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## Toward National Estimates of Alcohol Use Disorders among Drivers: Results from the National Roadside Survey Pilot Program

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### Abstract

**Objective**—To determine whether drivers contacted at the roadside can be screened for alcohol use disorders (AUDs). Secondly, to produce preliminary estimates of AUDs among drivers and estimate the relationship between AUD status and BAC measured at the roadside.

**Methods**—A two-phase survey program was undertaken. In phase 1, 206 motorists were interviewed at the roadside using a 15-item AUD Survey derived from a condensed version of the AUDADIS and the AUDIT-C. One hundred sixty-seven of these motorists were invited, for a \$25 incentive, to call the research team within 48 hours of the roadside assessment to repeat the questionnaire and complete a more detailed AUD assessment. Phase 2 involved a six-state pilot test of the AUD Survey as an add-on to the 2005 National Roadside Survey Pilot Program. The setting for both phases of the survey program was U.S. roadways on weekends between 10 p.m. and 3 a.m.

**Results**—Ninety-seven percent of all eligible drivers completed the AUD questionnaire. The correlation between roadside and telephone interview results was 0.3 for alcohol abuse, 0.6 for alcohol dependence and heavy drinking, and 0.7 for binge drinking. Alcohol abuse and dependence diagnoses had 0.6 and 0.7 correlation with diagnoses derived from the full AUDADIS and the AUDIT-C had a 0.8 correlation with the full AUDIT. There was also a statistically significant and positive relationship between having a positive BAC at the roadside and meeting criteria for heavy drinking.

**Conclusions**—AUD status can be effectively measured at the roadside. The poor reliability for alcohol abuse is related to underreporting of drinking and driving during roadside assessments, compared to telephone follow up. Other measures of hazardous alcohol use should be used in the roadside context to measure alcohol abuse.

### Keywords

Alcohol Dependence; Alcohol Abuse; Impaired Driving; Roadside Surveys; Drinking and Driving; Binge Drinking

## INTRODUCTION

### An Overview of DUI Research

The extent to which repeat offenders are overrepresented in alcohol-related crashes remains controversial and is significant to policymaking because of the costs of sanctions—extended

incarceration, house arrest, vehicle interlock, and probation programs—being imposed on DUI offenders judged to be “hardcore.” Hedlund and Fell (1995) and Jones and Lacey (1998, 2000), although noting the overrepresentation of repeat offenders in fatal crashes, pointed out that they still accounted for only a small proportion of total crashes. The use of a high BAC at the time of arrest as a signal that the individual is a hardcore offender or dependent on alcohol is questionable based on the Wieczorek et al study (1992) of the limited utility of BAC for identifying alcohol-related problems among DWI offenders. Marowitz, DeYoung, and Yu (1996) also found only a relatively modest relationship between BAC and recidivism among California DUI offenders.

One missing piece of evidence in the controversy regarding the role of alcohol-abusive and alcohol-dependent drivers in crashes is their prevalence on the road. DeYoung, Peck, and Helander (1997) developed a method of estimating prevalence of repeat DUI offenders from archival data, but it involved several assumptions that are difficult to verify. A more direct method is needed to measure the prevalence of drivers with AUDs on U.S. roadways that will provide, when compared with crash data, a better determination of the relative risk of involvement in alcohol-related crashes. Potential sources for such data are the national roadside surveys that have been conducted every decade since 1973. To date, only BAC data have been collected in these surveys. The relationship of such single, situational BAC measures of alcohol consumption to more long-term AUD status is unknown, although it is assumed that a substantial portion of those with high BAC levels could be classified as moderate drinkers or “social drinkers” who, on that particular evening, consumed more than their normal amount (Nichols & Quinlan, 1989; Nichols et al., 1978). Conversely, some with low or zero BAC levels may be periodic binge drinkers who did not consume any alcohol on the particular night they were stopped for the survey.

