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Validity of Police-Reported Alcohol Involvement In Fatal Motor Carrier Crashes in the United States Between 1982 and 2005

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Abstract

Objective—To examine the validity of police-reported alcohol data for drivers involved in fatal motor carrier crashes.

Material and Methods—We determined the availability of blood alcohol concentration (BAC) and police-reported alcohol data on 157,702 drivers involved in fatal motor carrier crashes between 1982 – 2005 using Fatality Analysis and Reporting System (FARS) data. Drivers were categorized as motor carrier drivers if they operated a vehicle with a gross vehicle weight rating of greater than 26,000 pounds. Otherwise, they were classified as non motor carrier drivers. The sensitivity and specificity of police-reported alcohol involvement were estimated for both driver types.

Results—Of the 157,702 drivers, 18% had no alcohol information, 15% had BAC results, 42% had police-reported alcohol data, and 25% had both. Alcohol information varied significantly by driver, crash, and vehicle characteristics. For example, motor carrier drivers were significantly more likely (51%) to have BAC testing results compared to non motor carrier drivers (31%) ($p < 0.001$). The sensitivity of police-reported alcohol involvement for a BAC level ≥ 0.08 was 83% (95% CI 79%, 86%) for motor carrier drivers and 90% (95% CI 89%, 90%) for non motor carrier drivers. The specificity rates were 96% (95% CI 95%, 96%) and 91% (95% CI 90%, 91%), respectively.

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Conclusions—The sensitivity and specificity of police-reported alcohol involvement are reasonably high for drivers involved in fatal motor carrier crashes. Further research is needed to determine the extent to which the accuracy of police-reported alcohol involvement may be overestimated because of verification bias.

Keywords

alcohol; motor carriers; police reports; blood alcohol concentration testing; fatalities

INTRODUCTION

Despite the advances in vehicle safety and occupant protection in the past four decades, there are still more than 40,000 motor vehicle-related deaths each year. Alcohol poses a serious threat to road safety. Using police-reported crash data, the National Highway Traffic Safety Administration (NHTSA) estimates that alcohol is involved in approximately 40% of all fatal crashes (NHTSA's National Center for Statistics and Analysis, 2008). However, this estimate is based partially on imputation because blood alcohol concentration (BAC) values are missing in approximately 60% of all traffic fatalities, usually because the test is not administered (National Center for Statistics and Analysis, 2002). For those with missing BAC values, NHTSA imputes the BAC level based on driver, vehicle, roadway, and temporal characteristics (Rubin, Schafer, & Subramanian, 1998).

One of the most influential variables NHTSA relies on to impute alcohol involvement is the police officer's judgment as to whether alcohol was involved in the crash (Rubin et al., 1998). However, relatively few studies have compared the validity of police officers' assessments to the gold standard, BAC testing (Grossman et al., 1996; van Wijngaarden, Cushing, Kerns, & Dischinger, 1995; Waller et al., 1986; Baker & Fisher, 1977; Williams & Wells, 1993). Most of the studies that have compared the two have limited generalizability because they are based on single state (Waller et al., 1986; Baker & Fisher, 1977) or single site (Grossman et al., 1996; van Wijngaarden et al., 1995) data. The one exception is a study that compared police reports to BAC testing results for 6,632 drivers of passenger vehicles who were fatally injured in 1991 in one of 23 states (Williams & Wells, 1993) The police correctly identified alcohol involvement in 91% of those with a BAC $\geq$ 0.10% (Williams & Wells). These results suggest that police judgments about alcohol involvement are usually accurate. However, they could be overestimated because the investigators only included data from states that obtained BAC test results on 80% or more of fatally injured passenger vehicle drivers.

In addition to evaluating the validity of police officers' judgments about alcohol involvement in fatal crashes of passenger vehicles, it is also important to examine the validity for large trucks. Over the past decade, there has been an increase (approximately 20%) in both the number of registered large trucks and the number of miles they traveled (Federal Motor Carrier Safety Administration, 2007). Large truck crashes account for fewer than 5% of all highway crashes but they result in 13% of all traffic fatalities, or about 5,500 of the approximately 43,000 highway fatalities that occur nationwide each year (Fatality Analysis Reporting System, 2008). Thus, while the rate of fatal large truck crashes per 100 million vehicle miles traveled has decreased by 16% during the past decade, the absolute number of large truck-related fatalities has been relatively stable (Federal Motor Carrier Safety Administration, 2007).

