, including repeat offenders and high-BAC offenders.	Specific weekends throughout the year.	n/a	http://www.nhtsa.gov/Impaired
Rhode Island	You Drink & Drive, You Lose	Focuses on high-visibility enforcement and heightened public awareness.	Specific weekends throughout the year.	n/a	https://www.ri.gov/press/view.php?id=9552
Minnesota	Operation NightCAP	Year-long sustained high visibility DWI enforcement saturation patrols in the thirteen deadliest alcohol-related counties.	Year-long	n/a	http://www.dps.state.mn.us/ots/enforcement_programs/NightCAP/default.asp
Nova Scotia	Integrated Impaired Driving Enforcement	Pilot enforcement unit that specifically targets impaired drivers.	Various time throughout the year	n/a	http://www.gov.ns.ca/news/details.asp?id=20080821004
Ontario	Reduced Impaired Driving Everywhere (RIDE)	Enforcement campaign that involves sobriety checkpoints.	Year-long	n/a	http://www.mto.gov.on.ca/english/safety/impaired/programs.shtml

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
Saskatchewan	Operation Overdrive	Resources for enforcement agencies to provide targeted stops to check for impaired driving		n/a	http://www.police.saskatoon.sk.ca/index.php?loc=insideourservice/traffic_unit/index.php
Laws and Enforcement-High Risk Other Drivers					
Georgia	SuperSpeeder Law	Designed to penalize high-risk drivers who ignore warnings to slow down.	Year-long	n/a	http://www.safespeedsgeorgia.org/
Pennsylvania	Ticket the Aggressive Driver (TAG-D)	The program utilizes enforcement units and targets aggressive driving with saturation patrol efforts.	Year-long	n/a	http://www.nhtsa.gov/people/injury/enforce/aggressdrivers/aggenforce/pennsylvania.html
Arizona	Operation Chill	It focuses on aggressive driving enforcement with a strong media campaign. It is the longest running aggressive driver program in the country.		n/a	http://nhtsa.uptracs.com/people/injury/enforce/aggressdrivers/aggenforce/arizona.html
California	Negligent Operator Treatment System	Based on negligent operator points and consists of computer-generated series of warning letters and progressive sanctions	Year-long	http://www.dmv.ca.gov/about/profile/rd/toc.htm	http://www.dmv.ca.gov/dl/driversafety/neg_operator.htm
	Electronic database	Focuses on actively suspended repeat offenders. Uses enforcement vehicles that are equipped with automated license plate readers.	Year-long	n/a	n/a

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
Oregon	Safe and Courteous Driving	Addresses aggressive and unsafe driving issues with road messages.	Year-long	n/a	http://www.oregon.gov/ODOT/TS/SafeandCourteousDriving.shtml
Ontario	Eliminate Racing Activities on Streets Everywhere (E.R.A.S.E.)	Enforcement agencies working collaboratively to target illegal street racing. The goal is to change driver behavior through strategic enforcement and education.		n/a	http://www.yrp.ca/erase/
Victoria, Australian	Automatic Number Plate Recognition (ANPR)	Uses cameras to automatically read the license plate of a vehicle to detect unregistered vehicles and unlicensed drivers.		n/a	http://www.legislation.vic.gov.au/domino/Web_Notes/newmedia.nsf/bc348d5912436a9cca256cfc0082d800/0e1831b8ecf7fbe4ca256fc70021ba5c!OpenDocument
Educational Programs- High Risk Impaired Drivers					
Florida	Level II DWI Course	This course focuses on the problems of the repeat offender and treatment readiness for those referred to treatment. It addresses the effects of the driving task, physical effects of alcohol and drug abuse, signs and symptoms of abuse, and psychological aspects of drugs and alcohol dependency. (Level I is for first-time offenders.)	21 hours of classroom time using primarily interactive educational techniques.	Unable to find an evaluation	http://www.flhsmv.gov/ddl/dui_county.html
Maine	Risk Reduction Program	Risk Reduction Program provides in-depth education to assist and identifying and changing high-risk behaviours.		http://students.umf.maine.edu/reguernj/public.www/Thesis%20paper.pdf	http://www.maine.gov/dhhs/osa/deep/prodesc/riskreduction.htm
	Driver Education and Evaluation Programs (DEEP)	DEEP fouses on education, self-assessment, evaluation, treatment and completion of the program.	20-hours		http://www.maine.gov/dhhs/osa/deep/index.htm

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
New Jersey	Intoxicated Driving Resource Center (IDRC)	Offenders attend mandatory Alcohol and Highway Safety Education courses which contain information on social and problem drinking, stages of alcoholism, family and other relationships, alcohol and drugs and their effects on driving ability, and the New Jersey Intoxicated Driving Law.	12- for first time offenders 48- hour for second offenders	n/a	http://www.nj-dmv-dwi.com/parts/IDRC.html
New York	Drinking Driver Program	The program includes classroom education, screening, and if warranted assessment and treatment. The objectives of the program are to provide the motorist with the opportunity to seek treatment for substance abuse.	Seven weekly classroom sessions, each taking 2 to 3 hours, for 16 hours total.	n/a	http://www.nydmv.state.ny.us/broch/c40.htm
Pennsylvania	Intensive Outpatient Program	Designed for individuals who have been arrested for two or more DUIs. Classes, address the circumstances of their arrest, assessment of their use or abuse pattern of alcohol and/or drugs, resistance and defenses about changing their patterns and learning reoccurrence prevention.	18-hour program with lectures, discussion, films, activities and homework are used as tools to facilitate this class.	n/a	n/a
South Carolina	Alcohol and Drug Safety Action Program (ADSAP)	A state-wide education and treatment program for individuals who are convicted of driving under the influence (DUI).		n/a	http://www.scdmvonline.com/DMVNew/forms/adsapbrochure1-04.pdf
Vermont	Countermeasures Related to Alcohol and Safety on Highways (CRASH) Program	Designed to provide information to help the individual understand clearly how alcohol, and other drugs affects behaviour and driving skills so that an individual can prevent impaired driving in the future.		n/a	http://healthvermont.gov/adap/treatment/crash.aspx
Virginia	Virginia Alcohol Safety Action Program (VASAP)	Alcohol/drug program that focuses on behavioral changes of multiple offenders. Intensive Education is used for multiple offenders.	20 hours of classroom instruction	n/a	http://www.vasap.state.va.us/

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
Rehabilitation/Treatment Programs- High Risk Impaired Drivers					
Massachusetts	Three-Phase treatment model: Phase 1- First Offender Driver Alcohol Education (DAE) course.	The major focus of DAE is on alcohol, other substances of abuse are also discussed.		n/a	http://www.mass.gov/?pageID=eohhs2terminal&L=6&L0=Home&L1=Provider&L2=Guidelines+and+Resources&L3=Guidelines+for+Services+%26+Planning&L4=Behavioral+Health&L5=Substance+Abuse&sid=Eeohhs2&b=terminalcontent&f=dph_substance_abuse_p_services_descriptions&csid=Eeohhs2#dui
	Phase 2- Second Offender 14-day Residential program	This includes a medical evaluation, individual and group counseling, educational sessions including the introduction to self-help, and recreation			
	Phase 3- Second Offender Aftercare program	Group and/or individual services in order to assess the risk and needs of the client. Each client will be involved in treatment for the length of probation (2 years).	8 weeks		
New Hampshire	Phase II Program	An intensive 7 day/6 night residential program for 2nd time offenders; a 28 day residential treatment program for 3rd time offenders Alcohol and other drug education, group interactions and self-assessment	2nd time offenders- 7 days 3rd time offenders- 28 days	n/a	http://www.dhhs.state.nh.us/DHHS/ATOD/driving-phase2-repeat.htm
New York	DWI Treatment Program	Designed to provide the offender the foundation for behavior change through assessment, education, counseling, relapse prevention and discharge planning.	6 to12 months	n/a	

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
Defensive Driving Courses- High Risk Other Drivers					
Florida	Traffic Collision Avoidance course	Designed to reduce demerit points, dismiss traffic ticket, and avoid insurance increases	4-hour online course	n/a	http://www.flhsmv.gov/ddl/bdis.html
	Advanced Driver Improvement course	Explores the reasons for taking the course and answers different questions regarding driving habits and behaviors behind the wheel and outlines a different approach to driving habits.	12-hour course	n/a	http://www.flhsmv.gov/ddl/adicphone.html
Maine	Driving Dynamics course	Driver improvement course aimed to improve an offender's defensive driving awareness and abilities	5 ½-hour course	n/a	http://www.state.me.us/dps/bhs/driving-dynamics/index.html
Massachusetts	Alive at 35	Interactive program which encourages young driers between the ages of 16 to 24 to take responsibility for their driving behavior.	4-hour program	n/a	http://www.mass.gov/rmv/jol/alive.htm
Ontario	Collision Repeater Program	Requires full-class drivers who have been involved in three or more collisions in a two year period to attend an interview with a Driver Improvement Counselor.		n/a	http://www.mto.gov.on.ca/english/dandv/driver/improve.shtml
	Over 70 Collision Program	Requires drivers over 70 convicted of a collision-related offense to pass a vision, knowledge, and road test to keep their license.		n/a	http://www.mto.gov.on.ca/english/pubs/seniors-guide/part6.shtml

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
United Kingdom	National Driver Improvement Scheme	Course involve a mixture of driving theory, utilizing the latest researched thinking on 'low-risk' driving techniques, combined with modern training methods in practical on-road driving.		http://www.icadts.org/proceedings/2000/icadts2000-089.pdf	http://www.driver-improvement.co.uk/
Victoria, Australia	Demerit Point Intervention Trial	For demerit point redemption an offender must attend a behavioral course on road safety awareness		n/a	http://www.vicroads.vic.gov.au/Home/Licences/DemeritsAndOffences/DemeritPointsAndFines/DemeritPointOffences.htm
Driver Retraining Courses- High Risk Other Drivers					
Massachusetts	State Courts Against Road Rage (SCARR) Program	Developed to educate younger drivers charged with serious motor vehicle violations.		n/a	http://www.mass.gov/rmv/jol/scarr.htm
New York	Driver Responsibility Program	The purpose of the program is to prevent repeat behaviour of program drivers and to improve traffic safety.		n/a	http://www.nydmv.state.ny.us/drp.htm
New Jersey	Driver improvement program	The purpose is to correct improper or dangerous driving practices	3-hour classroom program	n/a	http://www.state.nj.us/mvc/Violations/driverImprovement.htm
Arizona	Traffic Survival School	Designed to reach offenders who have exhibited a disregard for traffic laws and the safety of others. It attempts to modify the behaviours of the offenders by teaching them how to avoid adverse traffic situations and improve their attitude toward safe driving.		n/a	http://www.azdot.gov/mvd/driver/DriverImprovement.asp

Program Summaries					
	Name of program	**Focus & Content of program**	**Length of program**	**Program Evaluation Link**	**Website**
California	Traffic Violator School	Educates drivers on safe driving behaviours and traffic laws	400 minute curriculum	n/a	http://www.dmv.ca.gov/vehindustry/ol/tvschool.htm

Jurisdiction Summaries on Legislation, Sanctions, and Interlocks			
	Legislation	**Sanctions**	**Interlocks**
Connecticut		A 2nd DUI conviction results in a suspension of one year. Jail time: 120 days minimum mandatory to 2yrs and 100 hours of community service. Fine: $1,000 to $4,000 A 3rd DUI Conviction results in permanent license revocation. Jail time: 1 yr. minimum mandatory to 3yrs and 100 hrs of community service. Fine: $2,000 to $8,000 Offenders may request a hearing after at least 6 years after date of revocation.	Following license restoration- a vehicle may only be operated with an approved Ignition Interlock Device for 24 months.
Delaware	All DUI sentences are carried on the driving record for a minimum of five years.	2nd DUI Offense Penalties Jail time: 2 to 18 months Fines: $575 to $2,300; Alcohol education course License suspension: 18 months 3rd DUI Offense Penalties Class 6 felony; Jail time: 1 to 2 years Fines: $1,000 to $3,000; Alcohol education course; License suspension: 24 months	Sanctions, mandated by law, that are imposed on high-risk drivers are Ignition Interlock Programs. Any person who is convicted of a subsequent offense must have the IID installed on all vehicles registered in his/her name 12 months from the effective date of the revocation.
Florida	High-risk drivers are defined as multiple DUI offenders. These drivers have two convictions within 5 years or a third conviction with in 10 years of the second conviction. These drivers receive an enhanced penalty if the blood alcohol level is 0.15 or greater or if they have a minor in the car at the time of the stop.	2nd DUI Conviction (BAC .08-.15) Fine: $1,000-$2,000 2nd High BAC (>.15) Conviction: Fine: $2,000- $4,00 Jail time: maximum 9 months License suspension: 5 years. 3rd High BAC (>.15) Conviction: Not less than $4,000. Jail time: 30 days to 12 months. License suspension: 10 years.	Mandatory ignition interlock device for high BAC (>.15) for six months to two years depending on number of convictions Other drivers may opt into interlock program in order to get licence back early.

Jurisdiction Summaries on Legislation, Sanctions, and Interlocks			
	Legislation	**Sanctions**	**Interlocks**
Georgia	Georgia's definition of a high risk offender is a person who has two or more DUI arrests within 10 years.	2nd DUI Offense Penalties Jail time: 90 days to 1 year Fines: $600-$1000 License suspension: 18 months Minimum community service is 30 days. Additionally a 2nd conviction is license plate confiscation. 3rd DUI Offense Penalties Jail time: 120 days -1 year; Fines: $1,000 to $5,000; License suspension: 5 years. Minimum community service is 30 days. License plate confiscation.	Under the current law, for a second or subsequent conviction within a five year period, an ignition interlock device must be installed. Eligibility- Submit proof of completion of DUI alcohol or drug risk reduction program, clinical evaluation, enrolment in treatment or completion of treatment if required by evaluation and installation of an interlock device.
Maine		2nd OUI conviction: Jail time: Minimum 7 days Fines: at least $400 License suspension: 18 months 3rd OUI conviction: Jail time: Minimum 30 days Fines: at least $1,000 License suspension: 4 years	As a condition of license reinstatement, the Secretary of State may require a person to have state approved interlock installed in their vehicle for a period of up to 2 years.
Maryland	A repeat offender is anyone who has received more than one DUI violation within a 5-year period. A "habitual offender" is defined as someone with a 4th or subsequent offense.	2nd DWI offense, Fine: at least $2,000. Jail term: Two years. A "repeat offender" will be suspended for a one-year period. After the one-year suspension period has ended, the person then must maintain an ignition interlock device on his or her vehicle(s) for one year.	A driver may be required to participate if he or she has accumulated sufficient "points", is a "repeat offender", or violates a previously imposed alcohol-related driving restriction. For a 2nd conviction an Ignition Interlock Program is possible after 45 days of suspension and is continued for an amount of time determined by one of the following: Maryland District Court; Office of Administrative Hearings; Medical Advisory Board.

