

# The Hispanic Americans Baseline Alcohol Survey (HABLAS): Rates and predictors of DUI across Hispanic national groups

Raul Caetano\*, Suhasini Ramisetty-Mikler, Lori A. Rodriguez

*University of Texas School of Public Health, Dallas Regional Campus, United States*

Received 20 July 2007; received in revised form 24 August 2007; accepted 9 September 2007

## Abstract

This paper examines rates of self-reported driving under the influence (DUI) of alcohol and 12-month and lifetime DUI arrest rates among Mexican Americans, Puerto Ricans, Cuban Americans and South/Central Americans in the U.S. population. Using a multistage cluster sample design, a total of 5224 individuals 18 years of age and older were selected from the household population in five metropolitan areas of the U.S.: Miami, New York, Philadelphia, Houston and Los Angeles. The survey weighted response rate was 76%. Among men, 21% of Mexican Americans, 19.9% of South/Central Americans, 11.6% of Puerto Ricans and 6.9% of Cuban Americans reported DUI. Rates were lower among women, ranging from 9.7% for Mexican Americans to 1.3% for Cuban Americans. Mexican American men had the highest 12-month arrest rate (1.6%) and the highest lifetime arrest rate (11.2%). Drinkers who reported DUI were heavier drinkers than those not reporting DUI according to a variety of indicators. However, most DUI incidents involved non-alcohol-dependent drivers. Mexican Americans and South Central Americans, men, younger drivers, those with less than high school education, those with higher income and higher alcohol consumption were more likely to report DUI and DUI arrests. These findings show that Hispanic national groups in the U.S. are diverse regarding drinking and DUI-related experiences.

© 2007 Elsevier Ltd. All rights reserved.

*Keywords:* Hispanic groups; Driving under the influence; Epidemiology; Survey

## 1. Introduction

Driving under the influence of alcohol (DUI) continues to be a major public health problem in the U.S. After declining from a high rate of 59.5% in 1982 to 39.7% in 1999 as a proportion of all traffic fatalities, alcohol-related traffic fatalities have stabilized since then (Yi et al., 2006). In 2005 there were 16,885 alcohol-related traffic fatalities in the U.S., or 39% of all traffic fatalities (U.S. National Highway Traffic Safety Administration (NHTSA), 2006). About 86% of the people killed in these motor vehicle crashes were in a car where a driver or non-occupant had a BAC of .08 g/dL or higher (NHTSA, 2006).

As previously discussed by a number of authors, ethnicity has been one of the factors linked with DUI (Caetano and McGrath, 2005; Caetano et al., 2000; Ferguson et al., 2002; Padilla and Morrissey, 1993; Voas et al., 1998). According to some indica-

tors, Hispanics are one of the ethnic groups with a higher than average involvement in DUI. Members of this ethnic group have been found to be over represented among drunk drivers in roadside surveys, alcohol-related fatal crashes and arrests for DUI (Hilton, 2006; Lapham et al., 1998; Perrine et al., 1989; Ross et al., 1991). For instance, data from roadside surveys for 1986 and 1996 showed that Hispanics were 1.5 times more likely than Whites to drive with a BAC at or above .05 (Voas et al., 1998). Data on DUI arrests by ethnicity indicate that Hispanics and other minority groups (e.g., Native Americans) are over represented among arrestees (Caetano, 1984; Chang et al., 1996). In California in 2005, 45.5% of those arrested for DUI were Hispanic, a proportion considerably higher than the state's 32.5% total population of Hispanics (Tashima and Daoud, 2007).

Data from general population household surveys are less consistent on the extent to which Hispanics are involved in DUI in comparison to other groups. Self-reported lifetime arrest rates for DUI in the 1995 National Alcohol Survey (NAS) were higher for Hispanic men (19%) than for White (13%) and Black men (11%) (Caetano and Clark, 2000). Twelve-month arrest rates from the same survey were 1% for White

\* Corresponding author at: 6011 Harry Hines Blvd., Room V8.112, Dallas, TX 75390-9128, United States. Tel.: +1 214 648 1080; fax: +1 214 648 1081.

E-mail address: raul.caetano@utsouthwestern.edu (R. Caetano).

and Black men, but 4% for Hispanic men. National surveys have also reported 12-month rates of driving after “having too much to drink” (National Epidemiologic Survey on Alcohol and Related Conditions—NESARC), or after “having drunk enough to be in trouble if the police stopped you” (NAS), or driving “under the influence of alcohol” (National Household Survey on Drug Abuse—NHSDA), or driving “two hours after drinking” (NHTSA). These rates are derived from different questions and thus difficult to compare. In general, they also are higher than 12-month arrest rates. Thus, rates of driving in the 1995 “after having enough to be in trouble if stopped by the police” were similar for White (22%) and Hispanic men (21%), and lower for Black men (14%) (Caetano and Clark, 2000).

In contrast, results from analyses of the combined NHTSA surveys of 1993, 1995 and 1997, which cover the driving population (16 years of age and older), showed that White men reported the highest rate of driving “two hours after drinking” (28%), followed by Hispanic (17%) and Black men (16%) (Royal, 2003). Data from the 2000 NHSDA (Caetano and McGrath, 2005) showed that the 12-month rate of “driving under the influence” for Hispanic men (16.8%) was below that for Native Americans/Alaskan Natives (20.8%) and that for individuals of mixed race (22.5%) but higher than the rate for other groups. In the 2002 NESARC, the 12-month rate of driving “after having too much to drink” for Hispanic men was 3.3%, lower than that for Native Americans (5.9%) and Whites (5%) (Chou et al., 2006; Chou et al., 2005). These rates are lower than those from the NAS and NHTSA probably because these surveys count respondents who engaged in the behavior “more than once,” which is not the case in those other surveys.