The Commercial Motor Vehicle Safety Act was passed in 1986 to improve highway safety by ensuring that qualified drivers operate large trucks and buses and to remove unsafe and unqualified drivers from the highways. This act includes many regulations to promote highway safety. For example, motor carrier drivers are required to have a commercial driver's license. Motor carrier drivers are regulated in terms of the amount of hours they can work and drive and the minimum amount of time they must rest. They are also subject to disqualification sanctions if they have a blood alcohol concentration (BAC) level of 0.04% or above. The few studies that have examined the rate of driving while impaired among drivers of large trucks have reported low prevalence rates of alcohol intoxication (i.e., approximately 1%; Couper, Pemberton, Jarvis, Hughes, & Logan, 2002; Lund, Preusser, Blomberg, & Williams, 1988).

The purpose of this study was to examine the validity of police-reported alcohol data for motor carrier crashes given that BAC testing is commonly not conducted. To do this, we selected all drivers involved in a fatal motor carrier crash and categorized them as a motor carrier versus a non motor carrier driver. We compared the two types of drivers in terms of driver, crash, and vehicle characteristics and evaluated the accuracy of police-reported judgment of alcohol involvement for the two driver types to determine whether police-reported alcohol information for motor carrier crashes could be relied upon when BAC test results were missing.

METHODS

Study Population and Setting

All drivers involved in a motor carrier crash that occurred in the United States that resulted in at least one fatality to a driver, occupant, or nonoccupant between January 1, 1982 and December 31, 2005 were eligible for the study. Passengers or nonoccupants involved in fatal motor carrier crashes were excluded. The study sample was derived by merging the FARS data across the 24-year study period and selecting all drivers that were involved in a fatal motor carrier crash. A motor carrier was defined in this study as a single motor vehicle that had a gross vehicle weight rating of greater than 26,000 pounds.

Data Source

All eligible cases were selected from the Fatality Analysis Reporting System (FARS). FARS is a national data system that includes information on all motor vehicle traffic crashes that occur on a public road in the United States that result in a fatality to a vehicle occupant or non motorist within 30 days of the crash (Fatality Analysis Reporting System, 2008). FARS was started in 1975 by NHTSA as a means of monitoring motor vehicle, driver, traffic, and roadway safety. NHTSA operates the FARS data system through cooperative agreements with individual states. These cooperative agreements are managed by NHTSA’s technical representatives located in 10 regional offices throughout the country.

FARS data are collected by analysts using standard protocols. FARS analysts receive both formal and on-the-job training. FARS analysts extract the FARS data from a number of sources including police accident reports, state motor vehicle registration records, state driver licensing files, state highway administration data, vital statistics, death certificates, medical examiner records, hospital medical charts, and emergency medical service reports. FARS maintains a rigorous quality control program to check for inconsistencies, timeliness, completeness and accuracy of the data collected (Fatality Analysis Reporting System, 2008).

For each fatal crash, FARS analysts collect detailed information on the crash circumstances as well as all drivers, vehicles, and persons involved in the crash. Data collected on the circumstances of the crash include date and time of the crash, crash location, number of vehicles, and people involved and manner of collision. For all drivers involved in a fatal crash, the driver’s age, sex, and driving history (i.e., number of previous crashes, number of previous drinking while intoxicated (DWI) convictions, number of speeding convictions, and number of other previous motor vehicle convictions) are recorded. For each vehicle involved, detailed information is collected on the vehicle type (i.e., make, model, gross vehicle weight rating, etc.), vehicle maneuvers during the crash (i.e., rollover, jackknife, crash avoidance maneuver, etc) and vehicular deformation as a result of the crash (Fatality Analysis Reporting System, 2008).