Jurisdiction Summaries on Legislation, Sanctions, and Interlocks			
	Legislation	**Sanctions**	**Interlocks**
Massachusetts		2nd DWI offense, Jail term: 30 days to 2 ½ years Fine: $600-$10,000 License suspended: 2 years, 3rd DWI offense, Jail: 150 days to 5 years State Prison (felony status) Fine $1,000-$15,000 License suspended: 8 years. Commonwealth may seize, keep, and/or sell your vehicle.	If convicted of 2 or more OUI, an Alcohol Detecting Ignition Interlock Device will be installed in the offenders' car as a condition of driver's license reinstatement or Hardship License for at least 2 years.
New Hampshire	Increased penalties for BAC over .16, for multiple DWI offenders, felony enhancement, increased penalties for under 21 drivers and for impaired drivers who have children under age 16 in the car at the time of arrest.	2nd DWI offense, Jail term: 10 days to 3 years Fine: up to $750 3rd DWI offense, Jail: minimum of 180 days Fine $1,000-$5,000 License suspended: 5 years. New Hampshire identifies enhanced penalties for high-risk impaired drivers.	Imposes the alcohol ignition interlock device for aggravated DWI (BAC >.16) and a DWI subsequent offense for 1 to 2 years.
New Jersey	To date New Jersey does not have enhanced sanctions for high-BAC offenders. Any person convicted of an alcohol related traffic offense in New Jersey must participate in a program at an Intoxicated Driving Resource Center (IDRC).	2nd DWI offense, Jail term: 48 days to 90 days Fine: $500-$1,000 License suspended: 2 years. Community Service: 30 Days 3rd DWI offense, Jail: minimum of 180 days Fine $1,000-$4,5,00 License suspended: 10 years.	After a 2nd DUI offense installation of interlock device for 1 to 3 years.

Jurisdiction Summaries on Legislation, Sanctions, and Interlocks			
	Legislation	**Sanctions**	**Interlocks**
New York	Aggravated Driving While Intoxicated: 0.18 BAC or higher.	1st aggravated DWI Fine: $1,000- $2,500 License suspended: 1 year Jail time: 1 year 2nd DWI offense, Fine: $1,000- $5.000 License suspended: at least 18 months Jail time: 4 years. 3rd DWI offense, Fine $2,000- $10,000 License suspended: at least 18 months Jail time: 7 years.	Imposes the alcohol ignition interlock device for aggravated DWI and subsequent offenses.
North Carolina	A high-risk driver is a person whose license was revoked as a result of a conviction of driving while impaired, with an alcohol concentration of 0.15 or more; or has been convicted of another offense involving impaired driving, within seven years after the date of the offense for which the person's license has been revoked.	2nd DWI offense, Fine: up to $2,000 License suspended: 4 years Jail time: up to 24 months 3rd DWI offense, Fine: up to $2,000 License suspended: permanent revocation Jail time: up to 24 months 4th DWI offense, Fine: undisclosed License suspended: permanent revocation Jail time: felony and 1-3 years.	A conviction of Driving While Impaired with a BAC of 0.16 or more, or another conviction for DWI within the past seven years, will require an ignition interlock device to be installed on the vehicle for at least 1 year.

Jurisdiction Summaries on Legislation, Sanctions, and Interlocks			
	Legislation	**Sanctions**	**Interlocks**
Pennsylvania	In Pennsylvania, a high-risk driver is identified as an individual that has been convicted of driving with an alcohol concentration of 0.16 or higher. Stricter penalties are imposed on offenders with a high BAC (≥ 0.16).	2nd DWI offense, Fine: up to $1,500- $10,000 License suspended: 18 months Jail time: 90 days to 5 years 3rd DWI offense, Fine: up to $2,500- $10,000 License suspended: 18 months Jail time: 1 to 5 years	An ignition interlock device could be installed on the vehicle for 1 year, if convicted of a high BAC.
Rhode Island	A "habitual impaired offender" is any person whose record shows that he/she has accumulated multiple convictions of driving or operating a motor vehicle while under the influence of liquor or drugs in violation.	1st High (BAC >0.15) OUI offense, Fine: up to $500 License suspended: 3-18 months Jail time: up to 1 year. Community service: 20-60 hours 2nd High (BAC >0.15) OUI offense, Fine: Over $1,000 License suspended: 2 years Jail time: misdemeanor, 6 months-1 year 3rd High (BAC >0.15) OUI offense, Fine: up to $1,000- $5,000 License suspended: 3 years Jail time: 3 to 5 years	Installing a ignition interlock device ones vehicle for a period of 1-2 years following the completion of the sentence.

Jurisdiction Summaries on Legislation, Sanctions, and Interlocks			
	Legislation	**Sanctions**	**Interlocks**
South Carolina	High-risk impaired drivers fall into this category if they are charged as a "0.15" which is in addition to a charge of DUI for drivers of any age who operate a vehicle with a blood alcohol concentration of 0.15 percent or higher.	2nd DUI offense (BAC <0.10) Fine: $2,100- $5,100 License suspended: 1 year Jail time: 5 days-1 year 1st High (BAC >0.16) DUI offense, Fine: $1,000 License suspended: 6 months Jail time: 30-90 days 30 Days of Public Service Employment 2nd High (BAC >0.16) DUI offense, Fine: $3,500- $6,500 License suspended: 1 year Jail time: 90 days-3 years 3rd High (BAC >0.16) DUI offense, Fine: up to $7,000- $10,000 License suspended: 2 years Jail time: 6 months to 5 years	If a multiple DUI offender has completed the required license suspension period and the Alcohol and Drug Safety Action Program (ADSAP), and wishes to get their driver's license back, they must first have an Ignition Interlock Device installed. The length of time you will be required to have the IID installed will depend upon your convictions and any violations you might have during the program.
Vermont		2nd DUI offense, Fine: Up to $1,500 Jail time: up to 18 months Community service: 200 hours 3rd High DUI offense, Fine: up to $2,500 Jail time: Up to 5 years Community service: 400 hours	Currently, no ignition interlock laws

Jurisdiction Summaries on Legislation, Sanctions, and Interlocks			
	Legislation	**Sanctions**	**Interlocks**
Virginia	Hard core drunk drivers are those who drive with a high blood alcohol concentration of 0.15 or above, who do so repeatedly, as demonstrated by having more than one drunk driving arrest, and who are highly resistant to changing their behavior despite previous sanctions, treatment or education efforts.	2nd DUI offense, Fine: $,500 Jail time: 10 days p to 1 year License suspended: 3 years Community service: 200 hours 3rd High DUI offense, Fine: at least $1,000 Jail time: a minimum 90 days License suspended: mandatory license revocation Community service: 400 hours	Under Virginia's IID statute, the court has discretion of whether or not to require a first time DUI offender to have the device installed. DUI offenders with a BAC higher than .15 will be required to install the device as a condition of a restricted license or license restoration following a suspension. For second or subsequent offenses, the device is required for the period of license suspension or a mandatory minimum period of 6 months.
District of Columbia		2nd DUI offense, Fine: $1,000 - $5,000 Jail time: 1 year License suspended: 1 year 3rd High DUI offense, Fine: $2,000 - $10,000 Jail time: 1 year License suspended: 2 years	Applicable for 2nd or subs conviction

APPENDIX B: CRASH CHARACTERISTICS OF HIGH-RISK DRIVERS

New England

Number of vehicles by HRD

No. of vehicles	No	Yes	Don't Know	Total	Overall %
Single vehicle	41.87%	55.48%	40.46%	2085	43.23%
Multiple vehicle	58.13%	44.52%	59.54%	2738	56.77%
Total	100.00%	100.00%	100.00%	4823	100.00%

Total	2964	611	1248	4823
Overall %	61.46%	12.67%	25.88%	100.00%

Manner of Collision by HRD

Manner of collision	No	Yes	Don't Know	Total	Overall %
No other vehicle	44.88%	59.01%	48.18%	2276	47.52%
Front/rear	7.66%	6.78%	7.13%	355	7.41%
Head-on	20.31%	13.06%	14.66%	859	17.93%
Angle	22.95%	16.53%	23.72%	1070	22.34%
Sideswipe	3.83%	4.30%	5.99%	213	4.45%
Other	0.37%	0.33%	0.32%	17	0.35%
Total	100.00%	100.00%	100.00%	4790	100.00%

Total	2950	605	1235	4790
Overall %	61.59%	12.63%	25.78%	100.00%

Harmful even ty HRD

Harmful event	No	Yes	Don't Know	Total	Overall %
Rollover	4.49%	7.05%	6.02%	251	5.21%
Peds	7.90%	6.39%	10.03%	398	8.26%
Vehicle-vehicle collision	53.73%	39.84%	51.52%	2476	51.40%
Fixed object	27.69%	41.31%	26.73%	1405	29.17%
Other	6.18%	5.41%	5.70%	287	5.96%
Total	100.00%	100.00%	100.00%	4817	100.00%

Total	2961	610	1246	4817
Overall %	61.47%	12.66%	25.87%	100.00%

Vehicle rollover by HRD

Rollover	No	Yes	Don't Know	Total	Overall %
No rollover	84.72%	77.58%	86.14%	4060	84.18%
One or more	15.28%	22.42%	13.86%	763	15.82%
Total	100.00%	100.00%	100.00%	4823	100.00%

Total	2964	611	1248	4823
Overall %	61.46%	12.67%	25.88%	100.00%

Vehicle towed by HRD

Towed away	No	Yes	Don't Know	Total	Overall %
Driven	6.34%	3.71%	9.35%	321	6.79%
Towed	93.66%	96.29%	90.65%	4405	93.21%
Total	100.00%	100.00%	100.00%	4726	100.00%

Total	2903	593	1230	4726
Overall %	61.43%	12.55%	26.03%	100.00%

Vehicle impact point by HRD

Impact point	No	Yes	Don't Know	Total	Overall %
Non-collision	2.47%	2.53%	1.85%	109	2.32%
Front	70.12%	73.31%	69.00%	3295	70.24%
Right	7.90%	8.11%	7.50%	367	7.82%
Rear	6.25%	4.56%	6.57%	287	6.12%
Left	10.06%	6.08%	10.87%	458	9.76%
Other	3.19%	5.41%	4.21%	175	3.73%
Total	100.00%	100.00%	100.00%	4691	100.00%
Total	2912	592	1187	4691	
Overall %	62.08%	12.62%	25.30%	100.00%	

Age of driver by HRD

Age	No	Yes	Don't Know	Total	Overall %
<15	0.24%	0.00%	0.25%	10	0.21%
16-20	13.20%	17.02%	12.20%	642	13.43%
21-24	8.50%	28.48%	10.04%	547	11.45%
25-34	16.50%	26.35%	17.59%	862	18.04%
35-44	16.50%	14.73%	18.01%	796	16.66%
45-54	17.95%	8.67%	18.59%	809	16.93%
55-64	12.93%	2.78%	10.87%	531	11.11%
65-74	6.41%	0.82%	4.98%	255	5.34%
75+	7.76%	1.15%	7.47%	327	6.84%
Total	100.00%	100.00%	100.00%	4779	100.00%
Total	2963	611	1205	4779	
Overall %	62.00%	12.79%	25.21%	100.00%	

Gender of driver by HRD

Gender	No	Yes	Don't Know	Total	Overall %
Male	70.50%	83.47%	74.69%	3505	73.22%
Female	29.50%	16.53%	25.31%	1282	26.78%
Total	100.00%	100.00%	100.00%	4787	100.00%
Total	2963	611	1213	4787	
Overall %	61.90%	12.76%	25.34%	100.00%	

Vehicle manoeuvre by HRD

Vehicle manoeuvre	No	Yes	Don't Know	Total	Overall %
Going straight/starting in traffic lane	65.37%	66.17%	66.32%	3145	65.71%
Slowing/stopped	3.16%	1.16%	3.32%	141	2.95%
Passing	2.99%	5.45%	2.91%	157	3.28%
Turning left	5.91%	2.81%	7.29%	281	5.87%
Negotiating a curve	16.40%	18.15%	15.22%	781	16.32%
Other	6.18%	6.27%	4.94%	281	5.87%
Total	100.00%	100.00%	100.00%	4786	100.00%
Total	2945	606	1235	4786	
Overall %	61.53%	12.66%	25.80%	100.00%	

Avoidance manoeuver by HRD

Avoidance manoeuvre	No	Yes	Don't Know	Total	Overall %
No avoid manoeuvre	51.08%	40.26%	45.75%	2331	48.33%
Braking	6.21%	7.53%	10.50%	361	7.48%
Steering	11.13%	14.89%	18.91%	657	13.62%
Other	0.74%	0.33%	0.32%	28	0.58%
Not reported	30.84%	36.99%	24.52%	1446	29.98%
Total	100.00%	100.00%	100.00%	4823	100.00%

Total	2964	611	1248	4823
Overall %	61.46%	12.67%	25.88%	100.00%

Restraint use by HRD

Restraint use	No	Yes	Don't Know	Total	Overall %
No restraint	33.23%	48.28%	27.16%	1619	33.57%
Seat belt	44.94%	23.73%	50.96%	2113	43.81%
Helmet	6.04%	9.66%	4.25%	291	6.03%
Don't know	15.79%	18.33%	17.63%	800	16.59%
Total	100.00%	100.00%	100.00%	4823	100.00%

Total	2964	611	1248	4823
Overall %	61.46%	12.67%	25.88%	100.00%

Ejected from vehicle in fatal crashes by HRD

Ejected	No	Yes	Don't Know	Total	Overall %
No	89.77%	79.34%	91.87%	4271	89.00%
Yes	10.23%	20.66%	8.13%	528	11.00%
Total	100.00%	100.00%	100.00%	4799	100.00%

Total	2951	605	1243	4799
Overall %	61.49%	12.61%	25.90%	100.00%

Drinking driver in fatal crashes by HRD

Driver Drinking	No	Yes	Don't Know	Total	Overall %
No	81.21%	66.78%	77.96%	3788	78.54%
Yes	18.79%	33.22%	22.04%	1035	21.46%
Total	100.00%	100.00%	100.00%	4823	100.00%

Total	2964	611	1248	4823
Overall %	61.46%	12.67%	25.88%	100.00%

Impaired driver (surrogate) by HRD

Impaired driver	No	Yes	Don't Know	Total	Overall %
No	89.41%	79.08%	87.55%	4213	87.62%
Yes	10.59%	20.92%	12.45%	595	12.38%
Total	100.00%	100.00%	100.00%	4808	100.00%

Total	2956	607	1245	4808
Overall %	61.48%	12.62%	25.89%	100.00%

Drug use by HRD

Drugs	No	Yes	Don't Know	Total	Overall %
Yes	7.81%	16.25%	11.39%	445	9.78%
No	92.19%	83.75%	88.61%	4107	90.22%
Total	100.00%	100.00%	100.00%	4552	100.00%
Total	2816	560	1176	4552	
Overall %	61.86%	12.30%	25.83%	100.00%	