The high rate of DUI arrests for Hispanics compared to other ethnic groups have been explained by some as resulting from differential police enforcement of DUI laws. For instance, Hispanics are more likely to be arrested in the vicinity of their drinking place than Whites (Lapham et al., 1998), which may suggest a stronger police presence where Hispanics drink and live. Alternatively, others assert that Hispanics compared to other ethnic groups do not recognize DUI as a highly deviant behavior, possibly due to views brought to this country from Mexico and other Latin American countries where DUI laws are not strictly enforced. However, analysis of national survey data show that U.S.-born Hispanics are more likely than those born abroad to report “driving after having drunk enough to be in trouble if stopped by police,” to report ever arrest for DUI (Caetano and Clark, 2000) and to report driving under the influence (Caetano and McGrath, 2005). A third explanation for the higher arrest rate links Hispanics’ high rate of heavy drinking to their inability to recognize the impairing effects of alcohol on psychomotor abilities necessary for driving. For instance, Hispanic men think that on average they can consume seven drinks before their driving is impaired (Caetano and Clark, 2000). However, this argument is contradicted by other data that reveal that a greater proportion of Hispanics than Whites recognize the adverse effects of alcohol on their ability to drive (Posner and Marin, 1996).

Besides the inconsistency present in these data from the general population, the literature on DUI among Hispanics is limited

because of its lack of attention to potential differences in DUI rates across Hispanic national groups. Yet, when completed, these analyses suggest that there may be considerable differences in DUI rates (Tippets and Voas, 1999). The objective of this paper is to examine rates of self-reported driving after drinking (DUI), 12-month DUI arrest rates and lifetime DUI arrest rates across Hispanic national groups (Mexican Americans, Puerto Ricans, Cuban Americans and South/Central Americans) in the U.S. population. In addition, the paper examines selected alcohol-related data for drinkers who reported DUI or DUI arrest compared to those who do not report such events. Sociodemographic and drinking-related correlates of these events are also identified.

## 2. Methods

### 2.1. Sample and data collection

Data were collected as part of the 2006 Hispanic Americans Baseline Alcohol Survey (HABLAS). The HABLAS employed a multistage cluster sample design in five selected metropolitan areas of the U.S.: Miami, New York, Philadelphia, Houston and Los Angeles. These sites were chosen because of the large proportion of Hispanics of specific national groups in their population. Thus, most Cuban Americans (98%) were interviewed in Miami, most Mexican Americans in Houston and Los Angeles (87%), most South/Central Americans in Miami (50%) and New York (41%), and most Puerto Ricans in Philadelphia (50%) and New York (50%). After appropriately weighted, respondents are a representative sample of the Hispanic civilian non-institutionalized population aged 18 and older in these sites. A total of 5224 individuals were interviewed, for a weighted response rate of 76%. Computer Assisted Personal Interviews (CAPI) lasting 1 h in average were conducted in respondents’ homes by trained interviewers, all of which were bilingual English/Spanish. The main topics covered in the interview besides DUI were: sociodemographic information, alcohol consumption, drinking problems, alcohol abuse and dependence, attitudes and norms about drinking, alcohol-related expectancies, alcohol-related intimate partner violence, alcohol-treatment experiences, depression, acculturation and acculturation stress.

### 2.2. Questionnaire translation

This took into account the possibility that respondents in different Hispanic national groups would use different idioms and words in their daily use of Spanish. Thus, once the English questionnaire was pre-tested and finalized, the questionnaire was translated into Spanish by a lead translator, and then independently back-translated. The two versions of the questionnaire, original English and Spanish, were then harmonized by a group of seven translators from different parts of Latin America: Cuba, Puerto Rico, Venezuela, Argentina, Peru, Mexico and the Dominican Republic. This group of translators also created a roster of terms and words that appeared in the questionnaire and that had different usage across the Spanish spoken by different

Hispanic national groups. This roster was provided to the interviewers, who then used it when necessary during interviews in the field.

### 3. Measurements

#### 3.1. Driving under the influence of alcohol (DUI)

Respondents who drank alcohol in the past 12 months were first asked: “In the last 12 months, have you driven a car when you had drunk enough to be in trouble if the police had stopped you?” On the basis of their response, respondents were classified as “no” or “yes”. Respondents who answered positively to the first question were further asked for the frequency with which they engaged in the behavior in the past 12 months. In the analysis these data are identified as DUI, and this group of individuals excludes all of those who had a 12-month or a lifetime arrest, except in Table 2.

#### 3.2. Twelve-month and lifetime arrest for driving under the influence (DUI arrest) of alcohol

Respondents were divided into those who reported and those who did not report an arrest in the past 12 months or during their lifetime. Respondents who reported an arrest in the past 12 months were further asked for the number of arrests they had had in that time frame.

#### 3.3. Drinkers

All respondents who reported drinking any alcohol in the past 12 months.

#### 3.4. Alcohol disorders

Based on DSM-IV criteria for alcohol abuse and dependence (American Psychiatric Association, 1994). Respondents reporting the presence of three or more dependence indicators during the 12 months prior to the interview were identified as alcohol dependent. Those who reported the presence of at least one of the abuse criteria were grouped as “Abusers.” Those who did not meet the criteria were grouped as the “no” category (reference group).

#### 3.5. Binge drinking

This was defined as drinking four (women) or five (men) standard drinks per occasion (within 2 h) in the past 12 months. Respondents were divided into two groups: those who reported binge drinking in the past 12 months and those who did not report this type of drinking (reference group).

#### 3.6. Number of drinks can consume before driving is impaired

Respondents were asked to report on about how many drinks they think they can consume over a 2-h period before their ability to drive becomes impaired.

#### 3.7. Average drinks per week

This was assessed by combining the self-reported frequency and quantity of drinking any type of alcohol in the past 12 months. This alcohol consumption variable was included in the model as a continuous independent variable. For purposes of data interpretation, the risk associated with drinking five standard drinks of alcohol is reported.