In past surveys, questions about drinking problems have been avoided, partly because of time constraints on the length of interview and partly because such questions might reduce participation in the breath test that follows the interview. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) funded a Pilot Study to augment the National Highway Traffic Safety Administration's (NHTSA's) 2005 National Roadside Survey (NRS) Pilot Program to determine which AUD questions the public would comfortably answer at the roadside and the feasibility of using those questions as a roadside AUD assessment tool. If credible information on AUD status (namely, heavy drinking, alcohol abuse, and dependence) can be collected during a nationwide driver survey, it will be possible to better inform decisionmakers about the risk posed by DUI offenders and high BAC drivers and estimate potential unmet treatment needs in this population.

### Measuring Alcohol Use Disorders

There is a range of diagnostic tools available to identify AUDs with varying utility and application. Although the accuracy of the procedures used in diagnosing AUDs in the DUI population is limited, several valuable scales have been studied. Conley (2001) evaluated the construct validity of the Michigan Alcoholism Screening Test (MAST) and the Alcohol Use Disorders Identification Test (AUDIT) for the current American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, 1994) definition of alcohol dependence. These tests were administered to 126 DUI offenders in court-ordered inpatient treatment. DSM-IV alcohol disorders were evaluated for a representative subset of clients using National Longitudinal Alcohol Epidemiological Surveys (NLAES). Both instruments exhibited acceptable internal consistency and correlated moderately well with each other ( $r=0.617$ ). The MAST correlated more strongly ( $r=0.602$ ) than the AUDIT ( $r=0.432$ ) with DSM-IV diagnoses (Conley, 2001). At the roadside, however, there is concern about administration of the MAST, which has more detail on impairment and might be too lengthy

to be feasible as a rapid roadside assessment tool. The AUDIT, however, is a brief 10-item screening divided into subscales. The first three items of the AUDIT comprise the AUDIT consumption (AUDIT-C) subscale and as a group have a 0.8 correlation with the entire scale (Chung et al., 2002) and were selected for inclusion in the brief AUD assessment developed for the current study.

The criteria for DSM-IV alcohol abuse and dependence are more complex than simply identifying patterns of heavy drinking. Categorization of alcohol abuse require some problem items (i.e., trouble with the law or inability to fulfill social roles), and dependence diagnoses require items covering either tolerance or withdrawal (American Psychiatric Association, 1994). Thus, to fully explore alcohol-use disorders, additional measures beyond the AUDIT-C would be required.

The Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS) from the NLAES was viewed as an appropriate tool for measuring alcohol abuse and dependence (Cottler et al., 1997; Pull et al., 1997). The AUDADIS is a comprehensive, fully structured diagnostic tool developed for use in the NIAAA-sponsored NLAES survey, a large population-based study in the United States of AUDs and cooccurring health conditions (Grant & Dawson, 1997). Diagnoses from the AUDADIS are produced by algorithms that generate International Classification of Disease—Tenth version (ICD-10) and DSM-IV AUDs. The metric properties of the AUDADIS have been studied extensively across cultures (e.g., Canino et al., 1999; Chatterji et al., 1997; Hasin et al., 1997; Üstün et al., 1997; Vrsti et al., 1998) and settings (e.g., Hasin et al., 1997; Volk et al., 1997). The abuse scale has acceptable validity, namely concordance rates with DSM-IV abuse above 0.5 (Üstün et al., 1997). The dependence scale of the AUDADIS also has high metric properties. The test-retest reliability ( $\kappa=0.68$ ) exceeds clinical standards for a measurement instrument (Grant & Harford, 1995; Grant, Kushner, & Kim, 2002; Üstün et al., 1997). As a measure of validity, the AUDADIS has a 0.61 correlation with the Schedules for Clinical Assessment in Neuropsychiatry (SCAN) and a 0.69 correlation with the Diagnostic Interview Schedule (DIS). These good reliability coefficients also provide additional support for the validity of the dependence syndrome and somewhat less so for the abuse syndrome.