Estimated travel speed by HRD

Travel speed	No	Yes	Don't Know	Total	Overall %
<=30	2.40%	1.31%	4.89%	140	2.90%
31-55	4.28%	5.07%	8.09%	259	5.37%
56-69	1.45%	3.11%	2.72%	96	1.99%
70+/no limit	4.18%	5.56%	4.97%	220	4.56%
Don't know	87.69%	84.94%	79.33%	4108	85.18%
Total	100.00%	100.00%	100.00%	4823	100.00%
Total	2964	611	1248	4823	
Overall %	61.46%	12.67%	25.88%	100.00%	

Speeding by HRD

Speeding	No	Yes	Don't Know	Total	Overall %
Yes	18.40%	41.19%	15.35%	900	20.39%
No	81.60%	58.81%	84.65%	3515	79.61%
Total	100.00%	100.00%	100.00%	4415	100.00%
Total	2723	539	1153	4415	
Overall %	61.68%	12.21%	26.12%	100.00%	

License status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	1.52%	1.15%	5.36%	111	2.38%
Licensed	94.19%	76.89%	90.36%	4252	91.03%
Not valid	4.29%	21.97%	4.27%	308	6.59%
Total	100.00%	100.00%	100.00%	4671	100.00%
Total	2961	610	1100	4671	
Overall %	63.39%	13.06%	23.55%	100.00%	

Road location by HRD

Road location	No	Yes	Don't Know	Total	Overall %
On-road	65.18%	49.02%	67.63%	3071	63.77%
Shoulder	9.66%	6.89%	2.17%	355	7.37%
Median/left turn	3.88%	8.03%	4.50%	220	4.57%
Roadside	21.28%	36.07%	25.70%	1170	24.29%
Total	100.00%	100.00%	100.00%	4816	100.00%
Total	2961	610	1245	4816	
Overall %	61.48%	12.67%	25.85%	100.00%	

Number of lanes by HRD

No. of lanes	No	Yes	Don't Know	Total	Overall %
1-2	83.59%	78.58%	74.43%	3805	80.56%
3	7.29%	9.78%	10.76%	402	8.51%
4+	9.12%	11.64%	14.81%	516	10.93%
Total	100.00%	100.00%	100.00%	4723	100.00%

Total	2894	593	1236	4723
Overall %	61.27%	12.56%	26.17%	100.00%

Divided road by HRD

Divided road	No	Yes	Don't Know	Total	Overall %
Not divided	76.19%	70.25%	72.12%	3560	74.38%
Divided/no barrier	8.54%	10.41%	7.57%	408	8.52%
Divided/barrier	11.87%	16.03%	17.16%	659	13.77%
Other	3.40%	3.31%	3.14%	159	3.32%
Total	100.00%	100.00%	100.00%	4786	100.00%

Total	2940	605	1241	4786
Overall %	61.43%	12.64%	25.93%	100.00%

Road function by HRD

Road function	No	Yes	Don't Know	Total	Overall %
Principal arterial interstate	13.74%	16.58%	16.25%	701	14.74%
Principal arterial other frwy/exprwy	12.11%	14.45%	8.33%	545	11.46%
Principal arterial	13.36%	12.48%	21.83%	732	15.39%
Minor arterial	22.49%	19.21%	27.00%	1104	23.21%
Collector	18.05%	14.94%	13.25%	782	16.44%
Local rd. or st.	20.25%	22.33%	13.33%	893	18.77%
Total	100.00%	100.00%	100.00%	4757	100.00%

Total	2948	609	1200	4757
Overall %	61.97%	12.80%	25.23%	100.00%

Road alignment by HRD

Road alignment	No	Yes	Don't Know	Total	Overall %
Straight	72.74%	70.33%	68.36%	3380	71.31%
Curved	27.26%	29.67%	31.64%	1360	28.69%
Total	100.00%	100.00%	100.00%	4740	100.00%

Total	2920	600	1220	4740
Overall %	61.60%	12.66%	25.74%	100.00%

Road grade by HRD

Road profile	No	Yes	Don't Know	Total	Overall %
Level	77.11%	77.99%	63.08%	3407	73.70%
Grade	20.21%	19.80%	31.07%	1058	22.89%
Hill crest/sag	2.68%	2.22%	5.85%	158	3.42%
Total	100.00%	100.00%	100.00%	4623	100.00%

Total	2875	586	1162	4623
Overall %	62.19%	12.68%	25.14%	100.00%

Intersection by HRD

Intersection	No	Yes	Don't Know	Total	Overall %
No	68.97%	68.41%	59.07%	3194	66.33%
Yes	31.03%	31.59%	40.93%	1621	33.67%
Total	100.00%	100.00%	100.00%	4815	100.00%
Total	2958	611	1246	4815	
Overall %	61.43%	12.69%	25.88%	100.00%	

Intersection traffic controls by HRD

Traffic controls	No	Yes	Don't Know	Total	Overall %
No controls	53.28%	56.38%	56.35%	878	54.60%
Traffic signal	17.79%	20.74%	25.00%	328	20.40%
Stop/yield	25.44%	18.62%	13.10%	334	20.77%
Other	3.49%	4.26%	5.56%	68	4.23%
Total	100.00%	100.00%	100.00%	1608	100.00%
Total	916	188	504	1608	
Overall %	56.97%	11.69%	31.34%	100.00%	

Road conditions by HRD

Road conditions	No	Yes	Don't Know	Total	Overall %
Dry	75.44%	79.22%	80.03%	3647	77.10%
Wet	16.45%	15.71%	15.40%	761	16.09%
Snow/slush/ice	7.56%	4.90%	3.59%	293	6.19%
Other	0.55%	0.17%	0.98%	29	0.61%
Total	100.00%	100.00%	100.00%	4730	100.00%
Total	2911	592	1227	4730	
Overall %	61.54%	12.52%	25.94%	100.00%	

Speed limit by HRD

Speed limit	No	Yes	Don't Know	Total	Overall %
<=30	23.57%	28.26%	32.68%	1255	26.52%
31-55	64.51%	57.19%	57.27%	2921	61.72%
56-69	10.96%	12.71%	9.64%	513	10.84%
70+	0.96%	1.84%	0.41%	44	0.93%
Total	100.00%	100.00%	100.00%	4733	100.00%
Total	2911	598	1224	4733	
Overall %	61.50%	12.63%	25.86%	100.00%	

Rural/urban by HRD

Rural/urban	No	Yes	Don't Know	Total	Overall %
Rural	43.66%	32.08%	19.40%	1721	36.07%
Urban	56.34%	67.92%	80.60%	3050	63.93%
Total	100.00%	100.00%	100.00%	4771	100.00%
Total	2959	611	1201	4771	
Overall %	62.02%	12.81%	25.17%	100.00%	

Vehicle type by HRD

Type of vehicle	No	Yes	Don't Know	Total	Overall %
Car	47.87%	51.39%	51.19%	2354	49.16%
Utility	15.27%	15.06%	14.80%	724	15.12%
Van	5.96%	2.78%	5.97%	266	5.56%
Truck	12.90%	11.13%	8.83%	557	11.63%
Heavy truck/bus	5.99%	3.60%	5.64%	268	5.60%
Motorcycle	10.39%	15.06%	12.02%	546	11.40%
Other	1.62%	0.98%	1.55%	73	1.52%
Total	100.00%	100.00%	100.00%	4788	100.00%

Total	2954	611	1223	4788
Overall %	61.70%	12.76%	25.54%	100.00%

Model year by HRD

Model year	No	Yes	Don't Know	Total	Overall %
<=1997	36.18%	41.03%	34.88%	1732	36.46%
1998-2000	20.84%	20.43%	22.12%	1003	21.12%
2001-2003	22.17%	18.44%	21.54%	1023	21.54%
2004+	20.81%	20.10%	21.46%	992	20.88%
Total	100.00%	100.00%	100.00%	4750	100.00%

Total	2941	602	1207	4750
Overall %	61.92%	12.67%	25.41%	100.00%

State license status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	1.52%	1.15%	5.36%	111	2.38%
Licensed	94.19%	76.89%	90.36%	4252	91.03%
Not valid	4.29%	21.97%	4.27%	308	6.59%
Total	100.00%	100.00%	100.00%	4671	100.00%

Total	2961	610	1100	4671
Overall %	63.39%	13.06%	23.55%	100.00%

Day of week by HRD

Day of week	No	Yes	Don't Know	Total	Overall %
Sunday	14.07%	17.02%	17.07%	734	15.22%
Monday	11.71%	9.66%	11.70%	552	11.45%
Tuesday	12.72%	9.49%	13.70%	606	12.56%
Wednesday	13.23%	10.64%	11.54%	601	12.46%
Thursday	13.93%	13.42%	13.78%	667	13.83%
Friday	15.65%	19.31%	17.79%	804	16.67%
Saturday	18.69%	20.46%	14.42%	859	17.81%
Total	100.00%	100.00%	100.00%	4823	100.00%

Total	2964	611	1248	4823
Overall %	61.46%	12.67%	25.88%	100.00%

Time of day by HRD

Time	No	Yes	Don't Know	Total	Overall %
12am-2:59am	10.80%	21.42%	12.79%	608	12.66%
3am-5:59am	5.45%	9.56%	6.28%	297	6.18%
6am-8:59am	9.41%	7.91%	9.33%	442	9.20%
9am-11:59am	13.27%	8.40%	9.81%	565	11.76%
12pm-2:59pm	16.08%	8.07%	15.53%	717	14.93%
3pm-5:59pm	19.84%	13.67%	15.37%	860	17.90%
6pm-8:59pm	13.34%	15.65%	16.65%	696	14.49%
9pm-11:59pm	11.81%	15.32%	14.24%	619	12.89%
Total	100.00%	100.00%	100.00%	4804	100.00%
Total	2954	607	1243	4804	
Overall %	61.49%	12.64%	25.87%	100.00%	

Weekday/end by HRD

Weekday/end	No	Yes	Don't Know	Total	Overall %
Weekday	61.59%	54.26%	60.26%	2908	60.32%
Weekend	38.41%	45.74%	39.74%	1913	39.68%
Total	100.00%	100.00%	100.00%	4821	100.00%
Total	2963	610	1248	4821	
Overall %	61.46%	12.65%	25.89%	100.00%	

Quarter of year by HRD

Quarter of year	No	Yes	Don't Know	Total	Overall %
Jan-Mar	21.39%	21.44%	20.27%	1018	21.11%
Apr-Jun	25.27%	27.00%	26.20%	1241	25.73%
Jul-Sep	28.00%	29.79%	30.13%	1388	28.78%
Oct-Dec	25.34%	21.77%	23.40%	1176	24.38%
Total	100.00%	100.00%	100.00%	4823	100.00%
Total	2964	611	1248	4823	
Overall %	61.46%	12.67%	25.88%	100.00%	

Light conditions by HRD

Light conditions	No	Yes	Don't Know	Total	Overall %
Daylight	58.61%	42.10%	52.63%	2626	54.98%
Dark	19.86%	25.29%	17.00%	946	19.81%
Dark & lighted	17.07%	29.95%	27.13%	1017	21.29%
Dawn/dusk	4.46%	2.66%	3.24%	187	3.92%
Total	100.00%	100.00%	100.00%	4776	100.00%
Total	2940	601	1235	4776	
Overall %	61.56%	12.58%	25.86%	100.00%	

Weather conditions by HRD

Weather conditions	No	Yes	Don't Know	Total	Overall %
No adverse weather	84.63%	85.83%	87.20%	4041	85.45%
Rain	9.97%	9.61%	8.56%	452	9.56%
Sleet/snow	4.37%	3.20%	2.28%	174	3.68%
Fog	0.79%	1.01%	1.96%	53	1.12%
Other	0.24%	0.34%	0.00%	9	0.19%
Total	100.00%	100.00%	100.00%	4729	100.00%
Total	2909	593	1227	4729	
Overall %	61.51%	12.54%	25.95%	100.00%	

North

Number of vehicles by HRD

No. of vehicles	No	Yes	Don't Know	Total	Overall %
Single vehicle	38.26%	49.27%	49.23%	6158	40.15%
Multiple vehicle	61.74%	50.73%	50.77%	9181	59.85%
Total	100.00%	100.00%	100.00%	15339	100.00%
Total	12710	1983	646	15339	
Overall %	82.86%	12.93%	4.21%	100.00%	

Manner of Collision by HRD

Manner of collision	No	Yes	Don't Know	Total	Overall %
No other vehicle	41.97%	51.21%	56.92%	6713	43.80%
Front/rear	9.60%	9.99%	12.75%	1500	9.79%
Head-on	14.85%	13.07%	7.93%	2197	14.33%
Angle	28.89%	20.84%	17.26%	4194	27.36%
Sideswipe	4.32%	4.59%	4.82%	671	4.38%
Other	0.35%	0.30%	0.31%	53	0.35%
Total	100.00%	100.00%	100.00%	15328	100.00%
Total	12703	1982	643	15328	
Overall %	82.87%	12.93%	4.19%	100.00%	

Harmful even ty HRD

Harmful event	No	Yes	Don't Know	Total	Overall %
Rollover	3.04%	2.93%	2.17%	458	2.99%
Peds	10.80%	11.76%	32.97%	1818	11.86%
Vehicle-vehicle collision	56.80%	47.33%	40.71%	8417	54.89%
Fixed object	23.63%	31.69%	17.65%	3744	24.42%
Other	5.74%	6.31%	6.50%	896	5.84%
Total	100.00%	100.00%	100.00%	15333	100.00%
Total	12705	1982	646	15333	
Overall %	82.86%	12.93%	4.21%	100.00%	

Vehicle rollover by HRD

Rollover	No	Yes	Don't Know	Total	Overall %
No rollover	87.82%	84.77%	90.25%	13426	87.53%
One or more	12.18%	15.23%	9.75%	1913	12.47%
Total	100.00%	100.00%	100.00%	15339	100.00%
Total	12710	1983	646	15339	
Overall %	82.86%	12.93%	4.21%	100.00%	

Vehicle towed by HRD

Towed away	No	Yes	Don't Know	Total	Overall %
Driven	10.73%	9.55%	40.72%	1804	11.84%
Towed	89.27%	90.45%	59.28%	13437	88.16%
Total	100.00%	100.00%	100.00%	15241	100.00%
Total	12632	1968	641	15241	
Overall %	82.88%	12.91%	4.21%	100.00%	

Vehicle impact point by HRD

Impact point	No	Yes	Don't Know	Total	Overall %
Non-collision	1.59%	1.62%	1.03%	238	1.57%
Front	67.37%	74.40%	71.01%	10380	68.43%
Right	9.75%	8.16%	7.72%	1436	9.47%
Rear	8.06%	5.27%	9.43%	1176	7.75%
Left	10.45%	7.75%	6.86%	1511	9.96%
Other	2.77%	2.79%	3.95%	428	2.82%
Total	100.00%	100.00%	100.00%	15169	100.00%
Total	12613	1973	583	15169	
Overall %	83.15%	13.01%	3.84%	100.00%	