#### 3.8. Police stops

Respondents who reported driving a car in the past 12 months were asked whether they had ever been stopped by police for any reason when driving a car.

#### 3.9. Ethnicity and Hispanic national origin

This was done in two steps and is based on self-identification. The first step included screening households by asking the household informant whether there were any adult household members that were Hispanic/Latino. Once these adults were identified, one was randomly selected to be interviewed. In the second step, during the survey interview, the ethnicity of the adult selected into the survey was confirmed through self-identification. Respondents were asked “Which of these groups best describes your own ethnic identification”: Puerto Rican, Cuban, Cuban American, Mexican, Mexican American (including Chicano/a), Dominican, South American, Central American. In this paper, Dominicans are grouped with South/Central Americans.

#### 3.10. Other sociodemographic variables

*Age.* The age of respondents was used as a continuous variable.

*Income.* Respondents were asked to identify the category into which their total household income fell from a list of 12 categories, beginning with < \$4000 ending with a highest category of > \$100,000. However, nearly 20% of the total sample ( $n = 1069$ ) either refused to provide their income or did not know their income. For these respondents, log-transformed income was multiply imputed using the Markov Chain Monte Carlo method (Schafer, 1997) as implemented in SAS PROC MI. Imputed incomes were transformed back to the 12 categories. Imputations were based on the respondent’s education, employment status, marital status, household size, age, metropolitan area of residence, Hispanic nationality, whether the respondent was born in the U.S., how long respondent had lived in the U.S., acculturation, whether the respondent had driven an automobile in the past year, and annual wage and salary data for the respondent’s occupation in the case of employed respondents. The source of the wage and salary estimates was the Occupational Employment Statistics (OES) program, a cooperative program between the Bureau of Labor Statistics (BLS) and State Workforce Agencies (SWAs). The OES program produces employment and wage estimates for various occupations, excluding self-employed individuals. These data were publicly available online

through the BLS website (<http://www.bls.gov/oes/>). State and metropolitan estimates were used corresponding to the five locations where interviews were conducted for this study. In all, 10 imputations were generated. Additionally, a single imputation based on the mean of the 10 log-transformed imputations was created for purposes of exploratory data analysis.

**Marital status.** Respondents were classified into three groups: (a) never married; (b) widowed, divorced or separated and (c) married or cohabiting (reference group).

**Employment status.** Respondents were categorized into four employment categories: (a) unemployed (temporary illness, unemployed, looking/not looking for job/in school); (b) employed part-time or employed full-time (reference group); (c) retired/homemaker and (d) disabled/never worked/something else.

**Education status.** Respondents were categorized into four education categories: (a) less than high school; (b) completed high school or GED; (c) some college or technical or vocational school and (d) completed 4-year college or higher (reference group).

#### 4. Statistical analyses

To take into account the multistage, multi-cluster design used in the HABLAS sampling frame, all analyses were conducted with the Software for Survey Data Analysis (SUDAAN) (Research Triangle Institute, 2005). Analyses were conducted on data weighted to correct for unequal probabilities of selection into the sample. In addition, a post-stratification weight was applied, which corrects for non-response and adjusts the sample to known Hispanic population distributions on certain demographic variables (education, age and gender for all sites; plus ethnicity for the Miami, New York and Philadelphia samples).

Bivariate analyses included Chi-square, *t*-tests, and *F*-tests to detect statistically significant associations between dependent and independent variables. Logistic regression models were developed using SUDAAN first using the singly imputed income variable. Once the tentative decision on variables to include in the models was reached, the analysis was repeated using the mul-

tiply imputed data and results were combined using SAS PROC MIANALYZE. Odds ratios and 95% confidence intervals for odds ratios were calculated by hand from the logistic regression coefficients and their confidence intervals. These were almost identical to the results of analyses using singly imputed data, so there was no need to reconsider the choice of models.

## 5. Results

### 5.1. DUI and DUI arrest rates

Among men, rates of driving after having drunk too much (DUI) range from 17.3% to 6.2%. The rate is highest among Mexican Americans, followed by South/Central Americans, then by Puerto Ricans and Cuban Americans (Table 1). Rates for 12-month DUI arrest are similar across national groups. Rates for lifetime arrest are also highest among Mexican American men, followed by South/Central Americans, Puerto Ricans and Cuban Americans. These differences across national groups are statistically significant.

Women report rates that are lower than those for men. DUI is highest among Mexican American women, followed by Puerto Ricans, followed by South/Central Americans and Cuban Americans. However, these differences are not statistically significant. Rates for 12-month and lifetime DUI arrest among women are low and are not statistically different across national groups.

### 5.2. Selected drinking indicators and DSM-IV alcohol abuse and dependence among drinkers with and without DUI-related events

Because of the small number of women who report DUI (the largest *n* is 18 among Mexican Americans), the analysis in Table 2 is presented for both genders together. Also, because all of those who report DUI or DUI arrest are automatically alcohol abusers, this diagnosis is not considered in this analysis. A little over a half to two thirds of those who report DUI also report binge drinking in the past 12 months. However, dif-

Table 1  
Rates of 12-month and lifetime DUI among Hispanic national groups by gender

	Puerto Rican % (n)	Cuban American % (n)	Mexican American % (n)	South/Central American % (n)	Significance
<b>Male</b>					
DUI past 12 months <sup>a</sup>	7.8 (428)	6.2 (411)	17.3 (383)	14.5 (420)	**
DUI arrest past 12 months <sup>a</sup>	0.8 (453)	0.1 (427)	1.6 (442)	0.3 (442)	
Lifetime DUI arrest <sup>b</sup>	3.9 (483)	2.0 (457)	10.9 (466)	5.6 (479)	***
<b>Female</b>					
DUI past 12 months <sup>a</sup>	1.9 (268)	1.1 (232)	7.5 (213)	1.8 (285)	
DUI arrest past 12 months <sup>a</sup>	0.0 (271)	0.0 (233)	1.0 (218)	0.3 (287)	
Lifetime DUI arrest <sup>b</sup>	0.8 (341)	0.3 (269)	1.8 (269)	0.2 (343)	

Note: Numbers in parenthesis are denominators and the percentages are weighted.