### Significance of Research

There are substantial societal resources being allocated to address the perceived risk posed by AUD drivers who are believed to be hardcore DUI offenders, as evidenced by the passage of state laws providing for more severe penalties for first DUI offenders with high BACs. AUD measures validated in other contexts (telephone and household surveys) and treatment programs were available for application to roadside surveys; however, their feasibility in that context must first be demonstrated. Although these instruments have acceptable psychometric properties in medical settings, before applying them in nonmedical contexts (particularly at the roadside), we needed to explore any variation in performance attributable to the shift in context. In addition, given the low probability of arrest for intoxicated drivers, this epidemiologic investigation of the feasibility of assessing AUDs among drivers at the roadside and quantification of the association between cross-sectional BAC and AUD status is a critical first step in understanding the extent of the problem in the U.S. population. The resultant data will be used to justify large-scale replication of the methodology to ultimately provide data to make scientifically informed decisions about policies intended to reduce impaired driving and provide an evidence base for primary prevention for all drivers and secondary prevention efforts for drivers identified in the medical and criminal justice system as high-risk drivers.

## METHODS

This study was undertaken (1) to determine the feasibility of collecting information on AUDs (including heavy drinking, binge drinking, alcohol abuse, and alcohol dependence) from a random sample of drivers using the roads on weekend evenings; (2) to estimate the prevalence of AUDs among this high-risk population of drivers; and (3) to estimate the relationship between AUD status and cross-sectional BAC (measured at the roadside). This study was incorporated into the NHTSA-funded 2005 National Roadside Survey (NRS) Pilot Study. The 2005 NRS Pilot Survey was undertaken because the proposed plans for the pending 2007 NRS included extensive additions to the data collection compared to the three previous decennial roadside surveys.

To achieve the goals of this AUD study, a brief 15-item AUD survey was constructed. The survey was first validated as a feasible tool for implementation at the roadside. The success of the feasibility phase of testing was assessed using four criteria: (1) driver willingness to respond to items related to alcohol use at the roadside (i.e., response rates); (2) replicability of the roadside responses to a followup survey in another context such as telephone administration (i.e., reliability); (3) correlation of AUD screener responses to criterion measures of AUD such as the full AUDIT or DIS (i.e., validity); and (4) comparability between AUD prevalence measured at the roadside compared to AUDs measured in other contexts reported in the literature (i.e., generalizability). The second phase of this work involved administration of the survey in a six-state nationwide Pilot Program that allowed estimation of AUD prevalence and the relationship between AUD status and BAC.

### The Assessments and Diagnoses

**Heavy drinking**—To assess AUDs, a 15-item survey was constructed. The first three items (Table 1) were derived from the AUDIT and represent the AUDIT Consumption subscale, also known as the AUDIT-C (Babor et al., 1992; Chung, Colby, & Barnett, 2002; Conley, 2001). Scores of 6 or more signaled heavy drinking for men and scores of 5 or more signaled heavy drinking for women using the AUDIT-C. The values that corresponded to AUDIT-C response options are included on the AUDIT-C survey. Item 3 of the AUDIT-C most closely corresponded to binge drinking within the past year, and includes having 6 or more drinks (males) or 5 or more drinks (females) on at least one drinking occasion in the past year. A second binge-drinking category was constructed from this item to denote past-year binge drinkers who reported binge drinking at least monthly or more frequently. The standard definition of binge drinking is 5 or more drinks (males) or 4 or more drinks (females) on at least one drinking occasion in the past year; however, to preserve the integrity of the AUDIT items and comparability with other published reports, we used the item in its pre-existing form. Because the AUDIT item has a higher threshold, our estimates of binge drinking would potentially be an underestimate (compared to using the standard 5+/4+ criteria).

**Alcohol abuse and dependence**—The items we used to measure DSM-IV alcohol abuse and dependence were drawn from the AUDADIS. Items 4 through 7 on the survey were used to assess alcohol abuse. This condensed version of the AUDADIS contains one item per DSM-IV symptom for alcohol abuse. A positive response to any of these items signals alcohol abuse. However, there is a hierarchy for categorizing abuse in relationship to dependence. Respondents who meet the criteria for both abuse and dependence are classified as dependent (American Psychiatric Association, 1994). Items 8 through 15 on the survey were also derived from the AUDADIS and were used to classify alcohol dependence. Items 8 and 9 both tapped into the domain of tolerance. Items 10 through 15 each represented one DSM-IV diagnostic symptom. Therefore, seven diagnostic symptoms were represented across the eight items. A

positive response to three of the seven symptoms signaled alcohol dependence. The alcohol abuse and dependence items are listed in Table 1.