Age of driver by HRD

Age	No	Yes	Don't Know	Total	Overall %
<15	0.28%	0.00%	0.51%	38	0.25%
16-20	11.63%	12.56%	6.06%	1750	11.61%
21-24	9.57%	25.32%	11.87%	1764	11.70%
25-34	16.41%	29.40%	21.46%	2752	18.25%
35-44	19.02%	18.41%	22.47%	2870	19.03%
45-54	16.65%	9.43%	16.16%	2366	15.69%
55-64	12.06%	3.78%	11.36%	1651	10.95%
65-74	6.21%	0.50%	5.81%	822	5.45%
75+	8.17%	0.61%	4.29%	1066	7.07%
Total	100.00%	100.00%	100.00%	15079	100.00%
Total	12700	1983	396	15079	
Overall %	84.22%	13.15%	2.63%	100.00%	

Gender of driver by HRD

Gender	No	Yes	Don't Know	Total	Overall %
Male	73.26%	85.97%	81.84%	11352	75.16%
Female	26.74%	14.03%	18.16%	3751	24.84%
Total	100.00%	100.00%	100.00%	15103	100.00%
Total	12708	1982	413	15103	
Overall %	84.14%	13.12%	2.73%	100.00%	

Vehicle manoeuvre by HRD

Vehicle manoeuvre	No	Yes	Don't Know	Total	Overall %
Going straight/starting in traffic lane	64.33%	65.03%	72.14%	9879	64.73%
Slowing/stopped	4.29%	1.92%	4.81%	611	4.00%
Passing	1.94%	3.59%	1.99%	329	2.16%
Turning left	7.11%	3.94%	3.65%	1001	6.56%
Negotiating a curve	17.13%	19.30%	11.77%	2625	17.20%
Other	5.20%	6.22%	5.64%	816	5.35%
Total	100.00%	100.00%	100.00%	15261	100.00%
Total	12679	1979	603	15261	
Overall %	83.08%	12.97%	3.95%	100.00%	

Avoidance manoeuver by HRD

Avoidance manoeuvre	No	Yes	Don't Know	Total	Overall %
No avoid manoeuvre	48.17%	52.04%	49.23%	7472	48.71%
Braking	7.34%	5.60%	4.95%	1076	7.01%
Steering	12.23%	8.98%	8.05%	1785	11.64%
Other	0.50%	0.25%	0.15%	69	0.45%
Not reported	31.76%	33.13%	37.62%	4937	32.19%
Total	100.00%	100.00%	100.00%	15339	100.00%

Total	12710	1983	646	15339
Overall %	82.86%	12.93%	4.21%	100.00%

Restraint use by HRD

Restraint use	No	Yes	Don't Know	Total	Overall %
No restraint	26.96%	38.43%	12.69%	4270	27.84%
Seat belt	57.44%	39.79%	38.39%	8338	54.36%
Helmet	6.25%	10.94%	2.32%	1027	6.70%
Don't know	9.35%	10.84%	46.59%	1704	11.11%
Total	100.00%	100.00%	100.00%	15339	100.00%

Total	12710	1983	646	15339
Overall %	82.86%	12.93%	4.21%	100.00%

Ejected from vehicle in fatal crashes by HRD

Ejected	No	Yes	Don't Know	Total	Overall %
No	92.32%	87.96%	96.07%	14052	91.91%
Yes	7.68%	12.04%	3.93%	1237	8.09%
Total	100.00%	100.00%	100.00%	15289	100.00%

Total	12676	1977	636	15289
Overall %	82.91%	12.93%	4.16%	100.00%

Drinking driver in fatal crashes by HRD

Driver Drinking	No	Yes	Don't Know	Total	Overall %
No	81.72%	66.62%	90.25%	12291	80.13%
Yes	18.28%	33.38%	9.75%	3048	19.87%
Total	100.00%	100.00%	100.00%	15339	100.00%

Total	12710	1983	646	15339
Overall %	82.86%	12.93%	4.21%	100.00%

Impaired driver (surrogate) by HRD

Impaired driver	No	Yes	Don't Know	Total	Overall %
No	90.13%	83.25%	92.26%	13683	89.33%
Yes	9.87%	16.75%	7.74%	1634	10.67%
Total	100.00%	100.00%	100.00%	15317	100.00%

Total	12689	1982	646	15317
Overall %	82.84%	12.94%	4.22%	100.00%

Drug use by HRD

Drugs	No	Yes	Don't Know	Total	Overall %
Yes	13.47%	24.61%	6.22%	2147	14.55%
No	86.53%	75.39%	93.78%	12611	85.45%
Total	100.00%	100.00%	100.00%	14758	100.00%
Total	12290	1841	627	14758	
Overall %	83.28%	12.47%	4.25%	100.00%	

Estimated travel speed by HRD

Travel speed	No	Yes	Don't Know	Total	Overall %
<=30	5.74%	1.97%	3.10%	788	5.14%
31-55	16.02%	8.57%	7.59%	2255	14.70%
56-69	4.25%	3.73%	5.57%	650	4.24%
70+/no limit	6.68%	7.72%	5.26%	1036	6.75%
Don't know	67.32%	78.01%	78.48%	10610	69.17%
Total	100.00%	100.00%	100.00%	15339	100.00%
Total	12710	1983	646	15339	
Overall %	82.86%	12.93%	4.21%	100.00%	

Speeding by HRD

Speeding	No	Yes	Don't Know	Total	Overall %
Yes	17.84%	27.64%	12.30%	2749	18.84%
No	82.16%	72.36%	87.70%	11842	81.16%
Total	100.00%	100.00%	100.00%	14591	100.00%
Total	12120	1845	626	14591	
Overall %	83.06%	12.64%	4.29%	100.00%	

License status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	2.38%	1.73%	12.32%	352	2.38%
Licensed	93.10%	68.49%	82.61%	13256	89.72%
Not valid	4.52%	29.78%	5.07%	1167	7.90%
Total	100.00%	100.00%	100.00%	14775	100.00%
Total	12666	1971	138	14775	
Overall %	85.73%	13.34%	0.93%	100.00%	

Road location by HRD

Road location	No	Yes	Don't Know	Total	Overall %
On-road	71.09%	61.69%	75.82%	10737	70.07%
Shoulder	5.05%	5.60%	5.62%	789	5.15%
Median/left turn	2.06%	2.57%	4.06%	339	2.21%
Roadside	21.79%	30.14%	14.51%	3458	22.57%
Total	100.00%	100.00%	100.00%	15323	100.00%
Total	12701	1981	641	15323	
Overall %	82.89%	12.93%	4.18%	100.00%	

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Number of lanes by HRD

No. of lanes	No	Yes	Don't Know	Total	Overall %
1-2	82.08%	78.07%	73.24%	12041	81.20%
3	9.34%	13.01%	15.72%	1493	10.07%
4+	8.58%	8.92%	11.04%	1294	8.73%
Total	100.00%	100.00%	100.00%	14828	100.00%

Total	12324	1906	598	14828
Overall %	83.11%	12.85%	4.03%	100.00%

Divided road by HRD

Divided road	No	Yes	Don't Know	Total	Overall %
Not divided	70.64%	64.60%	52.68%	10393	69.13%
Divided/no barrier	16.60%	18.50%	25.53%	2587	17.21%
Divided/barrier	9.96%	13.80%	18.21%	1622	10.79%
Other	2.80%	3.10%	3.58%	432	2.87%
Total	100.00%	100.00%	100.00%	15034	100.00%

Total	12484	1935	615	15034
Overall %	83.04%	12.87%	4.09%	100.00%

Road function by HRD

Road function	No	Yes	Don't Know	Total	Overall %
Principal arterial interstate	9.03%	10.05%	24.53%	1502	9.82%
Principal arterial other frwy/exprwy	4.89%	7.57%	5.59%	806	5.27%
Principal arterial	30.94%	30.19%	31.68%	4725	30.88%
Minor arterial	21.94%	19.84%	16.77%	3282	21.45%
Collector	15.85%	14.34%	6.83%	2337	15.27%
Local rd. or st.	17.35%	18.02%	14.60%	2651	17.32%
Total	100.00%	100.00%	100.00%	15303	100.00%

Total	12678	1981	644	15303
Overall %	82.85%	12.95%	4.21%	100.00%

Road alignment by HRD

Road alignment	No	Yes	Don't Know	Total	Overall %
Straight	73.46%	70.30%	81.24%	11246	73.38%
Curved	26.54%	29.70%	18.76%	4080	26.62%
Total	100.00%	100.00%	100.00%	15326	100.00%

Total	12701	1980	645	15326
Overall %	82.87%	12.92%	4.21%	100.00%

Road grade by HRD

Road profile	No	Yes	Don't Know	Total	Overall %
Level	68.68%	72.51%	73.56%	10627	69.38%
Grade	27.67%	23.29%	23.48%	4125	26.93%
Hill crest/sag	3.65%	4.19%	2.95%	565	3.69%
Total	100.00%	100.00%	100.00%	15317	100.00%

Total	12695	1979	643	15317
Overall %	82.88%	12.92%	4.20%	100.00%

Intersection by HRD

Intersection	No	Yes	Don't Know	Total	Overall %
No	61.97%	65.46%	68.58%	9618	62.70%
Yes	38.03%	34.54%	31.42%	5721	37.30%
Total	100.00%	100.00%	100.00%	15339	100.00%
Total	12710	1983	646	15339	
Overall %	82.86%	12.93%	4.21%	100.00%	

Intersection traffic controls by HRD

Traffic controls	No	Yes	Don't Know	Total	Overall %
No controls	39.61%	49.04%	42.08%	2327	40.82%
Traffic signal	31.77%	32.99%	41.58%	1839	32.26%
Stop/yield	25.92%	17.23%	14.85%	1396	24.49%
Other	2.70%	0.74%	1.49%	138	2.42%
Total	100.00%	100.00%	100.00%	5700	100.00%
Total	4819	679	202	5700	
Overall %	84.54%	11.91%	3.54%	100.00%	

Road conditions by HRD

Road conditions	No	Yes	Don't Know	Total	Overall %
Dry	79.65%	81.93%	78.85%	12234	79.91%
Wet	14.96%	14.83%	16.33%	2296	15.00%
Snow/slush/ice	5.09%	2.94%	4.82%	735	4.80%
Other	0.30%	0.30%	0.00%	44	0.29%
Total	100.00%	100.00%	100.00%	15309	100.00%
Total	12690	1976	643	15309	
Overall %	82.89%	12.91%	4.20%	100.00%	

Speed limit by HRD

Speed limit	No	Yes	Don't Know	Total	Overall %
<=30	11.47%	14.78%	12.69%	1833	11.95%
31-55	71.18%	62.99%	45.36%	10589	69.03%
56-69	6.96%	7.77%	18.73%	1160	7.56%
70+	0.31%	0.15%	0.62%	47	0.31%
Don't know	10.07%	14.32%	22.60%	1710	11.15%
Total	100.00%	100.00%	100.00%	15339	100.00%
Total	12710	1983	646	15339	
Overall %	82.86%	12.93%	4.21%	100.00%	

Rural/urban by HRD

Rural/urban	No	Yes	Don't Know	Total	Overall %
Rural	41.77%	31.94%	32.76%	6146	40.12%
Urban	58.23%	68.06%	67.24%	9174	59.88%
Total	100.00%	100.00%	100.00%	15320	100.00%
Total	12694	1982	644	15320	
Overall %	82.86%	12.94%	4.20%	100.00%	

Vehicle type by HRD

Type of vehicle	No	Yes	Don't Know	Total	Overall %
Car	47.95%	46.41%	42.08%	7200	47.57%
Utility	15.01%	12.88%	13.45%	2222	14.68%
Van	7.74%	5.30%	9.54%	1131	7.47%
Truck	10.71%	9.39%	4.99%	1568	10.36%
Heavy truck/bus	8.73%	9.19%	23.43%	1398	9.24%
Motorcycle	8.74%	15.25%	5.21%	1435	9.48%
Other	1.14%	1.57%	1.30%	182	1.20%
Total	100.00%	100.00%	100.00%	15136	100.00%

Total	12695	1980	461	15136
Overall %	83.87%	13.08%	3.05%	100.00%

Model year by HRD

Model year	No	Yes	Don't Know	Total	Overall %
<=1997	35.64%	38.90%	31.26%	5395	35.95%
1998-2000	19.28%	18.99%	19.33%	2888	19.24%
2001-2003	22.80%	20.52%	22.67%	3377	22.50%
2004+	22.27%	21.59%	26.73%	3348	22.31%
Total	100.00%	100.00%	100.00%	15008	100.00%

Total	12625	1964	419	15008
Overall %	84.12%	13.09%	2.79%	100.00%

State license status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	2.38%	1.73%	12.32%	352	2.38%
Licensed	93.10%	68.49%	82.61%	13256	89.72%
Not valid	4.52%	29.78%	5.07%	1167	7.90%
Total	100.00%	100.00%	100.00%	14775	100.00%

Total	12666	1971	138	14775
Overall %	85.73%	13.34%	0.93%	100.00%

Day of week by HRD

Day of week	No	Yes	Don't Know	Total	Overall %
Sunday	14.09%	17.40%	20.59%	2269	14.79%
Monday	13.26%	11.55%	12.07%	1992	12.99%
Tuesday	13.07%	11.80%	11.61%	1970	12.84%
Wednesday	12.62%	12.96%	11.15%	1933	12.60%
Thursday	13.89%	13.21%	13.00%	2112	13.77%
Friday	16.61%	15.08%	15.63%	2511	16.37%
Saturday	16.46%	18.00%	15.94%	2552	16.64%
Total	100.00%	100.00%	100.00%	15339	100.00%

Total	12710	1983	646	15339
Overall %	82.86%	12.93%	4.21%	100.00%

Time of day by HRD

Time	No	Yes	Don't Know	Total	Overall %
12am-2:59am	9.63%	16.61%	17.21%	1660	10.85%
3am-5:59am	6.24%	11.41%	13.33%	1103	7.21%
6am-8:59am	10.46%	8.88%	8.53%	1556	10.17%
9am-11:59am	11.27%	8.88%	10.54%	1672	10.93%
12pm-2:59pm	16.34%	9.79%	11.78%	2341	15.30%
3pm-5:59pm	18.11%	12.82%	12.25%	2628	17.18%
6pm-8:59pm	15.55%	15.30%	11.94%	2350	15.36%
9pm-11:59pm	12.41%	16.30%	14.42%	1988	13.00%
Total	100.00%	100.00%	100.00%	15298	100.00%