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

<sup>a</sup> Includes only current drinkers.

<sup>b</sup> Includes current drinkers and ex-drinkers.

Table 2  
Selected drinking and alcohol disorder indicators among drinkers who report and who do not report DUI by Hispanic national group

	Puerto Rican % (n)	Cuban American % (n)	Mexican American % (n)	South/Central American % (n)	Significance
Drove under the influence					
Binged in past 12 months	70.0 (53)	63.4 (28)	59.7 (101)	64.5 (62)	
Alcohol dependence	27.5 (52)	46.6 (28)	27.1 (98)	19.1 (62)	
Mean no. of drinks consumed per week <sup>a</sup>	26.5 ± 6.1	26.6 ± 5.6	22.3 ± 3.7	16.7 ± 2.6	
Mean no. of drinks can consume before driving is impaired <sup>a</sup>	3.2 ± 0.6	4.8 ± 1.1	3.0 ± 0.3	3.5 ± 0.5	*
Did not drive under the influence					
Binged in past 12 months	48.4 (642)	23.7 (614)	35.2 (510)	34.2 (647)	***
Alcohol dependence	18.5 (644)	4.1 (615)	14.1 (511)	7.2 (639)	***
Mean no. of drinks consumed per week <sup>a,b</sup>	12.5 ± 1.3	5.2 ± 0.7	8.8 ± 1.1	5.8 ± 0.5	***
Mean no. of drinks can consume before driving is impaired <sup>a,c</sup>	2.8 ± 0.1	1.7 ± 0.1	2.4 ± 0.1	2.0 ± 0.1	***

Note: Numbers in parenthesis are denominators and the percentages are weighted.

\*  $p < 0.05$ .

\*\*\*  $p < 0.001$ .

<sup>a</sup> Continuous variable; significance noted for  $F$ -test.

<sup>b</sup> Paired  $t$ -test significant between all groups except Cuban American and South/Central American.

<sup>c</sup> Paired  $t$ -test significant between all groups.

ferences across national groups are not statistically significant. The prevalence of alcohol dependence is high in all national groups among those who report DUI, varying from almost half among Cuban Americans to a fifth of the South/Central Americans. But these differences across national groups too are not statistically significant. Regarding the mean number of drinks consumed per week, Puerto Ricans and Cuban Americans have the highest means, followed closely by Mexican Americans and then South/Central Americans. Finally, although the mean number of drinks respondents think can be consumed before driving is impaired is not high, it is a number high enough that some individuals would be impaired or over the legal limit. The mean ranges from 3.0 (Mexican Americans) to 4.8 (Cuban Americans).

Not surprisingly, all drinking indicators in Table 2 and the prevalence of alcohol dependence are much lower among drinkers who do not report DUI-related events than among those who report these events, independently of national group. For instance, among Puerto Ricans, the proportion of those who report binge drinking in the past 12 months drops from two thirds to about half of the group. The same happens in the other national groups, so that rates of binge in the past 12 months among those without DUI events are about half of those with DUI events. Rates of alcohol dependence are also lower across all national groups, but especially lower among Cuban Americans. In this group the rate of dependence among those reporting DUI is 11 times higher than among those without DUI. Differences in mean number of drinks consumed per week between those with and without DUI are also substantial, dropping by as much as 20 drinks among Cuban Americans. The differences in means across national groups for those without DUI events are statistically significant, with Puerto Ricans having the highest mean, followed by Mexican Americans, South/Central Americans and Cuban Americans. Finally, the number of drinks respondents think can be consumed before driving is impaired is also lower among drinkers without DUI events than among those with DUI events. However, while differences in means across those with

DUI events were not statistically significant, they are significant across those without DUI events, ranging from a low of 1.7 drinks among Cuban Americans to a high of three drinks among Puerto Ricans.

### 5.3. Total number of DUI-related events, alcohol abuse and dependence

Results in Table 2 indicate that not all of those who report a DUI event are alcohol dependent. As an illustration, among Puerto Ricans, 27.5% are dependent, which means that 72.5% of the Puerto Ricans reporting a DUI event are not dependent. However, the rate in Table 2 does not take into consideration the frequency with which those who are dependent or not engaged in DUI. If those who are dependent engage in DUI more frequently than others, this groups of drinkers could be responsible for a majority of DUI events in each Hispanic group.

When data on the frequency of engaging in DUI (whether resulting in an arrest or not) in the past 12 months are analyzed by Hispanic national group (results not presented in tables), a substantial proportion of DUI events are not associated with alcohol dependent drinkers. Specifically, the proportion of all DUI events reported by drinkers who are not dependent is 50% among Puerto Ricans, 61% among Cuban Americans, 66% among Mexican Americans and 65% among South/Central Americans.