For each person involved in a fatal crash, information is collected on the person's age, sex, role (i.e., driver vs. passenger and motorist vs. non-motorist vs. non-occupant), severity of injury sustained, and survival status. According to documentation in the Police Accident Report (PAR), the FARS analyst documents whether the police officer reported that alcohol was involved, not reported, or unknown. The FARS analyst also uses the PAR to record the method of determination the police officer used to decide whether alcohol was involved (i.e., evidential test, preliminary breath test, behavioral, etc). The FARS analysts are specifically instructed to code these two variables based on the PAR or direct contact with the investigating officer. They are not to change the coding based on alcohol information from other sources. There is a separate field for actual BAC test results ordered by the police, coroner, or the state toxicology laboratory (Fatality Analysis Reporting System, 2008).

Data Analysis

The two main outcome variables were the source of alcohol information recorded in FARS and the sensitivity and specificity of police-reported judgments of alcohol involvement. The source of alcohol information was categorized as follows: (a) BAC test only; (b) police report only; (c) both BAC test and police report; and (d) neither BAC test nor police report. For those drivers with both sources of alcohol information, the reference standard was the BAC test result and the sensitivity of the police report was defined as the number of cases that the police reported alcohol was involved divided by the total number of cases with a positive BAC test result. The specificity of the police-reported judgments was defined as the number of cases that the police reported alcohol was not involved divided by the total number of cases with a negative BAC test result.

The analysis was conducted in three phases. First, we compared the BAC levels of the motor carrier drivers to the non motor carrier drivers. We also compared the driver, crash, and vehicle characteristics and the sources of alcohol information between these two groups using a Chi-square test of homogeneity. Cases in which the police-reported judgments of alcohol involvement were coded as not reported or unknown were classified according to whether there was a BAC test. Second, we computed and compared the sensitivity and specificity of the police-reported judgment of alcohol involvement among those with both a BAC value and a police-reported judgment for the motor carrier and non motor carrier drivers. Third, we compared the sensitivity and specificity of the police-reported judgment of alcohol involvement between the two types of drivers by selected driver, crash, and vehicle characteristics. Variation in the sensitivity and specificity was considered statistically significant if the 95% confidence interval (CI) did not include one. Differences in the sensitivity and specificity of the motor carrier and non motor carrier drivers were considered statistically significant if the 95% CIs did not overlap. Since the study population includes fatal crashes from all 50 states as well as the District of Columbia and Puerto Rico, we used a BAC value of 0.08 grams per deciliter (g/dl) as our definition of intoxication because this is the level most commonly used by states. However, we also conducted a sensitivity analysis and examined the results at a BAC level of 0.01 g/dl (any alcohol involvement) and at 0.04 g/dl (legal limit for motor carrier drivers).

RESULTS

Between 1982 and 2005, there were 157,702 drivers involved in a fatal motor carrier crash. Of these drivers, 40% had a documented BAC test result (see Table 1). BAC testing increased from 34% during the 1980s to 42% during the 1990s and did not change significantly (43%) during the most recent study period (2000 – 2005; data not shown). As illustrated in Table 1, a significant proportion of drivers were legally intoxicated (15%), however it was much higher among the non motor carrier drivers (22%) compared to the motor carrier drivers (3%). Among the 63,421 drivers with a BAC test result, the proportion of drivers who were legally intoxicated decreased significantly during the study period. During 1982 to 1989, 7% and 29% of motor carrier and non motor carrier drivers were legally intoxicated respectively, compared to 3% and 22% during 1990 to 1999 and 2% and 17% during 2000 to 2005 (data not shown).

Motor carrier drivers were significantly more likely to be between the ages of 25 and 54 (80%), male (98%), and to survive the crash (87%) compared to the non motor carrier driver group (see Table 2). More than three-quarters of all drivers in the sample had at least one source of alcohol information available. Motor carrier drivers were significantly more likely (51%) to have a BAC test result compared to non motor carrier drivers (31%). Police recorded a judgment about alcohol involvement in two-thirds of the cases. When no judgment was documented, it was more often because the PAR contained no information on alcohol (21%) rather than the police reporting they did not know (12%).

The source of alcohol information varied significantly by other driver and crash characteristics as well (data not shown). For example, drivers (regardless of type) who died were more likely to have a BAC test result (68%) compared to those who survived (23%) ($p < 0.001$). In contrast, police were more likely to make a judgment about alcohol involvement among drivers who survived (75%) compared to those who died (56%). There were significant differences in documentation of alcohol involvement by region of the country. Crashes that occurred in the West were more likely to have at least one source of alcohol information (91%) compared to the other regions of the country (range of 79% – 84%) ($p < 0.001$). BAC testing rates were highest in the Midwest (45%) and lowest in the South (38%).