Total	12672	1981	645	15298
Overall %	82.83%	12.95%	4.22%	100.00%

Weekday/end by HRD

Weekday/end	No	Yes	Don't Know	Total	Overall %
Weekday	62.16%	56.83%	55.42%	9382	61.18%
Weekend	37.84%	43.17%	44.58%	5952	38.82%
Total	100.00%	100.00%	100.00%	15334	100.00%

Total	12705	1983	646	15334
Overall %	82.86%	12.93%	4.21%	100.00%

Quarter of year by HRD

Quarter of year	No	Yes	Don't Know	Total	Overall %
Jan-Mar	21.48%	19.92%	18.42%	3244	21.15%
Apr-Jun	25.13%	25.26%	23.22%	3845	25.07%
Jul-Sep	28.15%	30.21%	30.19%	4372	28.50%
Oct-Dec	25.24%	24.61%	28.17%	3878	25.28%
Total	100.00%	100.00%	100.00%	15339	100.00%

Total	12710	1983	646	15339
Overall %	82.86%	12.93%	4.21%	100.00%

Light conditions by HRD

Light conditions	No	Yes	Don't Know	Total	Overall %
Daylight	56.85%	42.06%	42.75%	8307	54.35%
Dark	20.17%	23.41%	21.68%	3157	20.65%
Dark & lighted	18.69%	30.33%	32.14%	3173	20.76%
Dawn/dusk	4.29%	4.20%	3.43%	648	4.24%
Total	100.00%	100.00%	100.00%	15285	100.00%

Total	12666	1978	641	15285
Overall %	82.87%	12.94%	4.19%	100.00%

Weather conditions by HRD

Weather conditions	No	Yes	Don't Know	Total	Overall %
No adverse weather	85.88%	87.32%	84.03%	13153	85.99%
Rain	9.00%	9.03%	10.08%	1384	9.05%
Sleet/snow	3.89%	2.13%	4.19%	562	3.67%
Fog	1.06%	1.32%	1.55%	170	1.11%
Other	0.17%	0.20%	0.16%	27	0.18%
Total	100.00%	100.00%	100.00%	15296	100.00%

Total	12679	1972	645	15296
Overall %	82.89%	12.89%	4.22%	100.00%

Central

Number of vehicles by HRD

No. of vehicles	No	Yes	Don't Know	Total	Overall %
Single vehicle	38.04%	51.41%	52.07%	2932	40.58%
Multiple vehicle	61.96%	48.59%	47.93%	4294	59.42%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Manner of Collision by HRD

Manner of collision	No	Yes	Don't Know	Total	Overall %
No other vehicle	40.92%	53.29%	55.90%	3130	43.34%
Front/rear	10.22%	8.55%	10.76%	722	10.00%
Head-on	16.90%	13.91%	10.07%	1169	16.19%
Angle	28.71%	20.96%	19.10%	1963	27.18%
Sideswipe	2.45%	2.73%	2.78%	181	2.51%
Other	0.80%	0.56%	1.39%	57	0.79%
Total	100.00%	100.00%	100.00%	7222	100.00%

Total	5870	1064	288	7222
Overall %	81.28%	14.73%	3.99%	100.00%

Harmful even ty HRD

Harmful event	No	Yes	Don't Know	Total	Overall %
Rollover	3.07%	4.61%	1.38%	233	3.22%
Peds	9.03%	6.30%	28.62%	680	9.41%
Vehicle-vehicle collision	58.19%	45.77%	41.38%	4024	55.69%
Fixed object	22.87%	34.77%	17.24%	1763	24.40%
Other	6.85%	8.55%	11.38%	526	7.28%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Vehicle rollover by HRD

Rollover	No	Yes	Don't Know	Total	Overall %
No rollover	85.88%	78.29%	88.62%	6133	84.87%
One or more	14.12%	21.71%	11.38%	1093	15.13%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Vehicle towed by HRD

Towed away	No	Yes	Don't Know	Total	Overall %
Driven	6.50%	4.09%	31.58%	510	7.15%
Towed	93.50%	95.91%	68.42%	6626	92.85%
Total	100.00%	100.00%	100.00%	7136	100.00%

Total	5800	1051	285	7136
Overall %	81.28%	14.73%	3.99%	100.00%

Vehicle impact point by HRD

Impact point	No	Yes	Don't Know	Total	Overall %
Non-collision	2.41%	3.01%	2.52%	180	2.50%
Front	70.03%	73.03%	75.90%	5092	70.70%
Right	8.94%	8.65%	5.76%	632	8.78%
Rear	7.30%	5.36%	6.47%	503	6.98%
Left	10.29%	8.93%	6.83%	717	9.96%
Other	1.02%	1.03%	2.52%	78	1.08%
Total	100.00%	100.00%	100.00%	7202	100.00%
Total	5860	1064	278	7202	
Overall %	81.37%	14.77%	3.86%	100.00%	

Age of driver by HRD

Age	No	Yes	Don't Know	Total	Overall %
<15	0.27%	0.00%	0.57%	17	0.24%
16-20	12.42%	12.32%	13.14%	883	12.43%
21-24	10.02%	22.39%	20.00%	861	12.12%
25-34	17.21%	26.72%	22.86%	1334	18.77%
35-44	19.05%	20.70%	20.00%	1373	19.32%
45-54	16.38%	11.10%	13.14%	1102	15.51%
55-64	11.86%	5.08%	5.14%	759	10.68%
65-74	6.61%	1.13%	4.00%	407	5.73%
75+	6.17%	0.56%	1.14%	370	5.21%
Total	100.00%	100.00%	100.00%	7106	100.00%
Total	5868	1063	175	7106	
Overall %	82.58%	14.96%	2.46%	100.00%	

Gender of driver by HRD

Gender	No	Yes	Don't Know	Total	Overall %
Male	73.37%	83.82%	87.43%	5358	75.30%
Female	26.63%	16.18%	12.57%	1758	24.70%
Total	100.00%	100.00%	100.00%	7116	100.00%
Total	5870	1063	183	7116	
Overall %	82.49%	14.94%	2.57%	100.00%	

Vehicle manoeuvre by HRD

Vehicle manoeuvre	No	Yes	Don't Know	Total	Overall %
Going straight/starting in traffic lane	69.63%	63.53%	78.17%	4984	69.07%
Slowing/stopped	4.24%	2.73%	3.52%	288	3.99%
Passing	1.19%	1.97%	0.35%	92	1.27%
Turning left	5.28%	3.29%	3.52%	355	4.92%
Negotiating a curve	14.37%	23.78%	9.86%	1124	15.58%
Other	5.28%	4.70%	4.58%	373	5.17%
Total	100.00%	100.00%	100.00%	7216	100.00%
Total	5868	1064	284	7216	
Overall %	81.32%	14.75%	3.94%	100.00%	

Avoidance manoeuver by HRD

Avoidance manoeuvre	No	Yes	Don't Know	Total	Overall %
No avoid manoeuvre	74.13%	64.57%	80.34%	5273	72.97%
Braking	18.39%	25.09%	13.10%	1385	19.17%
Steering	6.91%	9.87%	4.48%	524	7.25%
Other	0.09%	0.00%	0.00%	5	0.07%
Not reported	0.48%	0.47%	2.07%	39	0.54%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Restraint use by HRD

Restraint use	No	Yes	Don't Know	Total	Overall %
No restraint	31.23%	49.25%	21.72%	2421	33.50%
Seat belt	50.41%	29.14%	30.00%	3357	46.46%
Helmet	6.93%	9.30%	3.10%	515	7.13%
Don't know	11.43%	12.31%	45.17%	933	12.91%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Ejected from vehicle in fatal crashes by HRD

Ejected	No	Yes	Don't Know	Total	Overall %
No	90.74%	83.63%	94.27%	6475	89.83%
Yes	9.26%	16.37%	5.73%	733	10.17%
Total	100.00%	100.00%	100.00%	7208	100.00%

Total	5866	1063	279	7208
Overall %	81.38%	14.75%	3.87%	100.00%

Drinking driver in fatal crashes by HRD

Driver Drinking	No	Yes	Don't Know	Total	Overall %
No	80.14%	65.51%	85.52%	5651	78.20%
Yes	19.86%	34.49%	14.48%	1575	21.80%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Impaired driver (surrogate) by HRD

Impaired driver	No	Yes	Don't Know	Total	Overall %
No	89.96%	81.09%	90.34%	6399	88.67%
Yes	10.04%	18.91%	9.66%	818	11.33%
Total	100.00%	100.00%	100.00%	7217	100.00%

Total	5864	1063	290	7217
Overall %	81.25%	14.73%	4.02%	100.00%

Drug use by HRD

Drugs	No	Yes	Don't Know	Total	Overall %
Yes	6.02%	7.49%	4.64%	438	6.18%
No	93.98%	92.51%	95.36%	6650	93.82%
Total	100.00%	100.00%	100.00%	7088	100.00%
Total	5766	1042	280	7088	
Overall %	81.35%	14.70%	3.95%	100.00%	

Estimated travel speed by HRD

Travel speed	No	Yes	Don't Know	Total	Overall %
<=30	7.66%	6.02%	5.52%	530	7.33%
31-55	26.94%	27.82%	21.03%	1939	26.83%
56-69	7.83%	10.81%	7.24%	596	8.25%
70+/no limit	9.47%	15.13%	7.93%	740	10.24%
Don't know	48.09%	40.23%	58.28%	3421	47.34%
Total	100.00%	100.00%	100.00%	7226	100.00%
Total	5872	1064	290	7226	
Overall %	81.26%	14.72%	4.01%	100.00%	

Speeding by HRD

Speeding	No	Yes	Don't Know	Total	Overall %
Yes	16.59%	29.08%	13.58%	1255	18.27%
No	83.41%	70.92%	86.42%	5614	81.73%
Total	100.00%	100.00%	100.00%	6869	100.00%
Total	5617	987	265	6869	
Overall %	81.77%	14.37%	3.86%	100.00%	

License status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	3.10%	1.22%	46.24%	238	3.39%
Licensed	92.60%	75.45%	43.01%	6275	89.35%
Not valid	4.30%	23.33%	10.75%	510	7.26%
Total	100.00%	100.00%	100.00%	7023	100.00%
Total	5867	1063	93	7023	
Overall %	83.54%	15.14%	1.32%	100.00%	

Road location by HRD

Road location	No	Yes	Don't Know	Total	Overall %
On-road	70.42%	56.86%	75.52%	4959	68.63%
Shoulder	4.80%	6.58%	7.24%	373	5.16%
Median/left turn	1.41%	2.26%	0.00%	107	1.48%
Roadside	23.37%	34.30%	17.24%	1787	24.73%
Total	100.00%	100.00%	100.00%	7226	100.00%
Total	5872	1064	290	7226	
Overall %	81.26%	14.72%	4.01%	100.00%	

Number of lanes by HRD

No. of vehicles	No	Yes	Don't Know	Total	Overall %
Single vehicle	38.04%	51.41%	52.07%	2932	40.58%
Multiple vehicle	61.96%	48.59%	47.93%	4294	59.42%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Divided road by HRD

Divided road	No	Yes	Don't Know	Total	Overall %
Not divided	53.16%	56.07%	43.45%	3839	53.20%
Divided/no barrier	15.78%	9.13%	15.86%	1068	14.80%
Divided/barrier	28.98%	32.46%	37.93%	2154	29.85%
Other	2.08%	2.35%	2.76%	155	2.15%
Total	100.00%	100.00%	100.00%	7216	100.00%

Total	5863	1063	290	7216
Overall %	81.25%	14.73%	4.02%	100.00%

Road function by HRD

Road function	No	Yes	Don't Know	Total	Overall %
Principal arterial interstate	12.07%	12.16%	15.97%	882	12.24%
Principal arterial other frwy/exprwy	3.82%	2.73%	4.51%	266	3.69%
Principal arterial	28.33%	24.41%	31.25%	2009	27.87%
Minor arterial	23.02%	21.58%	18.75%	1632	22.64%
Collector	18.13%	22.90%	14.93%	1348	18.70%
Local rd. or st.	14.63%	16.21%	14.58%	1071	14.86%
Total	100.00%	100.00%	100.00%	7208	100.00%

Total	5859	1061	288	7208
Overall %	81.28%	14.72%	4.00%	100.00%

Road alignment by HRD

Road alignment	No	Yes	Don't Know	Total	Overall %
Straight	69.66%	62.15%	80.97%	4965	69.01%
Curved	30.34%	37.85%	19.03%	2230	30.99%
Total	100.00%	100.00%	100.00%	7195	100.00%

Total	5844	1062	289	7195
Overall %	81.22%	14.76%	4.02%	100.00%

Road grade by HRD

Road profile	No	Yes	Don't Know	Total	Overall %
Level	70.93%	71.56%	75.43%	5114	71.21%
Grade	26.05%	25.05%	22.84%	1851	25.77%
Hill crest/sag	3.02%	3.39%	1.73%	217	3.02%
Total	100.00%	100.00%	100.00%	7182	100.00%

Total	5831	1062	289	7182
Overall %	81.19%	14.79%	4.02%	100.00%

Intersection by HRD

Intersection	No	Yes	Don't Know	Total	Overall %
No	64.23%	66.73%	66.78%	4674	64.70%
Yes	35.77%	33.27%	33.22%	2550	35.30%
Total	100.00%	100.00%	100.00%	7224	100.00%
Total	5871	1064	289	7224	
Overall %	81.27%	14.73%	4.00%	100.00%	

Intersection traffic controls by HRD

Traffic controls	No	Yes	Don't Know	Total	Overall %
No controls	50.02%	57.47%	52.08%	1261	51.16%
Traffic signal	31.42%	27.30%	39.58%	768	31.16%
Stop/yield	17.57%	13.51%	8.33%	410	16.63%
Other	0.99%	1.72%	0.00%	26	1.05%
Total	100.00%	100.00%	100.00%	2465	100.00%
Total	2021	348	96	2465	
Overall %	81.99%	14.12%	3.89%	100.00%	

Road conditions by HRD

Road conditions	No	Yes	Don't Know	Total	Overall %
Dry	84.37%	86.53%	80.28%	6095	84.52%
Wet	13.65%	12.05%	17.30%	978	13.56%
Snow/slush/ice	1.83%	1.32%	2.08%	127	1.76%
Other	0.15%	0.09%	0.35%	11	0.15%
Total	100.00%	100.00%	100.00%	7211	100.00%
Total	5860	1062	289	7211	
Overall %	81.26%	14.73%	4.01%	100.00%	

Speed limit by HRD

Speed limit	No	Yes	Don't Know	Total	Overall %
<=30	12.08%	11.15%	16.78%	869	12.13%
31-55	79.13%	80.15%	75.17%	5667	79.13%
56-69	8.68%	8.70%	8.04%	620	8.66%
70+	0.10%	0.00%	0.00%	6	0.08%
Total	100.00%	100.00%	100.00%	7162	100.00%
Total	5818	1058	286	7162	
Overall %	81.23%	14.77%	3.99%	100.00%	