### 5.4. Sociodemographic and drinking-related predictors of DUI, past 12-month DUI arrest and lifetime DUI arrest

In general, DUI is more likely to happen among males, among Mexican Americans and South/Central Americans compared to Cuban Americans; among those with higher income and among those who have higher alcohol consumption (Table 3). DUI is less likely to happen among those who are older. A DUI arrest in the past 12 months is more likely to happen among Mexican Americans compared to Cuban Americans, and less likely

Table 3  
Adjusted odds ratios (OR) and 95% confidence intervals (CI) from multiple logistic regression of DUI, past 12-month DUI arrest and lifetime DUI arrest on selected sociodemographic and drinking-related variables

	DUI past 12 months <sup>b</sup> (n = 2587)		DUI arrest past 12 months <sup>b</sup> (n = 2716)		Lifetime DUI arrest <sup>c</sup> (n = 3046)	
	OR	95% CI	OR	95% CI	OR	95% CI
Male (ref: female)	3.29 <sup>***</sup>	1.89–5.73	1.31	0.27–6.28	5.77 <sup>***</sup>	2.89–11.51
Age (5 years) <sup>a</sup>	0.88 <sup>**</sup>	0.81–0.95	1.13	0.86–1.48	1.22 <sup>***</sup>	1.11–1.34
Hispanic subgroup (ref: Cuban American)						
Puerto Rican	1.11	0.55–2.23	3.35	0.52–21.72	2.26 <sup>*</sup>	1.07–4.75
Mexican American	3.16 <sup>**</sup>	1.60–6.23	17.34 <sup>***</sup>	3.39–88.73	7.14 <sup>***</sup>	3.23–15.78
South/Central American	2.22 <sup>*</sup>	1.20–4.09	4.36	0.53–35.69	4.04 <sup>**</sup>	1.70–9.59
Marital status (ref: married/living with spouse/living with someone)						
Married not living with spouse/legally separated/divorced/widowed	1.71	0.88–3.33	1.99	0.38–10.46	1.72	0.94–3.15
Never married/never lived with someone	1.16	0.69–1.95	0.35	0.06–1.95	0.57	0.30–1.10
Education level (ref: 4-year college degree, graduate/professional school)						
<High school	1.18	0.51–2.75	2.37	0.30–18.43	3.59 <sup>*</sup>	1.33–9.68
HS diploma/GED	1.03	0.46–2.33	0.15 <sup>***</sup>	0.05–0.44	1.97	0.70–5.55
Some college, technical/vocational school	1.53	0.68–3.44	1.01	0.13–7.92	1.61	0.54–4.84
Employment status (ref: full/part-time employment)						
Unemployed: temporary illness/unemployed, looking/unemployed, not looking/in school	0.42	0.17–1.03	1.25	0.17–9.37	0.55	0.23–1.33
Retired/homemaker	0.40	0.15–1.11	0.07 <sup>*</sup>	0.01–0.73	0.35	0.11–1.14
Disabled/never worked/something else	0.64	0.20–2.01	0.85	0.13–5.46	1.05	0.50–2.21
Income <sup>a</sup>	1.01 <sup>***</sup>	1.01–1.02	1.01	1.00–1.03	1.01	1.00–1.02
Average number of drinks per week (5 drinks) <sup>a</sup>	1.10 <sup>***</sup>	1.05–1.15	1.04	0.96–1.13	1.07 <sup>**</sup>	1.02–1.12
Alcohol disorders (ref: abusers/no diagnosis)						
Dependence	1.73	1.00–3.01	1.35	0.34–5.34	1.47	0.68–3.18
	<i>R</i> -square	9.0%		3.9%		5.7%

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

<sup>a</sup> Continuous variable.

<sup>b</sup> Logistic regression model includes current drinkers only.

<sup>c</sup> Logistic regression model includes current drinkers and ex-drinkers.

to happen among those with a high school diploma and among those who are retired or homemakers. A lifetime DUI arrest is more likely to happen among males, among those who are older, among Puerto Ricans, Mexican Americans or South/Central Americans compared to Cuban Americans, among those with less than high school education, and among those with higher alcohol consumption.

### 5.5. Report of stops by police and drinking-related indicators

There are few differences in drinking-related indicators between drivers who report and who do not report being stopped by police when driving a car in the past 12 months (Table 4). Among Puerto Ricans and South/Central Americans, drivers who reported being stopped by police have a DUI rate 5 times and 2 times higher, respectively, than those who were not stopped by police. Among Cuban Americans and Mexican Americans there are no differences in drinking-related indicators between drivers who were stopped and those who were not stopped by police.

The effect of DUI on police stops can be confounded by factors such as gender and age. Logistic regression analysis

was thus conducted to assess the independent effect of DUI on police stops controlling for the effect of gender, age and all other predictors in Table 3. The dependent variable is a dichotomy: stopped, not stopped by police. Being a male (OR = 2.19, 95% CI = 1.59–3.00,  $p < .001$ ) and reporting DUI (OR = 1.65, 95% CI = 1.07–2.54,  $p < .01$ ) were significant factors of risk for being stopped by the police. Having less than high school education was a protective factor (OR = 0.46, 95% CI = 1.07–2.54,  $p < .01$ ). Hispanic national group is not associated with the likelihood of being stopped by police when driving.

## 6. Discussion

Results indicate that Hispanic national groups are diverse in regards to DUI rates, DUI arrest rates and selected alcohol-related indicators. This supports the contention put forward by many that grouping of Hispanics from different national origins in a large U.S. Hispanic group for research purposes may be misleading. Such grouping will inevitably fail to identify specific national groups with higher prevalence of particular behaviors, which may be important for targeting policy or prevention efforts.