### Phase 1: Feasibility Procedures

To implement the feasibility phase of the study, the investigative team gained the cooperation of a local police department in the northern Mid-Atlantic Region. Working with the police, the research team identified a safe, well-lit location in which to conduct the survey (in this case, a closed gas station lot where the proprietor agreed to leave the lights on). An off-duty police officer directed traffic into interview bays demarcated by cones. The survey location was selected to be on a roadway with sufficient traffic volume between 10 p.m. and 3 a.m. on Fridays and Saturdays to generate the number of cases necessary for the study. The procedures for selecting motorists for this roadside survey were identical to the previous three roadside surveys and the dozens of other surveys conducted over the last 30 years. The police officer, at the prompt of the interviewer or survey supervisor, directed the next car to the off-road interview location. The setup of the roadway, including signage and warning of a potential stop, complied with highway safety standards for traffic. Surveys occurred on three separate survey nights.

**Subject recruitment and survey administration**—We began contact with the driver using the standard NRS protocol (see Lestina et al., 1999) and informed consent procedure. A passive alcohol sensor (PAS) was taken on all drivers prior to obtaining consent as a safety procedure to identify and intervene with drinking drivers not detected by simple observation. Safe ride alternatives were available to all drinking drivers. After obtaining informed consent to the survey, we administered the standard roadside survey questionnaire used in the prior three roadside surveys, followed by the SD-400 breath test. Participants were offered an incentive to provide a saliva sample. At the end, an additional \$5 incentive was offered to participants to complete the AUD survey. This add-on procedure for the AUD survey was intended to avoid compromising the survey's comparability with previous roadside surveys. The AUD survey, although an add-on to the NRS program, had a separate consent statement. At the end of the interview, we queried participants about their assessment experience and solicited their opinions on how to most effectively obtain cooperation.

**Followup survey procedures**—Upon completion of the AUD survey on the second and third survey nights, respondents were given an index card with a unique ID number and a toll-free number to call for the followup survey. Respondents were given an inactive \$25 Walmart gift card and asked to call the number within 48 hours to complete the followup interview. A telephone respondent was verified as the selected individual by requesting information about their contact with the survey and responses to questions that could be verified in their survey records. After a respondent was verified, the roadside AUD survey was re-administered (to assess test-retest reliability), and the full AUDADIS and AUDIT (serving as criterion measures) were administered to assess the validity of roadside responses. Upon completion of the followup survey, the Walmart gift card, already in the respondent's possession, was activated. A licensed clinical psychologist administered followup interviews. These data were collected between April and June 2005.

### Phase 2: Six-State Pilot Program

Upon completion of the feasibility study and determining respondents would reliably and validly answer the AUD items, the AUD Survey component was added to the 2005 NRS Pilot Program. The survey took approximately 3 to 5 minutes to administer and followed the same procedure used in the feasibility study. Each respondent filled out the form while seated with the oral fluid collection device in his or her mouth. Respondents refusing to provide an oral fluid sample but agreeing to the AUD survey took it immediately after the NRS questionnaire.



All the survey procedures were approved by PIRE's Institutional Review Board (IRB) for the protection of human subjects.

### Statistical Methods

Data were analyzed using SPSS version 14 and STATA version 7.0. AUD survey response rates, unweighted sample statistics, and rates of AUDs were produced for the feasibility and pilot studies. In the feasibility study, correlations between AUD status derived at the roadside and AUD status derived from telephone follow up were estimated using Kappa Statistics.

In the Pilot Study, logistic regression analyses were used to estimate the strength of the association between BACs measured at the roadside and the presence of AUDs among current (within the previous 12 months) drinkers. Separate models were produced for each of five dependent variables including (1) heavy drinking, (2) any binge drinking (at least once in the past year), (3) monthly binge drinking (monthly or more often in the past year), (4) alcohol abuse, and (5) alcohol dependence. Models were adjusted for demographic characteristics (including age, gender, and race/ethnicity) and interaction tests were performed for each demographic variable. Odds ratios were used to depict the strength of association, and alpha levels were set to 0.05.