Rural/urban by HRD

Rural/urban	No	Yes	Don't Know	Total	Overall %
Rural	50.35%	53.86%	34.26%	3624	50.22%
Urban	49.65%	46.14%	65.74%	3592	49.78%
Total	100.00%	100.00%	100.00%	7216	100.00%
Total	5865	1062	289	7216	
Overall %	81.28%	14.72%	4.00%	100.00%	

Vehicle type by HRD

Type of vehicle	No	Yes	Don't Know	Total	Overall %
Car	45.96%	45.29%	51.09%	3293	46.02%
Utility	16.12%	14.12%	12.23%	1123	15.70%
Van	6.50%	4.80%	6.55%	447	6.25%
Truck	14.70%	15.54%	8.73%	1047	14.63%
Heavy truck/bus	7.67%	8.38%	12.66%	568	7.94%
Motorcycle	8.10%	10.83%	5.68%	603	8.43%
Other	0.95%	1.04%	3.06%	74	1.03%
Total	100.00%	100.00%	100.00%	7155	100.00%

Total	5864	1062	229	7155
Overall %	81.96%	14.84%	3.20%	100.00%

Model year by HRD

Model year	No	Yes	Don't Know	Total	Overall %
<=1997	36.30%	42.48%	42.71%	2657	37.40%
1998-2000	20.23%	19.49%	18.09%	1425	20.06%
2001-2003	21.02%	17.69%	17.09%	1450	20.41%
2004+	22.45%	20.34%	22.11%	1572	22.13%
Total	100.00%	100.00%	100.00%	7104	100.00%

Total	5848	1057	199	7104
Overall %	82.32%	14.88%	2.80%	100.00%

State license status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	3.10%	1.22%	46.24%	238	3.39%
Licensed	92.60%	75.45%	43.01%	6275	89.35%
Not valid	4.30%	23.33%	10.75%	510	7.26%
Total	100.00%	100.00%	100.00%	7023	100.00%

Total	5867	1063	93	7023
Overall %	83.54%	15.14%	1.32%	100.00%

Day of week by HRD

Day of week	No	Yes	Don't Know	Total	Overall %
Sunday	14.61%	18.98%	15.17%	1104	15.28%
Monday	13.13%	10.62%	13.79%	924	12.79%
Tuesday	12.41%	13.44%	9.66%	900	12.46%
Wednesday	13.10%	11.65%	10.00%	922	12.76%
Thursday	12.91%	11.37%	14.14%	920	12.73%
Friday	16.08%	14.85%	16.55%	1150	15.91%
Saturday	17.76%	19.08%	20.69%	1306	18.07%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Time of day by HRD

Time	No	Yes	Don't Know	Total	Overall %
12am-2:59am	9.69%	18.46%	21.80%	827	11.47%
3am-5:59am	6.93%	9.98%	10.38%	542	7.52%
6am-8:59am	11.06%	7.91%	7.27%	753	10.44%
9am-11:59am	10.02%	7.82%	7.27%	691	9.58%
12pm-2:59pm	16.01%	12.34%	7.61%	1091	15.13%
3pm-5:59pm	18.17%	14.41%	10.38%	1248	17.31%
6pm-8:59pm	14.80%	13.56%	18.34%	1064	14.76%
9pm-11:59pm	13.33%	15.54%	16.96%	995	13.80%
Total	100.00%	100.00%	100.00%	7211	100.00%

Total	5860	1062	289	7211
Overall %	81.26%	14.73%	4.01%	100.00%

Weekday/end by HRD

Weekday/end	No	Yes	Don't Know	Total	Overall %
Weekday	60.90%	55.36%	55.86%	4327	59.88%
Weekend	39.10%	44.64%	44.14%	2899	40.12%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Quarter of year by HRD

Quarter of year	No	Yes	Don't Know	Total	Overall %
Jan-Mar	21.30%	19.64%	16.90%	1509	20.88%
Apr-Jun	25.44%	25.38%	25.17%	1837	25.42%
Jul-Sep	26.55%	29.61%	28.28%	1956	27.07%
Oct-Dec	26.70%	25.38%	29.66%	1924	26.63%
Total	100.00%	100.00%	100.00%	7226	100.00%

Total	5872	1064	290	7226
Overall %	81.26%	14.72%	4.01%	100.00%

Light conditions by HRD

Light conditions	No	Yes	Don't Know	Total	Overall %
Daylight	55.59%	44.87%	31.83%	3830	53.06%
Dark	24.75%	35.37%	34.60%	1928	26.71%
Dark & lighted	15.43%	16.09%	26.64%	1153	15.97%
Dawn/dusk	4.23%	3.67%	6.92%	307	4.25%
Total	100.00%	100.00%	100.00%	7218	100.00%

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Total	5866	1063	289	7218
Overall %	81.27%	14.73%	4.00%	100.00%

Weather conditions by HRD

Weather conditions	No	Yes	Don't Know	Total	Overall %
No adverse weather	91.05%	93.51%	88.24%	6587	91.30%
Rain	6.67%	5.17%	9.69%	474	6.57%
Sleet/snow	1.45%	0.75%	1.04%	96	1.33%
Fog	0.82%	0.56%	1.04%	57	0.79%
Other	0.02%	0.00%	0.00%	1	0.01%
Total	100.00%	100.00%	100.00%	7215	100.00%

Total	5863	1063	289	7215
Overall %	81.26%	14.73%	4.01%	100.00%

South

Number of vehicles by HRD

No. of vehicles	No	Yes	Don't Know	Total	Overall %
Single vehicle	37.83%	48.26%	35.80%	6905	38.60%
Multiple vehicle	62.17%	51.74%	64.20%	10985	61.40%
Total	100.00%	100.00%	100.00%	17890	100.00%
Total	9083	2536	6271	17890	
Overall %	50.77%	14.18%	35.05%	100.00%	

Manner of Collision by HRD

Manner of collision	No	Yes	Don't Know	Total	Overall %
No other vehicle	40.47%	49.98%	39.05%	7383	41.32%
Front/rear	7.74%	7.62%	9.69%	1502	8.41%
Head-on	14.53%	13.54%	14.32%	2558	14.32%
Angle	31.12%	24.52%	31.60%	5424	30.35%
Sideswipe	5.68%	4.03%	4.77%	916	5.13%
Other	0.47%	0.32%	0.56%	86	0.48%
Total	100.00%	100.00%	100.00%	17869	100.00%
Total	9074	2533	6262	17869	
Overall %	50.78%	14.18%	35.04%	100.00%	

Harmful even ty HRD

Harmful event	No	Yes	Don't Know	Total	Overall %
Rollover	5.67%	6.59%	5.90%	1052	5.88%
Peds	7.09%	6.78%	7.73%	1301	7.27%
Vehicle-vehicle collision	58.87%	49.21%	60.37%	10381	58.03%
Fixed object	23.70%	32.57%	21.46%	4325	24.18%
Other	4.67%	4.85%	4.53%	831	4.65%
Total	100.00%	100.00%	100.00%	17890	100.00%
Total	9083	2536	6271	17890	
Overall %	50.77%	14.18%	35.05%	100.00%	

Vehicle rollover by HRD

Rollover	No	Yes	Don't Know	Total	Overall %
No rollover	80.57%	73.19%	80.83%	14243	79.61%
One or more	19.43%	26.81%	19.17%	3647	20.39%
Total	100.00%	100.00%	100.00%	17890	100.00%
Total	9083	2536	6271	17890	
Overall %	50.77%	14.18%	35.05%	100.00%	

Vehicle towed by HRD

Towed away	No	Yes	Don't Know	Total	Overall %
Driven	8.20%	6.17%	9.74%	1473	8.46%
Towed	91.80%	93.83%	90.26%	15948	91.54%
Total	100.00%	100.00%	100.00%	17421	100.00%
Total	8757	2481	6183	17421	
Overall %	50.27%	14.24%	35.49%	100.00%	

Vehicle impact point by HRD

Impact point	No	Yes	Don't Know	Total	Overall %
Non-collision	3.78%	4.35%	4.65%	742	4.17%
Front	62.65%	66.44%	64.60%	11370	63.87%
Right	10.49%	9.85%	8.57%	1732	9.73%
Rear	6.74%	5.42%	9.00%	1307	7.34%
Left	14.85%	11.52%	9.87%	2250	12.64%
Other	1.49%	2.41%	3.32%	402	2.26%
Total	100.00%	100.00%	100.00%	17803	100.00%
Total	9065	2527	6211	17803	
Overall %	50.92%	14.19%	34.89%	100.00%	

Age of driver by HRD

Age	No	Yes	Don't Know	Total	Overall %
<15	0.36%	0.00%	0.88%	86	0.49%
16-20	11.91%	10.41%	13.26%	2148	12.16%
21-24	8.74%	20.99%	9.53%	1902	10.77%
25-34	18.04%	30.93%	19.86%	3624	20.51%
35-44	18.08%	19.64%	18.24%	3244	18.36%
45-54	17.88%	11.32%	15.75%	2864	16.21%
55-64	11.87%	4.50%	11.51%	1888	10.69%
65-74	7.39%	1.42%	5.99%	1070	6.06%
75+	5.72%	0.79%	4.99%	841	4.76%
Total	100.00%	100.00%	100.00%	17667	100.00%
Total	9075	2535	6057	17667	
Overall %	51.37%	14.35%	34.28%	100.00%	

Gender of driver by HRD

Gender	No	Yes	Don't Know	Total	Overall %
Male	71.08%	81.54%	71.43%	12881	72.70%
Female	28.92%	18.46%	28.57%	4838	27.30%
Total	100.00%	100.00%	100.00%	17719	100.00%
Total	9080	2535	6104	17719	
Overall %	51.24%	14.31%	34.45%	100.00%	

Vehicle manoeuvre by HRD

Vehicle manoeuvre	No	Yes	Don't Know	Total	Overall %
Going straight/starting in traffic lane	74.03%	69.38%	61.46%	12324	68.97%
Slowing/stopped	3.59%	2.05%	4.11%	635	3.55%
Passing	1.26%	2.29%	1.61%	273	1.53%
Turning left	5.62%	3.47%	6.95%	1033	5.78%
Negotiating a curve	11.61%	19.38%	22.21%	2935	16.43%
Other	3.89%	3.43%	3.66%	669	3.74%
Total	100.00%	100.00%	100.00%	17869	100.00%
Total	9076	2534	6259	17869	
Overall %	50.79%	14.18%	35.03%	100.00%	

Avoidance manoeuver by HRD

Avoidance manoeuvre	No	Yes	Don't Know	Total	Overall %
No avoid manoeuvre	67.75%	58.24%	34.30%	9782	54.68%
Braking	0.73%	3.55%	6.79%	582	3.25%
Steering	2.72%	3.08%	4.54%	610	3.41%
Other	0.07%	0.08%	0.11%	15	0.08%
Not reported	28.73%	35.06%	54.25%	6901	38.57%
Total	100.00%	100.00%	100.00%	17890	100.00%

Total	9083	2536	6271	17890
Overall %	50.77%	14.18%	35.05%	100.00%

Restraint use by HRD

Restraint use	No	Yes	Don't Know	Total	Overall %
No restraint	27.82%	41.92%	28.21%	5359	29.96%
Seat belt	61.22%	42.31%	53.39%	9982	55.80%
Helmet	5.16%	7.22%	5.06%	969	5.42%
Don't know	5.79%	8.56%	13.35%	1580	8.83%
Total	100.00%	100.00%	100.00%	17890	100.00%

Total	9083	2536	6271	17890
Overall %	50.77%	14.18%	35.05%	100.00%

Ejected from vehicle in fatal crashes by HRD

Ejected	No	Yes	Don't Know	Total	Overall %
No	88.01%	81.11%	88.79%	15587	87.31%
Yes	11.99%	18.89%	11.21%	2266	12.69%
Total	100.00%	100.00%	100.00%	17853	100.00%

Total	9067	2530	6256	17853
Overall %	50.79%	14.17%	35.04%	100.00%

Drinking driver in fatal crashes by HRD

Driver Drinking	No	Yes	Don't Know	Total	Overall %
No	81.12%	65.10%	84.15%	14296	79.91%
Yes	18.88%	34.90%	15.85%	3594	20.09%
Total	100.00%	100.00%	100.00%	17890	100.00%

Total	9083	2536	6271	17890
Overall %	50.77%	14.18%	35.05%	100.00%

Impaired driver (surrogate) by HRD

Impaired driver	No	Yes	Don't Know	Total	Overall %
No	89.75%	82.78%	91.64%	15987	89.42%
Yes	10.25%	17.22%	8.36%	1891	10.58%
Total	100.00%	100.00%	100.00%	17878	100.00%

Total	9081	2532	6265	17878
Overall %	50.79%	14.16%	35.04%	100.00%

Drug use by HRD

Drugs	No	Yes	Don't Know	Total	Overall %
Yes	6.02%	7.49%	4.64%	438	6.18%
No	93.98%	92.51%	95.36%	6650	93.82%
Total	100.00%	100.00%	100.00%	7088	100.00%
Total	5766	1042	280	7088	
Overall %	81.35%	14.70%	3.95%	100.00%	

Estimated travel speed by HRD

Travel speed	No	Yes	Don't Know	Total	Overall %
<=30	13.70%	5.95%	1.05%	1461	8.17%
31-55	47.88%	30.52%	2.92%	5306	29.66%
56-69	11.91%	10.45%	1.39%	1434	8.02%
70+/no limit	16.87%	20.58%	4.45%	2333	13.04%
Don't know	9.64%	32.49%	90.19%	7356	41.12%
Total	100.00%	100.00%	100.00%	17890	100.00%
Total	9083	2536	6271	17890	
Overall %	50.77%	14.18%	35.05%	100.00%	

Speeding by HRD

Speeding	No	Yes	Don't Know	Total	Overall %
Yes	16.59%	29.08%	13.58%	1255	18.27%
No	83.41%	70.92%	86.42%	5614	81.73%
Total	100.00%	100.00%	100.00%	6869	100.00%
Total	5617	987	265	6869	
Overall %	81.77%	14.37%	3.86%	100.00%	

License status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	2.88%	0.83%	7.91%	755	4.29%
Licensed	90.19%	65.22%	88.08%	15102	85.88%
Not valid	6.93%	33.95%	4.01%	1729	9.83%
Total	100.00%	100.00%	100.00%	17586	100.00%
Total	9083	2536	5967	17586	
Overall %	51.65%	14.42%	33.93%	100.00%	

Road location by HRD

Road location	No	Yes	Don't Know	Total	Overall %
On-road	69.53%	59.14%	71.99%	12326	68.92%
Shoulder	11.75%	13.46%	3.73%	1642	9.18%
Median/left turn	1.78%	1.66%	1.56%	302	1.69%
Roadside	16.94%	25.74%	22.71%	3615	20.21%
Total	100.00%	100.00%	100.00%	17885	100.00%
Total	9083	2533	6269	17885	
Overall %	50.79%	14.16%	35.05%	100.00%	