**Table 4**  
Selected alcohol variables among past 12-month drivers who have and have not reported ever being stopped by police when driving among Hispanic national groups

	Puerto Rican stopped by police			Cuban American stopped by police			Mexican American stopped by police			South/Central American stopped by police		
	Yes	No	Significance	Yes	No	Significance	Yes	No	Significance	Yes	No	Significance
Mean number of drinks per week <sup>a</sup>	(n = 273) 9.2 ± 2.0	(n = 345) 6.9 ± 0.9		(n = 305) 4.4 ± 0.8	(n = 649) 3.3 ± 0.6		(n = 366) 7.6 ± 1.5	(n = 498) 6.2 ± 1.0		(n = 307) 5.0 ± 0.7	(n = 462) 4.3 ± 0.5	
Binged in past 12 months	(n = 274) 25.7	(n = 343) 33.6		(n = 307) 19.2	(n = 647) 14.3		(n = 363) 27.3	(n = 502) 22.6		(n = 306) 22.8	(n = 462) 22.2	
Alcohol disorders	(n = 274) 10.1	(n = 344) 9.3		(n = 306) 4.5	(n = 649) 2.9		(n = 362) 10.3	(n = 499) 9.3		(n = 306) 5.2	(n = 459) 5.6	
Alcohol dependence	15.4	3.5		2.9	0.7		5.5	3.1		4.0	1.7	
Alcohol abuse	15.4	3.5		2.9	0.7		5.5	3.1		4.0	1.7	
DUI past 12 months <sup>b</sup>	(n = 145) 19.3	(n = 225) 4.3	**	(n = 186) 7.0	(n = 360) 3.1		(n = 166) 18.5	(n = 288) 16.3		(n = 177) 20.5	(n = 291) 9.3	*

Note: Numbers in parenthesis are denominators within the Hispanic subgroup and percentages are weighted.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

<sup>a</sup> Continuous variable.

<sup>b</sup> Excludes any DUI arrests (lifetime and past 12 months).

More specifically, the present analysis shows that Mexican Americans in particular, but also South/Central Americans, report higher rates of DUI and DUI arrest than other Hispanic national groups. Regarding Mexican Americans, this result is not surprising. Previous studies show that Mexican Americans have higher rates of drinking and of frequent heavy drinking (Caetano, 1988a; Caetano and Galvan, 2001), higher mean frequency of drinking and a higher mean frequency of drinking five or more drinks (binge) on the same occasion (Dawson, 1998; Marin and Posner, 1995) than other Hispanic national groups. Further, Mexican Americans and South/Central Americans also report more alcohol-related problems than Cuban Americans and Puerto Ricans (Caetano, 1988b; Caetano and Galvan, 2001). However, DUI rates for all groups in the data under analysis are higher than those for Hispanics in other surveys, with exception of the 2000 National Household Survey on Drug Use and Health. In this latter survey, the 12-month DUI rate for Hispanic men and women was 16.8% and 6.7%, respectively (Caetano and McGrath, 2005). These rates are comparable to those reported by Puerto Ricans and South/Central Americans herein. Data from the NESARC show lower rates of 3.3% for Hispanic men and of 0.9% for Hispanic women (Chou et al., 2006; Chou et al., 2005).

As expected, drinkers who reported DUI in the past 12 months were heavier drinkers than those who did not report such an event. This is independent of Hispanic nationality. For instance, rates of alcohol dependence were 11 (Cuban Americans) to 2 times higher (Mexican Americans) among drivers who reported DUI than among other drivers. However, the rate of alcohol dependence is considerably higher among Cuban Americans who report DUI compared to other groups. This may be a sample inaccuracy given that only 28 drivers are in the Cuban American group reporting DUI in Table 2. Rates of alcohol dependence among Hispanics in the U.S. population are considerably lower than the rates among these drivers who report DUI. Alcohol dependence rates in the NLAES and the NESARC among Hispanics were 2.5% and 3.9%, respectively (Grant et al., 2004). Differences in these rates are partially explained by the fact that in the NLAES and the NESARC the rates are for the whole population 18 years of age and older, while in this paper rates are for a younger group of drivers who drink. Still, even the rates for the 18–29 age group in NLAES and NESARC (3.7% and 6.3%) are considerably lower than those in this paper (Grant et al., 2004).

In spite of the high prevalence of alcohol dependence among those reporting DUI, these individuals are still a minority in this group. Further, these individuals are also responsible for a minority of all incidents of 12-month DUI and 12-month DUI arrest. This has an important policy implication regarding the prevention of DUI among Hispanics. It indicates that DUI prevention policies should not be directed only to the small group of drinkers who are dependent because this will leave out non-dependent drinkers, who are responsible for the majority of DUI incidents in Hispanic communities.

The mean number of drinks that subjects think they can consume before becoming impaired is similar across national groups. These means varied between two and five (Table 2), and

with the exception of the reference to five drinks, may not actually lead to legal impairment or a BAC above .08 (two to three drinks). These means are lower than those reported in previous papers. For instance, the means in data reported by Hispanics in the 1995 National Alcohol Survey varied between six and eight drinks (Caetano and Clark, 2000). The means reported by Mexican Americans with and without a history of DUI in California varied between eight and ten drinks (Ferguson et al., 2002). It would be a welcome development if the lower means being reported here indicate a real shift in Hispanics' perception of the impairing properties of alcohol.

The sociodemographic and alcohol-related correlates of DUI and DUI arrest confirm the diversity that exists across different Hispanic national groups. Risk levels vary, but in general the results show that Mexican Americans, followed by South/Central Americans, followed by Puerto Ricans are more likely than Cuban Americans to engage in DUI and report a 12-month or a lifetime DUI arrest. These results also confirm previous findings in the literature indicating that males, independent of ethnicity, those who are younger, those with less than high school education, those who are never married or separated/divorced, those who have higher alcohol consumption or binge and those with an alcohol use disorder are more likely to report DUI or 12-month DUI arrest (Caetano and McGrath, 2005; Chou et al., 2006). Age has a different association with DUI, 12-month DUI arrest and lifetime DUI arrest. It predicts DUI, so that younger individuals are more at risk than those who are older. It also predicts lifetime arrest, only that in this case older individuals have higher odds of being arrested than younger ones. This latter result may just reflect that fact that older drivers have been driving, and maybe drinking, for a longer time than younger drivers, which then leads to a higher probability of arrest.