Table 3 displays the extent of agreement between BAC testing and police reports of alcohol involvement. Among the 40,033 drivers with both sources of alcohol involvement, the sensitivity was 89% (95% CI 88%, 90%) and the specificity was 93% (95% CI 93%, 93%) for the police officer's judgment at a BAC value of 0.08 g/dl or greater. The sensitivity was significantly lower among the motor carrier drivers (83%; 95% CI 0.79, 0.86) compared to the non motor carrier drivers (90%; 95% CI 0.89, 0.90). The police misclassified a higher proportion of the non motor carrier drivers (8%) as alcohol involved when the BAC test was negative or vice versa compared to the motor carrier drivers (4%). If alcohol involvement was based solely on the police report, 17% of motor carrier drivers and 10% of non motor carrier drivers who were legally intoxicated would have been missed (i.e., false negatives) and 4% of motor carrier drivers and 10% of non motor carrier drivers who were not (i.e., false positives) would have been classified as legally intoxicated. At lower BAC levels (i.e. ≥ 0.04 g/dl and at ≥ 0.01 g/dl), the sensitivity and specificity patterns between the two types of drivers were similar. For example, at a BAC level of ≥ 0.04 g/dl, the sensitivity for motor carriers was 82% (95% CI 79%, 88%) and the specificity was 96% (95% CI 96%, 97%) compared to 90% (95% CI 89%, 91%) and 90% (95% CI 90%, 91%) respectively for the non motor carrier drivers (data not shown).

Finally, Table 4 presents the sensitivity and specificity of the police-reported alcohol involvement data between the two study groups by driver, crash, and vehicle characteristics for BAC levels ≥ 0.08 g/dl. Police-reported judgment of alcohol involvement was lower for drivers who died (compared to drivers who survived). The police were also less likely to correctly identify intoxicated drivers if the crash occurred during daytime hours or in the Northeast. The sensitivity of police-reported judgment was significantly lower if the method used to determine alcohol method was not reported. As demonstrated in Table 4, the sensitivity and specificity patterns were consistent across the two study groups. When the analysis was repeated using a BAC level of ≥ 0.01 g/dl and a BAC level of ≥ 0.04, the variation in sensitivity and specificity across the variables remained the same (data not shown).

DISCUSSION

This study compared the sources of alcohol information available and the accuracy of police reports of alcohol involvement for drivers involved in a fatal motor carrier crash by merging population-based, cross-sectional data collected over a 24-year period. In this large cohort of drivers, there were significant differences between the motor carrier and non motor carrier drivers. While less than half (40%) of all drivers were chemically tested for alcohol, the testing rate was higher for motor carrier drivers compared to non motor carrier drivers. For the subgroup of drivers (25%) with a known BAC test result and a police-reported judgment about alcohol involvement, the sensitivity and specificity rates of the police reported alcohol data were reasonably high for both types of drivers (i.e., at least 83% and 91%, respectively). While the rates differed by other driver, vehicle, and crash characteristics as well, the patterns were similar by type of driver.

Although the sensitivity and specificity of the police-reported alcohol data were high, we do not recommend relying upon police-reported alcohol data because of the significant verification bias that was present in the evaluation of these data. Only 25% of drivers had both BAC testing and police-reported alcohol data. Verification bias occurs when the sensitivity and specificity of a test is not based upon the evaluation of all eligible subjects but rather a subgroup of subjects who receive either the index (police-reported judgment) or reference test (i.e., BAC test). In our study, we could only evaluate the sensitivity and specificity of police-reported alcohol data among drivers who also had a BAC test rather than among all drivers involved in a fatal motor carrier crash.

Previous studies that have evaluated the validity of police-reported assessments of alcohol involvement have also suffered from verification bias. For example, Williams and Wells (1993) investigated alcohol involvement among passenger vehicle drivers who died in 23 states where chemical tests were performed in at least 80% of the cases. Their sensitivity and specificity rates of 92% and 85% were based only on the cases where BAC test results and police reported judgments were documented; they excluded 41% of cases in which the police did not report alcohol information. Similarly, Grossman et al. (1996) reported a high sensitivity and specificity of police assessments for patients admitted to a Level 1 trauma center after being involved in a motor vehicle crash, however, the analysis was based on 22% of those initially hospitalized because of a motor vehicle injury. The remaining cases were not included because the crash records or alcohol information were missing.