Number of lanes by HRD

No. of lanes	No	Yes	Don't Know	Total	Overall %
1-2	79.85%	80.03%	75.50%	13946	78.36%
3	3.94%	3.61%	5.44%	786	4.42%
4+	16.22%	16.36%	19.05%	3066	17.23%
Total	100.00%	100.00%	100.00%	17798	100.00%
Total	9065	2524	6209	17798	
Overall %	50.93%	14.18%	34.89%	100.00%	

Divided road by HRD

Divided road	No	Yes	Don't Know	Total	Overall %
Not divided	69.35%	72.08%	68.45%	12396	69.42%
Divided/no barrier	19.49%	16.23%	17.47%	3272	18.32%
Divided/barrier	10.10%	9.83%	11.21%	1866	10.45%
Other	1.06%	1.86%	2.87%	322	1.80%
Total	100.00%	100.00%	100.00%	17856	100.00%
Total	9080	2532	6244	17856	
Overall %	50.85%	14.18%	34.97%	100.00%	

Road function by HRD

Road function	No	Yes	Don't Know	Total	Overall %
Principal arterial interstate	11.65%	11.60%	12.75%	2008	12.01%
Principal arterial other frwy/exprwy	1.34%	1.05%	0.71%	182	1.09%
Principal arterial	23.19%	19.66%	25.00%	3895	23.29%
Minor arterial	18.46%	21.10%	27.51%	3650	21.82%
Collector	28.25%	27.59%	21.00%	4308	25.76%
Local rd. or st.	17.12%	18.99%	13.04%	2682	16.04%
Total	100.00%	100.00%	100.00%	16725	100.00%
Total	8826	2370	5529	16725	
Overall %	52.77%	14.17%	33.06%	100.00%	

Road alignment by HRD

Road alignment	No	Yes	Don't Know	Total	Overall %
Straight	73.46%	67.80%	72.41%	12924	72.29%
Curved	26.54%	32.20%	27.59%	4954	27.71%
Total	100.00%	100.00%	100.00%	17878	100.00%
Total	9080	2534	6264	17878	
Overall %	50.79%	14.17%	35.04%	100.00%	

Road grade by HRD

Road profile	No	Yes	Don't Know	Total	Overall %
Level	69.21%	65.07%	49.76%	11047	61.81%
Grade	26.42%	30.66%	46.47%	6085	34.05%
Hill crest/sag	4.37%	4.26%	3.77%	741	4.15%
Total	100.00%	100.00%	100.00%	17873	100.00%
Total	9077	2534	6262	17873	
Overall %	50.79%	14.18%	35.04%	100.00%	

Intersection by HRD

Intersection	No	Yes	Don't Know	Total	Overall %
No	70.82%	77.52%	67.19%	12611	70.50%
Yes	29.18%	22.48%	32.81%	5277	29.50%
Total	100.00%	100.00%	100.00%	17888	100.00%
Total	9083	2536	6269	17888	
Overall %	50.78%	14.18%	35.05%	100.00%	

Intersection traffic controls by HRD

Traffic controls	No	Yes	Don't Know	Total	Overall %
No controls	27.43%	34.09%	36.85%	1679	31.82%
Traffic signal	27.40%	24.96%	23.33%	1348	25.55%
Stop/yield	43.51%	39.37%	38.36%	2166	41.05%
Other	1.66%	1.58%	1.46%	83	1.57%
Total	100.00%	100.00%	100.00%	5276	100.00%
Total	2650	569	2057	5276	
Overall %	50.23%	10.78%	38.99%	100.00%	

Road conditions by HRD

Road conditions	No	Yes	Don't Know	Total	Overall %
Dry	87.35%	87.16%	87.33%	15593	87.32%
Wet	12.03%	12.40%	12.35%	2178	12.20%
Snow/slush/ice	0.42%	0.16%	0.26%	58	0.32%
Other	0.20%	0.28%	0.06%	29	0.16%
Total	100.00%	100.00%	100.00%	17858	100.00%
Total	9069	2532	6257	17858	
Overall %	50.78%	14.18%	35.04%	100.00%	

Speed limit by HRD

Speed limit	No	Yes	Don't Know	Total	Overall %
<=30	2.89%	3.53%	4.64%	639	3.59%
31-55	84.05%	85.30%	83.66%	14947	84.09%
56-69	7.09%	5.79%	6.60%	1197	6.73%
70+	5.96%	5.39%	5.10%	992	5.58%
Total	100.00%	100.00%	100.00%	17775	100.00%
Total	9022	2523	6230	17775	
Overall %	50.76%	14.19%	35.05%	100.00%	

Rural/urban by HRD

Rural/urban	No	Yes	Don't Know	Total	Overall %
Rural	73.87%	66.75%	52.79%	11189	65.95%
Urban	26.13%	33.25%	47.21%	5776	34.05%
Total	100.00%	100.00%	100.00%	16965	100.00%
Total	8985	2430	5550	16965	
Overall %	52.96%	14.32%	32.71%	100.00%	

Vehicle type by HRD

Type of vehicle	No	Yes	Don't Know	Total	Overall %
Car	42.15%	43.53%	42.04%	7496	42.31%
Utility	15.77%	15.89%	15.34%	2771	15.64%
Van	6.39%	4.42%	6.31%	1077	6.08%
Truck	18.36%	17.39%	21.50%	3420	19.30%
Heavy truck/bus	8.77%	8.36%	7.64%	1474	8.32%
Motorcycle	7.98%	9.86%	6.15%	1350	7.62%
Other	0.58%	0.55%	1.02%	129	0.73%
Total	100.00%	100.00%	100.00%	17717	100.00%

Total	9080	2536	6101	17717
Overall %	51.25%	14.31%	34.44%	100.00%

Model year by HRD

Model year	No	Yes	Don't Know	Total	Overall %
<=1997	42.63%	46.17%	41.63%	7547	42.79%
1998-2000	20.90%	19.77%	22.03%	3726	21.13%
2001-2003	18.14%	19.02%	18.57%	3247	18.41%
2004+	18.34%	15.05%	17.78%	3117	17.67%
Total	100.00%	100.00%	100.00%	17637	100.00%

Total	9048	2519	6070	17637
Overall %	51.30%	14.28%	34.42%	100.00%

State license status by HRD

Licensed	No	Yes	Don't Know	Total	Overall %
Not licensed	2.88%	0.83%	7.91%	755	4.29%
Licensed	90.19%	65.22%	88.08%	15102	85.88%
Not valid	6.93%	33.95%	4.01%	1729	9.83%
Total	100.00%	100.00%	100.00%	17586	100.00%

Total	9083	2536	5967	17586
Overall %	51.65%	14.42%	33.93%	100.00%

Day of week by HRD

Day of week	No	Yes	Don't Know	Total	Overall %
Sunday	14.10%	15.97%	14.32%	2584	14.44%
Monday	13.22%	12.62%	14.37%	2422	13.54%
Tuesday	12.09%	11.63%	12.25%	2161	12.08%
Wednesday	13.08%	12.07%	12.50%	2278	12.73%
Thursday	13.37%	11.75%	13.71%	2372	13.26%
Friday	16.14%	16.09%	16.35%	2899	16.20%
Saturday	18.00%	19.87%	16.50%	3174	17.74%
Total	100%	100%	100%	17890	100%

Total	9083	2536	6271	17890
Overall %	50.77%	14.18%	35.05%	100.00%

Time of day by HRD

Time	No	Yes	Don't Know	Total	Overall %
12am-2:59am	9.18%	15.56%	8.42%	1755	9.82%
3am-5:59am	6.77%	9.72%	7.06%	1303	7.29%
6am-8:59am	11.05%	8.73%	12.95%	2034	11.38%
9am-11:59am	11.36%	8.93%	10.90%	1940	10.86%
12pm-2:59pm	14.35%	11.22%	14.94%	2522	14.11%
3pm-5:59pm	18.93%	15.32%	17.82%	3222	18.03%
6pm-8:59pm	15.52%	14.61%	15.82%	2769	15.50%
9pm-11:59pm	12.84%	15.92%	12.08%	2325	13.01%
Total	100.00%	100.00%	100.00%	17870	100.00%

Total	9081	2532	6257	17870
Overall %	50.82%	14.17%	35.01%	100.00%

Weekday/end by HRD

Weekday/end	No	Yes	Don't Know	Total	Overall %
Weekday	61.08%	56.55%	62.97%	10929	61.10%
Weekend	38.92%	43.45%	37.03%	6958	38.90%
Total	100.00%	100.00%	100.00%	17887	100.00%

Total	9083	2534	6270	17887
Overall %	50.78%	14.17%	35.05%	100.00%

Quarter of year by HRD

Quarter of year	No	Yes	Don't Know	Total	Overall %
Jan-Mar	21.80%	20.11%	23.47%	3962	22.15%
Apr-Jun	27.09%	27.05%	26.41%	4803	26.85%
Jul-Sep	25.13%	25.83%	24.22%	4457	24.91%
Oct-Dec	25.97%	27.01%	25.90%	4668	26.09%
Total	100.00%	100.00%	100.00%	17890	100.00%

Total	9083	2536	6271	17890
Overall %	50.77%	14.18%	35.05%	100.00%

Light conditions by HRD

Light conditions	No	Yes	Don't Know	Total	Overall %
Daylight	56.01%	45.15%	57.42%	9825	54.96%
Dark	31.92%	39.78%	29.27%	5739	32.10%
Dark & lighted	7.77%	11.40%	9.52%	1591	8.90%
Dawn/dusk	4.30%	3.67%	3.80%	721	4.03%
Total	100.00%	100.00%	100.00%	17876	100.00%

Total	9072	2534	6270	17876
Overall %	50.75%	14.18%	35.07%	100.00%

Weather conditions by HRD

Weather conditions	No	Yes	Don't Know	Total	Overall %
No adverse weather	89.30%	89.54%	90.91%	16067	89.90%
Rain	9.02%	8.72%	7.63%	1518	8.49%
Sleet/snow	0.23%	0.24%	0.27%	44	0.25%
Fog	1.32%	1.46%	1.09%	225	1.26%
Other	0.12%	0.04%	0.10%	18	0.10%
Total	100.00%	100.00%	100.00%	17872	100.00%

Total	9075	2534	6263	17872
Overall %	50.78%	14.18%	35.04%	100.00%

Florida

Number of vehicles by HRD

No. of vehicles	No	Yes	Don't Know	Total	Overall %
Single vehicle	33.37%	43.16%	42.63%	5040	35.13%
Multiple vehicle	66.63%	56.84%	57.37%	9305	64.87%
Total	100.00%	100.00%	100.00%	14345	100.00%

Total	11725	1914	706	14345
Overall %	81.74%	13.34%	4.92%	100.00%

Manner of collision by HRD

Manner of collision	No	Yes	Don't Know	Total	Overall %
No other vehicle	38.71%	48.09%	58.46%	5857	40.93%
Front/rear	12.90%	11.06%	14.08%	1819	12.71%
Head-on	11.33%	10.33%	6.54%	1569	10.97%
Angle	33.25%	27.37%	17.35%	4534	31.69%
Sideswipe	3.24%	2.78%	3.41%	456	3.19%
Other	0.56%	0.37%	0.14%	74	0.52%
Total	100.00%	100.00%	100.00%	14309	100.00%

Total	11699	1907	703	14309
Overall %	81.76%	13.33%	4.91%	100.00%

Harmful event by HRD

Harmful event	No	Yes	Don't Know	Total	Overall %
Rollover	8.09%	9.99%	5.81%	1180	8.23%
Peds	10.84%	10.72%	33.43%	1711	11.93%
Vehicle-vehicle collision	60.48%	50.68%	40.65%	8345	58.20%
Fixed object	14.82%	21.81%	10.20%	2226	15.52%
Other	5.78%	6.80%	9.92%	877	6.12%
Total	100.00%	100.00%	100.00%	14339	100.00%

Total	11721	1912	706	14339
Overall %	81.74%	13.33%	4.92%	100.00%

Vehicle rollover by HRD

Rollover	No	Yes	Don't Know	Total	Overall %
No rollover	84.92%	81.50%	89.94%	12152	84.71%
One or more	15.08%	18.50%	10.06%	2193	15.29%
Total	100.00%	100.00%	100.00%	14345	100.00%

Total	11725	1914	706	14345
Overall %	81.74%	13.34%	4.92%	100.00%

Vehicle towed away by HRD

Towed away	No	Yes	Don't Know	Total	Overall %
Driven	11.14%	9.09%	48.84%	1776	12.73%
Towed	88.86%	90.91%	51.16%	12179	87.27%
Total	100.00%	100.00%	100.00%	13955	100.00%

Total	11397	1870	688	13955
Overall %	81.67%	13.40%	4.93%	100.00%

Vehicle impact point by HRD

Impact point	No	Yes	Don't Know	Total	Overall %
Non-collision	3.97%	5.05%	3.90%	575	4.11%
Front	59.45%	64.73%	65.20%	8447	60.41%
Right	11.58%	10.54%	7.48%	1575	11.26%
Rear	9.24%	6.18%	9.76%	1238	8.85%
Left	13.08%	10.16%	8.62%	1747	12.49%
Other	2.68%	3.33%	5.04%	401	2.87%
Total	100.00%	100.00%	100.00%	13983	100.00%
Total	11508	1860	615	13983	
Overall %	82.30%	13.30%	4.40%	100.00%	

Age of driver by HRD

Age	No	Yes	Don't Know	Total	Overall %
<15	0.32%	0.00%	1.40%	43	0.31%
16-20	12.22%	14.83%	10.36%	1750	12.53%
21-24	10.06%	22.27%	11.20%	1642	11.76%
25-34	18.73%	29.14%	19.05%	2815	20.16%
35-44	18.30%	17.40%	20.17%	2545	18.22%
45-54	16.25%	9.91%	15.41%	2145	15.36%
55-64	11.16%	4.04%	11.20%	1423	10.19%
65-74	6.37%	1.68%	8.12%	806	5.77%
75+	6.59%	0.73%	3.08%	796	5.70%
Total	100.00%	100.00%	100.00%	13965	100.00%
Total	11700	1908	357	13965	
Overall %	83.78%	13.66%	2.56%	100.00%	

Gender of driver by HRD

Gender	No	Yes	Don't Know	Total	Overall %
Male	72.17%	83.88%	77.17%	10354	73.90%
Female	27.83%	16.12%	22.83%	3656	26.10%
Total	100.00%	100.00%	100.00%	14010	100.00%
Total	11718	1911	381	14010	
Overall %	83.64%	13.64%	2.72%	100.00%	