As high as some of the odds ratios in the analysis may be, these variables altogether do not have a high predictive power regarding the DUI events under analysis. The logistic regression for 12-month and lifetime DUI arrest explain only 4% and 6% of the variance in these outcomes, respectively. Two explanations are possible for the low predictive power in these results: first, variables with potential predictive power on the likelihood of apprehension for DUI such as, for instance, the place of arrest, the geographical relation of the place of arrest to local bars, are not considered. Second, given that the probability of arrest for DUI reported in the literature is low, 1 in 800 (Zador et al., 2000), it is possible that these arrests are difficult to predict. That is, they would happen in a random way, or perhaps in ways not well connected with characteristics of the individual being arrested. The predictive power of the logistic regression for DUI without arrest (9%) is similar to other survey results in the literature (Caetano and McGrath, 2005).

This difficulty in predicting DUI arrest is also reflected in the data comparing drivers who were and who were not stopped by police when driving. There are relatively few differences between these drivers. DUI is more common among drivers who had been stopped but only among Puerto Ricans and South/Central Americans. It is difficult to explain this difference across Hispanic national groups. It is possible that this may be

due to police patterns of traffic law enforcement in areas where these two national groups are. As described in Section 2, most respondents in each national group were interviewed in one of the particular metropolitan areas in the study (e.g., Cuban Americans in Miami). Different patterns of law enforcement could lead to these differences in DUI rates between drivers who have and who have not been stopped by police. In fact different patterns of law enforcement could also explain other results herein. For instance, if police in Miami is more lenient than police in Houston and Los Angeles, this could explain all or part of the difference in DUI rates between Cuban Americans (low) and Mexican Americans (high). Male gender and reporting DUI are also associated with the likelihood of being stopped. This is probably explained by the fact that males and those who report DUI have a driving pattern that includes higher speed and more risk taking, which attracts police attention and leads to stops. This is important to keep in mind because given that these drivers have not been arrested to DUI, in spite of reporting it, what caused the reported stop by police was possibly a non-DUI related traffic violation.

In conclusion, DUI, DUI arrests and drinking-related characteristics vary across Hispanic national groups. For reasons not entirely understood, Mexican Americans and South/Central Americans in the U.S. have higher rates of DUI than Puerto Ricans and Cuban Americans. These differences are not due to variations in the gender, age and socioeconomic characteristic of these populations. Future research on DUI among Hispanics should try to incorporate other potentially explanatory variables such as locale of arrest, patterns of DUI enforcement for local police, reasons for being stopped by police, relationship between locale of arrest and bars in different Hispanic communities. When together with the individual level variables used herein, these variables assessing aspects of the local environment may help expand understanding of DUI above and beyond knowledge based on individual characteristics.

### 6.1. Strengths and limitations

This study has several strengths. It collected comprehensive information on alcohol consumption, alcohol use disorders and DUI-related events from representative samples of Hispanic national groups in five large metropolitan areas in the U.S. Face to face interviews were conducted in English or Spanish, allowing thus for the selection of respondents who were not English-speakers and for the collection of detailed data on a variety of areas. The survey also achieved a high response rate. The design also has limitations. About a quarter of the selected respondents refused to be interviewed. The data under analysis are cross-sectional in nature, and do not allow for considerations of time order in the analyses. Respondents may have under-reported some of the behaviors under analysis. For instance, there is evidence that self-reported alcohol consumption in surveys does not cover all the alcohol sold in the U.S. according to sales statistics (Midanik, 1982, 1988; Pernanen, 1974; Rogers and Greenfield, 1999). This coverage has been estimated to range between one half and two-thirds of all the alcohol consumed (Pernanen, 1974). There is no evidence that reports of DUI are

affected in the same way. However, as a deviant behavior the possibility of under-reporting by survey respondents must be considered. If under-reporting is higher in a particular group than in others, this could affect the relationships discussed in this study.

### Acknowledgement

Work on this paper was supported by a grant (RO1-AA013642) from the National Institute on Alcohol Abuse and Alcoholism to the University of Texas School of Public Health.