Routine chemical testing is the most accurate way to estimate the role that alcohol plays in fatal crashes, to monitor trends, and to evaluate countermeasures such as laws or programs that are designed to reduce alcohol-impaired driving. The results of our study suggest that the conduct of BAC testing of drivers involved in a fatal crash needs to increase for drivers who die as well as those who survive. In this study, 68% of fatally injured drivers had a known BAC test result compared with 23% of surviving drivers. Approximately half of the states in our country have mandatory BAC testing of fatally injured drivers, 11 states authorize but do not require a test, and the remaining states have no law. In 2002, state testing rates of fatally injured drivers varied from 4% in the District of Columbia to 98% in Vermont (Hedlund, Ulmer, & Northrup, 2004). States with the highest BAC testing rates of fatally injured drivers are those in which the state medical examiners have adopted the practice of conducting a BAC test on every traffic fatality so that they can determine whether alcohol was involved in the death (Hedlund et al., 2004).

Among surviving drivers, only five states have mandatory BAC testing. The majority of states (i.e., 30) require that surviving drivers submit to a test when implied consent provisions have been met. In 2002, state BAC testing rates of surviving drivers ranged from less than 1% in Virginia to 90% in Maine (Hedlund et al., 2004). For surviving drivers, BAC testing is largely the responsibility of law enforcement agents. States with the highest BAC testing rates are those with a mandatory testing law (Hedlund et al., 2004). High BAC testing rates have also been achieved by states that rely on dedicated teams to investigate fatal crashes or require law enforcement agents to request a voluntary test from all surviving drivers not suspected of driving while impaired (DWI), as well as requesting a test of the remaining drivers under standard DWI procedures (Hedlund et al., 2004).

To achieve high BAC test rates for fatal crashes, medical examiners, coroners and law enforcement agents must be highly trained, properly equipped, and understand the importance of BAC testing. If more states followed a standard practice of BAC testing of all drivers involved in a fatal crash, not only would it increase testing rates, but it would reduce the testing biases associated with current practices. A recent study by Hedlund et al. (2004) that reviewed state laws and practices for BAC testing of drivers involved in fatal crashes recommended that NHTSA establish national guidelines for BAC testing and reporting rates. Based on the results states have been able to achieve nationwide, they recommended that the target BAC testing rate be 80% for fatally injured drivers and 60% for surviving drivers.

The results of this study must be interpreted in the context of the following limitations. First and most importantly, we were only able to evaluate the accuracy of police-reported judgments of alcohol involvement in a nonrandom sample, that is, only among the 25% of drivers for whom we also had a BAC test result. We suspect that police-reported judgments are less accurate in the absence of chemical testing because in more than one-third (39%) of the cases where both alcohol sources were present, the police reported basing their judgment on an evidential test.

Second, this study is limited to drivers involved in fatal motor carrier crashes. However, our results are consistent with studies involving other types of vehicles and drivers so the results are probably generalizable to crashes not involving a motor carrier.

A third limitation is that there may be other factors that influence the accuracy of police-reported judgments that we were unable to evaluate, such as the severity of the injury among surviving drivers. Past literature is inconsistent regarding whether injury severity significantly influences the accuracy of police-reported judgments of alcohol involvement (Grossman et al., 1996; van Wijngaarden et al., 1995). Finally, because of data limitations, our definition of a motor carrier was based solely on the gross vehicle weight rating. There are other classes of motor carriers as defined by the Federal Motor Carrier Safety Administration (2009) that we were not able to classify as motor carriers with the FARS data (i.e., vehicles with a combination weight rating of greater than 26,000 pounds as well as vehicles carrying hazardous materials or more than 15 passengers).