Vehicle manoeuver by HRD

Vehicle manoeuvre	No	Yes	Don't Know	Total	Overall %
Going straight/starting in traffic lane	73.72%	77.83%	81.11%	10653	74.63%
Slowing/stopped	5.69%	3.25%	3.95%	754	5.28%
Passing	1.68%	1.89%	1.02%	239	1.67%
Turning left	9.76%	5.40%	4.83%	1276	8.94%
Negotiating a curve	4.27%	6.81%	2.78%	648	4.54%
Other	4.88%	4.82%	6.30%	705	4.94%
Total	100.00%	100.00%	100.00%	14275	100.00%
Total	11684	1908	683	14275	
Overall %	81.85%	13.37%	4.78%	100.00%	

Avoidance manoeuvre by HRD

Avoidance manoeuvre	No	Yes	Don't Know	Total	Overall %
No avoid manoeuvre	65.77%	63.32%	63.46%	9371	65.33%
Braking	3.11%	3.55%	2.97%	454	3.16%
Steering	12.72%	12.70%	7.37%	1786	12.45%
Other	0.32%	0.37%	0.28%	47	0.33%
Not reported	18.08%	20.06%	25.92%	2687	18.73%
Total	100.00%	100.00%	100.00%	14345	100.00%

Total	11725	1914	706	14345
Overall %	81.74%	13.34%	4.92%	100.00%

Restraint use by HRD

Restraint use	No	Yes	Don't Know	Total	Overall %
No restraint	29.92%	42.37%	15.30%	4427	30.86%
Seat belt	61.72%	43.99%	31.16%	8299	57.85%
Helmet	5.15%	9.61%	1.98%	802	5.59%
Don't know	3.21%	4.02%	51.56%	817	5.70%
Total	100.00%	100.00%	100.00%	14345	100.00%

Total	11725	1914	706	14345
Overall %	81.74%	13.34%	4.92%	100.00%

Ejected from vehicle in fatal crashes by HRD

Ejected	No	Yes	Don't Know	Total	Overall %
No	90.89%	86.15%	96.45%	12979	90.53%
Yes	9.11%	13.85%	3.55%	1358	9.47%
Total	100.00%	100.00%	100.00%	14337	100.00%

Total	11719	1913	705	14337
Overall %	81.74%	13.34%	4.92%	100.00%

Drinking driver in fatal crash by HRD

Driver Drinking	No	Yes	Don't Know	Total	Overall %
No	84.74%	74.97%	83.72%	23381	83.55%
Yes	15.26%	25.03%	16.28%	4603	16.45%
Total	100.00%	100.00%	100.00%	27984	100.00%

Total	11725	1914	14345	27984
Overall %	41.90%	6.84%	51.26%	100.00%

Impaired driver (surrogate) by HRD

Impaired driver	No	Yes	Don't Know	Total	Overall %
No	91.01%	83.81%	94.45%	12898	90.21%
Yes	8.99%	16.19%	5.55%	1399	9.79%
Total	100.00%	100.00%	100.00%	14297	100.00%

Total	11686	1908	703	14297
Overall %	81.74%	13.35%	4.92%	100.00%

Drug use by HRD

Drugs	No	Yes	Don't Know	Total	Overall %
Yes	1.85%	3.86%	0.44%	280	2.05%
No	98.15%	96.14%	99.56%	13392	97.95%
Total	100.00%	100.00%	100.00%	13672	100.00%
Total	11184	1812	676	13672	
Overall %	81.80%	13.25%	4.94%	100.00%	

Estimated travel speed

Travel speed	No	Yes	Don't Know	Total	Overall %
<=30	19.97%	12.49%	13.17%	2673	18.63%
31-55	39.41%	36.15%	28.33%	5513	38.43%
56-69	11.28%	15.26%	12.75%	1705	11.89%
70+/no limit	16.49%	20.43%	12.04%	2409	16.79%
Don't know	12.85%	15.67%	33.71%	2045	14.26%
Total	100.00%	100.00%	100.00%	14345	100.00%
Total	11725	1914	706	14345	
Overall %	81.74%	13.34%	4.92%	100.00%	

Speeding by HRD

Speeding	No	Yes	Don't Know	Total	Overall %
Yes	9.04%	19.30%	5.67%	1372	10.22%
No	90.96%	80.70%	94.33%	12055	89.78%
Total	100.00%	100.00%	100.00%	13427	100.00%
Total	10995	1762	670	13427	
Overall %	81.89%	13.12%	4.99%	100.00%	

License status by HRD

State license	No	Yes	Don't Know	Total	Overall %
In state	93.85%	93.16%	8.33%	12803	91.98%
Out of state	6.15%	6.84%	91.67%	1116	8.02%
Total	100.00%	100.00%	100.00%	13919	100.00%
Total	11717	1914	288	13919	
Overall %	84.18%	13.75%	2.07%	100.00%	

Road location by HRD

Road location	No	Yes	Don't Know	Total	Overall %
On-road	77.77%	69.21%	81.79%	11008	76.82%
Shoulder	11.11%	14.82%	10.53%	1659	11.58%
Median/left turn	3.71%	4.45%	2.99%	541	3.78%
Roadside	7.41%	11.52%	4.69%	1121	7.82%
Total	100.00%	100.00%	100.00%	14329	100.00%
Total	11716	1910	703	14329	
Overall %	81.76%	13.33%	4.91%	100.00%	

Number of lanes by HRD

No. of lanes	No	Yes	Don't Know	Total	Overall %
1-2	70.88%	72.86%	69.13%	10144	71.06%
3	21.38%	20.05%	22.76%	3036	21.27%
4+	7.74%	7.09%	8.11%	1095	7.67%
Total	100.00%	100.00%	100.00%	14275	100.00%

Total	11667	1905	703	14275
Overall %	81.73%	13.35%	4.92%	100.00%

Divided road by HRD

Divided road	No	Yes	Don't Know	Total	Overall %
Not divided	39.61%	41.28%	37.98%	5680	39.75%
Divided/no barrier	43.52%	42.17%	44.52%	6200	43.39%
Divided/barrier	13.29%	11.92%	13.80%	1876	13.13%
Other	3.59%	4.62%	3.70%	533	3.73%
Total	100.00%	100.00%	100.00%	14289	100.00%

Total	11682	1904	703	14289
Overall %	81.76%	13.32%	4.92%	100.00%

Road function by HRD

Road function	No	Yes	Don't Know	Total	Overall %
Principal arterial interstate	12.99%	13.15%	18.44%	1880	13.27%
Principal arterial other frwy/exprwy	3.55%	3.39%	1.87%	488	3.45%
Principal arterial	36.69%	32.29%	36.17%	5109	36.08%
Minor arterial	12.94%	13.57%	12.25%	1840	12.99%
Collector	1.86%	2.33%	2.88%	279	1.97%
Local rd. or st.	31.98%	35.26%	28.39%	4566	32.24%
Total	100.00%	100.00%	100.00%	14162	100.00%

Total	11582	1886	694	14162
Overall %	81.78%	13.32%	4.90%	100.00%

Road alignment by HRD

Road alignment	No	Yes	Don't Know	Total	Overall %
Straight	86.44%	81.22%	89.33%	12303	85.88%
Curved	13.56%	18.78%	10.67%	2022	14.12%
Total	100.00%	100.00%	100.00%	14325	100.00%

Total	11710	1912	703	14325
Overall %	81.75%	13.35%	4.91%	100.00%

Road grade by HRD

Road profile	No	Yes	Don't Know	Total	Overall %
Level	87.59%	85.62%	87.34%	12505	87.31%
Grade	12.41%	14.38%	12.66%	1817	12.69%
Total	100.00%	100.00%	100.00%	14322	100.00%

Total	11707	1912	703	14322
Overall %	81.74%	13.35%	4.91%	100.00%

Intersection by HRD

Intersection	No	Yes	Don't Know	Total	Overall %
No	56.59%	61.10%	69.60%	8283	57.83%
Yes	43.41%	38.90%	30.40%	6040	42.17%
Total	100.00%	100.00%	100.00%	14323	100.00%
Total	11709	1910	704	14323	
Overall %	81.75%	13.34%	4.92%	100.00%	

Intersection traffic controls by HRD

Traffic controls	No	Yes	Don't Know	Total	Overall %
No controls	21.89%	28.38%	24.06%	1370	22.77%
Traffic signal	37.21%	32.70%	42.45%	2217	36.84%
Stop/yield	27.71%	25.68%	17.92%	1632	27.12%
Other	13.19%	13.24%	15.57%	799	13.28%
Total	100.00%	100.00%	100.00%	6018	100.00%
Total	5066	740	212	6018	
Overall %	84.18%	12.30%	3.52%	100.00%	

Road conditions by HRD

Road conditions	No	Yes	Don't Know	Total	Overall %
Dry	88.29%	89.57%	87.89%	12655	88.44%
Wet	11.63%	10.32%	12.11%	1643	11.48%
Other	0.08%	0.10%	0.00%	11	0.08%
Total	100.00%	100.00%	100.00%	14309	100.00%
Total	11699	1908	702	14309	
Overall %	81.76%	13.33%	4.91%	100.00%	

Speed limit by HRD

Speed limit	No	Yes	Don't Know	Total	Overall %
<=30	10.61%	12.28%	11.99%	1545	10.89%
31-55	68.74%	67.81%	62.07%	9687	68.30%
56-69	11.59%	11.49%	13.49%	1655	11.67%
70+	9.06%	8.42%	12.44%	1295	9.13%
Total	100.00%	100.00%	100.00%	14182	100.00%
Total	11626	1889	667	14182	
Overall %	81.98%	13.32%	4.70%	100.00%	

Rural/urban by HRD

Rural/urban	No	Yes	Don't Know	Total	Overall %
Rural	37.79%	38.81%	34.15%	5347	37.75%
Urban	62.21%	61.19%	65.85%	8818	62.25%
Total	100.00%	100.00%	100.00%	14165	100.00%
Total	11585	1886	694	14165	
Overall %	81.79%	13.31%	4.90%	100.00%	

Vehicle type by HRD

Type of vehicle	No	Yes	Don't Know	Total	Overall %
Car	42.61%	40.74%	39.44%	5888	42.26%
Utility	15.19%	13.11%	15.52%	2078	14.92%
Van	6.70%	3.16%	9.67%	878	6.30%
Truck	16.36%	15.89%	11.20%	2250	16.15%
Heavy truck/bus	7.38%	7.58%	13.49%	1056	7.58%
Motorcycle	10.85%	18.53%	8.91%	1650	11.84%
Other	0.91%	1.00%	1.78%	132	0.95%
Total	100.00%	100.00%	100.00%	13932	100.00%

Total	11639	1900	393	13932
Overall %	83.54%	13.64%	2.82%	100.00%

Model Year by HRD

Model year	No	Yes	Don't Know	Total	Overall %
<=1997	34.47%	32.38%	33.25%	4730	34.15%
1998-2000	19.32%	19.96%	24.55%	2709	19.56%
2001-2003	21.35%	20.81%	14.07%	2919	21.07%
2004+	24.85%	26.86%	28.13%	3493	25.22%
Total	100.00%	100.00%	100.00%	13851	100.00%

Total	11576	1884	391	13851
Overall %	83.58%	13.60%	2.82%	100.00%

State license by HRD

State license	No	Yes	Don't Know	Total	Overall %
In state	93.85%	93.16%	8.33%	12803	91.98%
Out of state	6.15%	6.84%	91.67%	1116	8.02%
Total	100.00%	100.00%	100.00%	13919	100.00%

Total	11717	1914	288	13919
Overall %	84.18%	13.75%	2.07%	100.00%

Day of week by HRD

Day of week	No	Yes	Don't Know	Total	Overall %
Sunday	17.12%	19.02%	19.12%	2506	17.47%
Monday	12.90%	11.29%	9.07%	1792	12.49%
Tuesday	11.97%	10.87%	10.20%	1683	11.73%
Wednesday	12.57%	12.12%	10.91%	1783	12.43%
Thursday	13.11%	12.12%	14.31%	1870	13.04%
Friday	15.02%	15.99%	15.72%	2178	15.18%
Saturday	17.32%	18.60%	20.68%	2533	17.66%
Total	100.00%	100.00%	100.00%	14345	100.00%

Total	11725	1914	706	14345
Overall %	81.74%	13.34%	4.92%	100.00%

Time of day by HRD

Time	No	Yes	Don't Know	Total	Overall %
12am-2:59am	10.39%	17.22%	17.05%	1654	11.62%
3am-5:59am	6.96%	9.48%	11.13%	1067	7.50%
6am-8:59am	9.80%	9.16%	8.38%	1373	9.65%
9am-11:59am	10.74%	7.79%	6.21%	1441	10.13%
12pm-2:59pm	14.03%	9.85%	8.53%	1879	13.20%
3pm-5:59pm	16.06%	13.22%	11.13%	2198	15.44%
6pm-8:59pm	17.91%	16.64%	17.49%	2522	17.72%
9pm-11:59pm	14.11%	16.64%	20.09%	2098	14.74%
Total	100.00%	100.00%	100.00%	14232	100.00%

Total	11641	1899	692	14232
Overall %	81.79%	13.34%	4.86%	100.00%

Weekday/end by HRD

Weekday/end	No	Yes	Don't Know	Total	Overall %
Weekday	58.47%	53.95%	49.93%	8233	57.45%
Weekend	41.53%	46.05%	50.07%	6098	42.55%
Total	100.00%	100.00%	100.00%	14331	100.00%

Total	11713	1913	705	14331
Overall %	81.73%	13.35%	4.92%	100.00%

Quarter of year by HRD

Quarter of year	No	Yes	Don't Know	Total	Overall %
Jan-Mar	26.46%	26.38%	27.76%	3803	26.51%
Apr-Jun	24.98%	26.02%	23.09%	3590	25.03%
Jul-Sep	22.41%	22.88%	21.95%	3220	22.45%
Oct-Dec	26.16%	24.71%	27.20%	3732	26.02%
Total	100.00%	100.00%	100.00%	14345	100.00%

Total	11725	1914	706	14345
Overall %	81.74%	13.34%	4.92%	100.00%

Light conditions by HRD

Light conditions	No	Yes	Don't Know	Total	Overall %
Daylight	50.32%	40.24%	31.24%	6875	48.04%
Dark	22.69%	27.89%	32.95%	3419	23.89%
Dark & lighted	22.48%	28.83%	32.81%	3411	23.83%
Dawn/dusk	4.50%	3.04%	3.00%	606	4.23%
Total	100.00%	100.00%	100.00%	14311	100.00%

Total	11699	1911	701	14311
Overall %	81.75%	13.35%	4.90%	100.00%

Weather conditions by HRD

Weather conditions	No	Yes	Don't Know	Total	Overall %
No adverse weather	91.83%	92.88%	90.41%	13142	91.90%
Rain	6.84%	5.87%	7.73%	966	6.76%
Fog	1.33%	1.26%	1.72%	191	1.34%
Other	0.00%	0.00%	0.14%	1	0.01%
Total	100.00%	100.00%	100.00%	14300	100.00%

Total	11692	1909	699	14300
Overall %	81.76%	13.35%	4.89%	100.00%

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