## RESULTS

### Feasibility Study Results

**Response rates and sample size**—As a first step in determining eligibility for applying the AUD screening instrument, English-speaking roadside survey participants aged 18 and older were asked if they had consumed alcohol in the previous year. Of the 305 drivers queried, 214 endorsed past-year drinking. Of these 214 eligible respondents, 206 completed the AUD screener, corresponding to a 96% response rate. For a fuller description of the subject recruitment process, see Lacey et al. (2007, Table 7, p. 24).

**Followup survey response rates**—Followup contact information was requested from 167 respondents who participated in the second and third nights of feasibility data collections. A total of 110 respondents consented to the followup survey. Among these 110 participants, 65% called the research team within 24-72 hours of the survey and completed the telephone followup survey (n=72/110).

**Followup survey results of reliability and validity analyses of roadside responses**—Reliability estimates for all AUD categories, except alcohol abuse, were in the good to fair range. Kappas of 0.6 were estimated for binge drinking and alcohol dependence and a Kappa of 0.7 was estimated for heavy drinking (when comparing roadside reports to responses provided in telephone followup interviews). These estimates are in the good to fair range based on standard conventions (Fleiss, 1981) and comparable to Pull et al.'s (1997) reliability estimates for alcohol dependence of 0.61. Alcohol abuse had a very low kappa of 0.3. The alcohol abuse estimates was less reliably measured at the roadside, and this estimate was based on a very small number of concordant cases at follow up (only 2 of 11 total cases met abuse criteria at follow up and at roadside combined). Six of the total 11 alcohol abuse cases at follow up endorsed drinking while driving but did not endorse this item during their roadside assessment. In short, motorists were very unlikely to endorse drinking and driving during the roadside assessment. Alcohol abuse and dependence diagnoses based on roadside reports had a 0.6 and 0.7 correlation with diagnoses derived from the full AUDADIS administered during the followup interview. The full AUDADIS has more items to tap into each symptom domain. The AUDIT-C administered at the roadside had a 0.8 correlation with the entire scale administered at follow up. These are acceptable indicators of validity.

## NRS Pilot Study Results

**Response rates and sample size**—Of the 959 drivers who entered the survey sites, 530 met the preliminary eligibility criteria and answered that they had consumed alcohol in the last year, and 516 of the 530 answered the 15-item AUD survey. Thus, of those who met the selection criteria, 97.4% participated.

**Alcohol use disorder estimates**—Based on the 15-item survey data obtained at the roadside, binge drinking within the past year was the most prevalent alcohol-related diagnosis with more than half (54.3%) reporting binge drinking in the past year ( $n=184/516$ ) and 20.5% reporting monthly binge drinking. Heavy drinking was the second most reported problem drinking behavior, with 21.7% of drivers reporting heavy drinking in the past year. An estimated 8.3% of respondents met the criteria for nondependent alcohol abuse ( $n=43/516$ ), and an estimated 6.8% of respondents met the criteria for alcohol dependence ( $n=35/516$ ). Mean age decreased as the severity of disorder increased. Several other interesting contrasts were noted in the demographics variations in disorder (Table 2); namely, Whites and males were overrepresented in the monthly binge-drinking group and monthly binge drinkers were the highest proportion of high BAC drivers.

**Association between AUDs and BACs**—Table 3 shows results of the multivariable linear regression models. Heavy drinking, binge drinking, and monthly binge drinking were all statistically significant predictors of BAC at the roadside but not alcohol abuse and dependence. Monthly binge drinking had a larger relationship to BAC than any other AUD category. These models were extended to include statistical adjustment for key demographic covariates, including age (coded continuously), gender, race (defined as White, Black, Asian, Hispanic, and other), and education (defined as high school graduate or not). Even after these adjustments, the relationship between heavy drinking, binge drinking, and monthly binge drinking and BAC at the roadside persisted. It is noteworthy that the main effect of each of the demographic covariates was also estimated. Asians were slightly more likely than all other racial groups to have a positive BAC at the roadside ( $\beta=0.02$ ;  $p=0.01$ ), although on average the BAC among Asians was lower than all other groups.