SUMMARY

The results of our study suggest that police-reported alcohol data for drivers involved in fatal motor carrier crashes is reasonably accurate for all drivers involved in a fatal motor carrier crash. However, we were only able to evaluate the accuracy of the police-reported alcohol data when chemical testing results were documented. There was significant verification bias present in the FARS alcohol data that threatens the generalizability of the police-reported alcohol data. We suspect that if it had been possible to evaluate the accuracy of the police-reported alcohol data for all drivers in this cohort rather than just the drivers for whom we also had a BAC test, the sensitivity and specificity of the police-reported alcohol data would be substantially lower.

IMPACT ON THE INDUSTRY

Based on the results of this study, the federal government should continue to work with states to strengthen their strategies to increase chemical testing of all drivers involved in fatal crashes.

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Table 1

Percentage of Alcohol-Related Crashes Among Drivers With Blood Alcohol Concentration (BAC) Testing* (N=63,421).

Drivers	N	% (95% C.I.)
A. BAC of All Drivers		
0.0 g/dl	51,495	81.2 (80.9, 81.5)
≥ 0.01 g/dl	11,926	18.8 (18.5, 19.1)
≥ 0.04 g/dl	10,516	16.6 (16.3, 16.9)
≥ 0.08+ g/dl	9,316	14.7 (14.4, 15.0)
B. BAC By Driver Type#		
Motor Carrier Drivers		
0.0 g/dl	23,388	94.9 (94.6, 95.1)
≥ 0.01 g/dl	1,268	5.1 (4.9, 5.2)
≥ 0.04 g/dl	946	3.8 (3.6, 4.0)
≥ 0.08+ g/dl	767	3.1 (2.9, 3.3)
Non Motor Carrier Drivers		
0.0 g/dl	28,107	72.5 (72.2, 72.8)
≥ 0.01 g/dl	10,658	27.5 (27.2, 27.8)
≥ 0.04 g/dl	9,570	24.7 (24.4, 25.0)
≥ 0.08+ g/dl	8,549	22.1 (21.8, 22.4)

* BAC testing reported in grams per deciliter (g/dl).

Table 2

Comparison of Driver and Crash Characteristics By Driver Type (N=157,702)

Characteristic	Motor Carrier Drivers (N=80,794)	Non Motor Carrier Drivers (N=76,908)
Age#*		
15 – 24	6.0%	21.9%
25 – 34	26.5	21.2
35 – 44	29.8	18.0
45 – 54	23.2	13.3
55 – 64	12.3	9.7
65+	2.2	15.9
Sex#*		
Male	97.5%	70.2%
Female	2.5	29.8
Previous Crashes#		
0	79.2%	79.3%
1	16.2	16.2
2+	4.6	4.5
Previous DWI#		
0	98.7%	98.8%
1	1.3	1.2
Previous Speeding#		
0	67.5%	67.9%
1	20.0	19.8
2+	12.5	12.3
Previous Other Convictions#		
0	75.7%	75.6%
1	16.7	16.8
2+	7.6	7.6
Survival Status#*		
Fatal	12.7%	66.0%
Survived	87.3	34.0
Characteristic	**Motor Carrier Drivers (N=80,794)**	**Non Motor Carrier Drivers (N=76,908)**
Source of Alcohol Information#*		
Police report & BAC test	30.2%	20.9%
Police report only	32.1	51.6
BAC test only	20.3	9.6
Neither police report or BAC test	17.4	17.9
Method of Alcohol Determination by Police#*		
Evidential test	9.9%	12.5%
Preliminary breath test	2.0	0.3

Characteristic	Motor Carrier Drivers (N=80,794)	Non Motor Carrier Drivers (N=76,908)
Behavioral alcohol test	0.4	0.2
Passive alcohol sensor	0.1	0.0
Observed	9.6	7.4
Other	0.4	0.9
Not reported	77.6	78.7
Day of Crash*		
Monday – Thursday	67.2%	66.0%
Friday – Sunday	32.8	34.0
Time of Crash#*		
00:00 – 05:59	18.1%	14.4%
06:00 – 11:59	30.8	31.8
12:00 – 17:59	33.5	36.5
18:00 – 23:59	17.6	17.3
Month of Crash		
January – March	22.6%	22.8%
April – June	24.2	24.2
July – September	26.7	26.3
October – December	26.5	26.7
Year of Crash*		
1982 – 1984	7.2%	6.8%
1985 – 1989	18.9	18.6
1990 – 1994	20.2	20.3
1995 – 1999	23.9	24.3
2000 – 2005	29.8	30.0
Geographic Region*		
Northeast	11.6%	11.1%
Midwest	25.2	25.7
South	47.5	47.2
West	15.7	16.0

#Missing data

*Motor carrier driver group differs significantly from non motor carrier driver group, $p < 0.05$.