### References

- American Psychiatric Association, 1994. Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), 4th ed. American Psychiatric Association, Washington, DC.
- Caetano, R., 1984. A note on arrest statistics for alcohol-related offenses. *Drink. Drug Pract. Surv.* 19, 12–17.
- Caetano, R., 1988a. Alcohol use among Hispanic groups in the United States. *Am. J. Drug Alcohol Abuse* 14 (3), 293–308.
- Caetano, R., 1988b. A comparative analysis of drinking among U.S. Hispanics in Madrid and Mexico. [NIAAA Research Monograph 19]. In: Harford, T., Towle, L. (Eds.), *Cultural Influences and Drinking Patterns: A Focus on Hispanic and Japanese Populations*. GPO, Washington, DC, pp. 273–311.
- Caetano, R., Clark, C.L., 2000. Hispanics, Blacks and Whites driving under the influence of alcohol: results from the 1995 National Alcohol Survey. *Acc. Anal. Prev.* 32 (1), 57–64.
- Caetano, R., Galvan, F., 2001. Alcohol use and alcohol-related problems among Latinos in the United States. In: Aguirre-Molina, M., Molina, C., Zambrano, R.E. (Eds.), *Health Issues in the Latino Community*. Jossey-Bass, San Francisco, pp. 383–412.
- Caetano, R., McGrath, C., 2005. Driving under the influence (DUI) among U.S. ethnic groups. *Acc. Anal. Prev.* 37 (2), 217–224.
- Caetano, R., Schafer, J., Clark, C.L., Cunradi, C.B., Raspberry, K., 2000. Intimate partner violence, acculturation and alcohol consumption among Hispanic couples in the United States. *J. Interpers. Violence* 15 (1), 30–45.
- Chang, I., Lapham, S.C., Barton, K.J., 1996. Drinking environment and sociodemographic factors among DWI offenders. *J. Stud. Alcohol* 57 (6), 659–669.
- Chou, S.P., Dawson, D.A., Stinson, F.S., Huang, B.J., Pickering, R.P., Zhou, Y., et al., 2006. The prevalence of drinking and driving in the United States, 2001–2002: results from the National Epidemiological Survey on Alcohol and Related Conditions. *Drug Alcohol Depend.* 83 (2), 137–146.
- Chou, S.P., Grant, B.F., Dawson, D.A., Stinson, F.S., Saha, T., Pickering, R.P., 2005. Twelve-month prevalence and changes in driving after drinking: United States, 1991–1992 and 2001–2002. *Drug Alcohol Depend.* 80 (2), 223–230.
- Dawson, D.A., 1998. Beyond black, white, and Hispanic: race, ethnic origin and drinking patterns in the United States. *J. Subst. Abuse* 10 (4), 321–339.
- Ferguson, S.A., Burns, M.M., Fiorentino, D., Williams, A.F., Garcia, J., 2002. Drinking and driving among Mexican American and non-Hispanic white males in Long Beach, California. *Acc. Anal. Prev.* 34, 429–437.
- Grant, B.F., Dawson, D.A., Stinson, F.S., Chou, S.P., Dufour, M.C., Pickering, R.P., 2004. The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991–1992 and 2001–2002. *Drug Alcohol Depend.* 74 (3), 223–234.
- Hilton, J., 2006. Race and ethnicity: factors in fatal motor vehicle traffic crashes 1999–2004 (No. DOT HS 809 956). U.S. National Highway Traffic Safety Administration, Washington, DC.
- Lapham, S.C., Skipper, B.J., Chang, I., Barton, K., Kennedy, R., 1998. Factors related to miles driven between drinking and arrest locations among convicted drunk drivers. *Acc. Anal. Prev.* 30 (2), 201–206.
- Marin, G., Posner, S.F., 1995. The role of gender and acculturation in determining the consumption of alcoholic beverages among Mexican Americans and Central Americans in the United States. *Int. J. Addict.* 30 (7), 779–794.
- Midanik, L.T., 1982. Over-reports of recent alcohol consumption in a clinical population: a validity study. *Drug Alcohol Depend.* 9 (2), 101–110.
- Midanik, L.T., 1988. Validity of self-reported alcohol use: a literature review and assessment. *Br. J. Addict.* 83, 1019–1029.
- Padilla, A.M., Morrissey, L., 1993. Place of last drink by repeat DUI offenders: a retrospective study of gender and ethnic group differences. *Hispanic J. Behav. Sci.* 15 (3), 357–372.
- Peranen, K., 1974. Validity of survey data on alcohol use. In: Gibbins, R.J., Kalant, H., Schmidt, W., Popham, R.E., Smart, R.G. (Eds.), *Research Advances in Alcohol and Drug Problems*, vol. 1. John Wiley and Sons, New York, pp. 355–374.
- Perrine, M.W., Peck, R.C., Fell, J.C., 1989. Epidemiologic perspectives on drunk driving. In: Surgeon General's Workshop on Drunk Driving: Background Papers. U.S. Department of Health and Human Services, Washington, DC, pp. 35–76.
- Posner, S.F., Marin, G., 1996. Expectancies for driving under the influence of alcohol among Hispanics and non-Hispanic Whites. *Subst. Use Misuse* 31 (4), 409–421.
- Research Triangle Institute, 2005. Software for Survey Data Analysis (SUDAAN), Release 9.01, Research Triangle Institute, Research Triangle Park, NC.
- Rogers, J.D., Greenfield, T.K., 1999. Beer drinking accounts for most of the hazardous alcohol consumption reported in the U.S. *J. Stud. Alcohol* 60 (6), 732–739.
- Ross, H.L., Howard, J.M., Ganikos, M.L., Taylor, E.D., 1991. Drunk driving among American Blacks and Hispanics. *Acc. Anal. Prev.* 23 (1), 1–11.
- Royal, D., 2003. Volume I: Summary Report; National Survey of Drinking and Driving Attitudes and Behavior: 2001 (No. DOT HS 809 549). U.S. National Highway Traffic Safety Administration, Washington, DC.
- Schafer, J.L., 1997. *Analysis of Incomplete Multivariate Data*. Chapman & Hall, London.
- Tashima, H.N., Daoud, S.O., 2007. Annual Report of the California DUI Management Information System (No. CAL-DMV-RSS-07-222). California Department of Motor Vehicles, Research and Development Section, Sacramento, CA.
- Tippets, S., Voas, R.B., 1999, February. Ethnicity and alcohol-related traffic fatalities: 1990 to 1994. Paper presented at the Mothers Against Drunk Driving National Diversity Forum, Miami, FL.
- U.S. National Highway Traffic Safety Administration [NHTSA], 2006. Traffic Safety Facts 2005: Alcohol (No. DOT HS 810 616). U.S. Department of Transportation, Washington, DC.
- Voas, R.B., Wells, J., Lestina, D., Williams, A.F., Greene, M., 1998. Drinking and driving in the United States: The 1996 National Roadside Survey. *Acc. Anal. Prev.* 30 (2), 267–275.
- Yi, H., Chen, C.M., Williams, G. D., 2006. Trends in Alcohol-related Fatal Traffic Crashes, United States, 1982–2004 (Surveillance Report No. 76). National Institute on Alcohol Abuse and Alcoholism, Division of Epidemiology and Prevention Research, Bethesda, MD.
- Zador, P.L., Krawchuck, S.A., Moore, B., 2000. Drinking and Driving Trips, Stops by Police, and Arrests: Analyzes of the 1995 National Survey of Drinking and Driving Attitudes and Behavior (No. DOT HS 809 184). U.S. National Highway Traffic Safety Administration, Washington, DC.