## DISCUSSION

This study demonstrated the feasibility of implementing a brief AUD screener among drivers at the roadside. In feasibility testing, drivers validly and reliably answered brief screening items related to their alcohol use in the past year with the exception of self-reported symptoms of alcohol abuse. We attribute this difference in part to underreporting of driving and driving behavior while at the roadside. This is particularly important as more than 50% of alcohol abuse cases in this study were determined by that single item. This is consistent with another published report on alcohol abuse relating to crash involvement that found half of all alcohol abuse cases were attributable to that single item (Voas, Romano, Tippetts, et al., 2006). We therefore expect that our estimates of alcohol abuse taken at the roadside are an underestimate of the problem. To suppress the potential impact of this reporting bias uncovered during feasibility testing, these assessments were subsequently measured via self-reported paper-and-pencil instruments in the NRS Pilot Study.

In the NRS Pilot Study, we found modest rates of drinking and driving at high BACs. This trend is consistent with previous studies of drinking and driving. Approximately 6% of all drivers who reported past-year alcohol consumption had measured BACs of .05 and higher at the roadside. This is a decrease from reported rates of approximately 10% in 1996 (Lestina et al., 1999).

Regarding alcohol use disorders, approximately 15% of all past-year drinkers met the criteria for alcohol use or dependence. Based on estimates from the National Household Survey on Drug Use and Health (NHSDUH), approximately 13% of the adult population met the criteria for alcohol abuse or dependence in 2005, the same year as the pilot study. Given the modest sample size of our Pilot Study, we are not inclined to highlight the differences in the two rates.

The most prevalent AUD was binge drinking. Given the increased proportion of alcohol-involved crashes late at night and on weekends, we suspect that binge drinking is the primary attributable risk factor for DUI. Regression analysis supported this conclusion. BAC measured at the roadside was statistically associated with heavy drinking and binge drinking but not with more severe forms of disorder (i.e., alcohol abuse and alcohol dependence).

Before further discussion of these results, three limitations must be addressed. First, the overall response rate for the entire NRS Pilot Program was 80%. It is possible that the high-risk drinking drivers and drivers with AUDs were more likely to decline to participate in the NRS portion of the program and are therefore underrepresented in this study. We did collect passive alcohol sensor and demographic data on all drivers as soon as they entered the research arena, so these key variables were available on all drivers. Exploratory analysis of these data revealed no significant difference in PAS readings among those who participated and those who did not. In addition, only 3% of all drivers who screened positive for the AUD portion of the survey did not complete the AUD assessment. We therefore expect the impact of nonresponses on our estimates of AUDs was minimal. The second limitation involves possible underreporting of drinking/driving behavior at the roadside. In the Pilot Program, we put in additional safeguards (e.g., paper-and pencil administration and underscored the anonymity of responses with selected drivers) to minimize potential underreporting. The final limitation includes reliance on self-report data and potential recall bias. All AUDs were based on reports of drinking behavior within the last year, and the burden is thus on the respondent to recall specific aspects of their drinking behavior over that period. This bias is inherent in any study assessing substance use or other mental disorders and a published report confirms that recall of drinking and drug use are more precise and reliable than other accounts of mood or related behaviors to assess other mental disorders (Anthony, 2000).

Notwithstanding these limitations, this is the first study of its kind to operationalize and successfully field an AUD screener in a roadside study. Future research stemming from this Pilot Program include AUD assessment in a nationwide probability sample of more than 10,000 drivers and a more in-depth analysis of the relationship between AUD status and drinking and drug-involved driving. This work will be used to guide future targeted preventive interventions to deter high-risk drinking and driving behavior and develop policies to address possible unmet alcohol treatment needs among this segment of the driving population.