Table 3

Extent of Agreement Between Police-Reported Alcohol Involvement and Blood Alcohol Concentration (BAC) Testing* For Drivers with Both (N=40,033).

	Police Report		
BAC Value	**Alcohol Not Involved**	**Alcohol Involved**	**Total**
All Drivers			
0.0 g/dl	30,785	1,260	32,045
0.01 – < 0.08 g/dl	563	1,061	1,624
≥ 0.08+ g/dl	708	5,656	6,364
Total	32,056	7,977	40,033
Motor Carrier Drivers			
0.0 g/dl	15,500	469	15,969
0.01 – < 0.08 g/dl	133	207	340
≥ 0.08+ g/dl	98	461	559
Total	15,731	1,137	16,868
Non Motor Carrier Drivers			
0.0 g/dl	15,285	791	16,076
0.01 – < 0.08 g/dl	430	854	1,284
≥ 0.08+ g/dl	610	5,195	5,805
Total	16,325	6,840	23,165

*BAC testing reported in grams per deciliter (g/dl).

Table 4

Sensitivity and Specificity of Police-Reported Judgment of Alcohol Involvement for Blood Alcohol Concentrations of ≥ 0.08 g/dl by Selected Driver, Crash and Vehicle Characteristics (N=40,033).

Characteristic	Sensitivity (95% CI)		Specificity (95% CI)	
	Motor Carrier Drivers	Non Motor Carrier Drivers	Motor Carrier Drivers	Non Motor Carrier Drivers
Age				
15 – 24	0.85 (0.71, 0.98)	0.91 (0.90, 0.93)	0.94 (0.92, 0.95)	0.87 (0.86, 0.88)
25 – 34	0.82 (0.76, 0.88)	0.91 (0.90, 0.92)	0.96 (0.95, 0.96)	0.87 (0.86, 0.88)
35 – 44	0.85 (0.80, 0.90)	0.89 (0.87, 0.90)	0.96 (0.95, 0.96)	0.91 (0.89, 0.92)
45 – 54	0.85 (0.78, 0.91)	0.88 (0.85, 0.90)	0.96 (0.96, 0.97)	0.92 (0.91, 0.93)
55 – 64	0.68 (0.56, 0.80)	0.85 (0.81, 0.89)	0.97 (0.96, 0.98)	0.93 (0.92, 0.95)
65+	n/a	0.78 (0.73, 0.84)	0.96 (0.94, 0.98)	0.95 (0.94, 0.95)
Sex				
Male	0.82 (0.79, 0.86)	0.90 (0.89, 0.91)	0.96 (0.96, 0.96)	0.89 (0.88, 0.90)
Female	n/a	0.88 (0.86, 0.90)	0.94 (0.92, 0.97)	0.94 (0.93, 0.94)
Survival Status				
Fatal	0.79 (0.74, 0.84)	0.88 (0.87, 0.89)	0.93 (0.93, 0.94)	0.91 (0.91, 0.92)
Survived	0.86 (0.82, 0.90)	0.99 (0.98, 1.00)	0.96 (0.96, 0.97)	0.86 (0.84, 0.87)
Method of Alcohol Determination by Police				
Evidential test	0.93 (0.89, 0.96)	0.97 (0.97, 0.98)	0.94 (0.93, 0.95)	0.87 (0.86, 0.88)
Preliminary breath test	0.92 (0.78, 1.07)	n/a	0.98 (0.98, 0.99)	0.91 (0.86, 0.96)
Behavioral alcohol test	n/a	n/a	0.90 (0.83, 0.98)	0.48 (0.26, 0.69)
Passive alcohol sensor	n/a	n/a	0.47 (0.30, 0.65)	0.67 (0.29, 1.04)
Observed	0.79 (0.66, 0.91)	0.92 (0.89, 0.94)	0.98 (0.97, 0.98)	0.89 (0.87, 0.91)
Other	0.75 (0.45, 1.05)	0.94 (0.90, 0.98)	0.94 (0.90, 0.98)	0.86 (0.82, 0.90)
Not reported	0.69 (0.61, 0.76)	0.82 (0.80, 0.83)	0.98 (0.98, 0.98)	0.94 (0.94, 0.95)
Day of Crash				
Monday – Thursday	0.79 (0.74, 0.83)	0.88 (0.87, 0.90)	0.96 (0.96, 0.96)	0.92 (0.91, 0.92)
Friday - Sunday	0.87 (0.83, 0.92)	0.91 (0.90, 0.92)	0.96 (0.95, 0.96)	0.88 (0.87, 0.89)
Time of Crash				
00:00 – 05:59	0.88 (0.83, 0.93)	0.92 (0.91, 0.93)	0.95 (0.94, 0.96)	0.78 (0.76, 0.80)
06:00 – 11:59	0.64 (0.51, 0.77)	0.78 (0.74, 0.82)	0.96 (0.96, 0.97)	0.95 (0.94, 0.95)
12:00 – 17:59	0.77 (0.70, 0.84)	0.85 (0.82, 0.87)	0.96 (0.96, 0.97)	0.92 (0.92, 0.93)
18:00 – 23:59	0.86 (0.81, 0.91)	0.91 (0.90, 0.92)	0.95 (0.95, 0.96)	0.85 (0.84, 0.86)
Month of Crash				
January – March	0.86 (0.80, 0.92)	0.90 (0.89, 0.92)	0.96 (0.95, 0.96)	0.90 (0.89, 0.90)
April – June	0.86 (0.81, 0.92)	0.90 (0.88, 0.91)	0.96 (0.95, 0.97)	0.91 (0.90, 0.92)
July – September	0.77 (0.71, 0.84)	0.89 (0.87, 0.91)	0.96 (0.95, 0.96)	0.91 (0.90, 0.92)
October – December	0.82 (0.76, 0.88)	0.89 (0.87, 0.90)	0.96 (0.96, 0.97)	0.91 (0.90, 0.92)
Characteristic	**Sensitivity (95% CI)**		**Specificity (95% CI)**	
	Motor Carrier Drivers	**Non Motor Carrier Drivers**	**Motor Carrier Drivers**	**Non Motor Carrier Driver**

Characteristic	Sensitivity (95% CI)		Specificity (95% CI)	
	Motor Carrier Drivers	Non Motor Carrier Drivers	Motor Carrier Drivers	Non Motor Carrier Drivers
Year of Crash				
1982 – 1984	0.79 (0.69, 0.89)	0.86 (0.83, 0.90)	0.90 (0.88, 0.93)	0.88 (0.86, 0.90)
1985 – 1989	0.85 (0.80, 0.90)	0.89 (0.87, 0.91)	0.92 (0.90, 0.93)	0.86 (0.84, 0.87)
1990 – 1994	0.86 (0.80, 0.93)	0.91 (0.90, 0.92)	0.94 (0.94, 0.95)	0.88 (0.87, 0.89)
1995 – 1999	0.83 (0.76, 0.91)	0.90 (0.88, 0.91)	0.98 (0.97, 0.98)	0.94 (0.93, 0.94)
2000 – 2005	0.74 (0.65, 0.83)	0.89 (0.88, 0.91)	0.98 (0.97, 0.98)	0.93 (0.92, 0.94)
Geographic Region				
Northeast	0.73 (0.61, 0.86)	0.84 (0.81, 0.87)	0.98 (0.97, 0.99)	0.95 (0.94, 0.96)
Midwest	0.82 (0.74, 0.90)	0.91 (0.89, 0.92)	0.98 (0.97, 0.98)	0.93 (0.92, 0.93)
South	0.86 (0.82, 0.90)	0.89 (0.88, 0.90)	0.93 (0.93, 0.94)	0.88 (0.87, 0.89)
West	0.78 (0.70, 0.85)	0.92 (0.90, 0.93)	0.97 (0.96, 0.97)	0.91 (0.89, 0.92)

n/a=not applicable because of zero cell or small sample size in one or more cells.

Biographical Sketch on All Authors For Manuscript Entitled "Validity of Police-Reported Alcohol Involvement In Fatal Motor Carrier Crashes in the United States Between 1982 and 2005"