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**Table 1**AUD Screener Items<sup>a</sup>

1.	How often did you have a drink containing alcohol? <b>never(0) monthly or less(1) 2-4 times/month(2) 2-3 times/week(3) 4 or more times/week(4)</b>
2.	How many drinks containing alcohol did you have on a typical day when you were drinking? <b>1 or 2(0) 2-4(1) 5 or 6(2) 7-9(3) 10 or more (4)</b>
3.	How often did you have six (five for a woman) or more drinks on one occasion? <b>never(0) less than monthly(1) monthly(2) weekly(3) daily/almost daily(4)</b>
4.	Did your drinking often interfere with taking care of your home or family or cause you problems at work or school?
5.	Did you more than once get into a situation while drinking or after drinking that increased your chances of getting hurt—like driving a car or other vehicle or using heavy machinery—after having had too much to drink?
6.	Did you get arrested, held at a police station, or have legal problems because of your drinking?
7.	Did you continue to drink even though it was causing you trouble with your family or friends?
8.	Have you found that you have to drink more than you once did to get the effect you want?
9.	Did you find that your usual number of drinks had less effect on you than it once did?
10.	Did you more than once want to try to stop or cut down on your drinking, but you couldn't do it?
11.	Did you end up drinking more or drinking for a longer period than you intended?
12.	Did you give up or cut down on activities that were important to you or gave you pleasure in order to drink?
13.	When the effects of alcohol were wearing off, did you experience some of the bad aftereffects of drinking—like trouble sleeping, feeling nervous, restless, anxious, sweating or shaking, or did you have seizures or sense things that weren't really there?
14.	Did you spend a lot of time drinking or getting over the bad aftereffects of drinking?
15.	Did you continue to drink even though it was causing you to feel depressed or anxious or causing a health problem or making one worse?

<sup>a</sup> All items prefaced with the statement "In the past year . . ."

Table 2

Demographic Characteristics and BAC Range by Alcohol Use Disorder Status

Demographics	Total AUD sample N=516 (100%)	AUDIT 3 binge drinking N= 280/516 (54.3)	AUDIT 3 binge drinking (monthly) <sup>a</sup> 106/516 (20.5)	Heavy drinkers N= 112/516 (21.7%)	Nondependent alcohol abusers <sup>b</sup> N= 43/516 (8.3%)	Alcohol dependence N= 35/516 (6.8%)
Mean age (standard deviation)	33.45 (13.6)	28.23 (9.6)	28.00 (9.56)	27.57 (9.8)	27.47 (8.1)	26.47 (8.2)
Male	322 (62.4)	193 (68.9)	82 (77.4)	78 (69.6)	32 (74.4)	26 (74.3)
White	393 (76.2)	227 (81.1)	88 (83.0)	99 (88.4)	34 (79.1)	24 (68.6)
Hispanic	52 (10.8)	28 (10.0)	8 (7.5)	9 (8)	4 (9.3)	5 (14.3)
High school graduate or more	466 (90.3)	255 (91.1)	98 (92.5)	101 (90.2)	39 (90.7)	30 (85.7)
<b>BAC Range</b>						
<.005	395 (76.6)	207 (74.0)	72 (67.9)	80 (76.2)	33 (76.7)	25 (71.4)
.005 – .049	56 (10.85)	32 (11.4)	13 (12.3)	16 (15.2)	5 (11.6)	5 (14.3)
.05 – .079	16 (3.1)	10 (3.6)	5 (4.7)	3 (2.9)	1 (2.3)	2 (5.7)
.08 and higher	15 (2.9)	14 (5.0)	8 (7.5)	6 (5.7)	2 (4.7)	1 (2.9)
Missing	34 (6.6)	17 (6.1)	8 (7.5)	7 (6.25)	2 (4.7)	2 (5.7)

<sup>a</sup>Reported binge drinking on AUDIT-C item number 3 with a frequency of at least monthly or more.<sup>b</sup>64 drivers (12.4%) met abuse criteria, but 21 were eliminated as they also met dependence criteria.

**Table 3**

## Results of Multivariable Linear Regression Analysis

	Unadjusted		Adjusted	
	$\beta$	p-value	$\beta$	p-value
Heavy drinking	0.006	0.038	0.006	0.031
Binge drinking	0.007	0.001	0.009	0.001
Monthly binge drinking	0.011	0.000	0.011	0.000
Alcohol abuse	0.002	0.575	0.001	0.806
Alcohol dependence	0.002	0.615	0.001	0.859