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Drinking and Driving in Puerto Rico

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Abstract

Background: Epidemiological information is lacking for driving under the influence of alcohol (DUI) in Puerto Rico.

Objectives: To examine the prevalence and correlates of DUI in Puerto Rico.

Methods: Data are from a household sample of 1510 individuals, aged 18–64 years in San Juan, Puerto Rico. The response rate was 83%.

Results: The rate of 12 month self-reported DUI was 20% among men and 8% among women ($p < .001$). Twelve month DUI arrests were reported by 0.1% of men and 0.2% of women (p : ns) while lifetime arrests were reported by 6% of men and 0.7% of women ($p < .001$). Adjusted analyses showed that the number of hours of daily driving (OR=1.08, 95% CI=1.01–1.17; $p < .05$), male gender (OR=1.66, 95% CI=1.07–2.58; $p < .01$), having more liberal drinking norms (OR=4.81; 95% CI=2.61–8.84; $p < .01$) and more positive attitudes towards drinking (OR=4.58; 95% CI=1.28–16.31; $p < .01$), consuming a higher number of weekly drinks (OR=1.05; 95% CI: 1.03–1.07; $p < .001$), and binge drinking (OR=2.60; 95% CI=1.62–4.16; $p < .001$) were factors of risk for self-reporting DUI. A lifetime arrest was associated with being separated or divorced (OR=2.7; 95% CI=1.04–7.36; $p < .05$), male gender (OR=5.25; 95% CI=1.93–14.26; $p < .001$), more liberal drinking norms (OR=6.97; 95% CI=2.37–20.48; $p < .001$), and illicit drug use (OR=2.82; 95% CI=1.25–6.35; $p < .001$).

Conclusions: The prevalence of self-reported DUI in San Juan, Puerto Rico was high, but the proportion of people arrested for DUI in a span of 12 months or during their lifetime was low. Stricter enforcement of DUI laws may be necessary to minimize DUI in urban Puerto Rico.

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Keywords

drinking and driving; DUI; Puerto Rico; epidemiology; correlates

1. Introduction

Data from national roadside surveys show that driving under the influence of alcohol (DUI) is declining in the U.S. population. For instance, the proportion of weekend nighttime drivers with a blood alcohol content (BAC) of .08 g/dL or higher decreased from 7.5% in 1973 to 1.5% in 2013–2014 (Berning, Compton, & Wochinger, 2015). Unfortunately, these trend data are not available for Puerto Rico; but DUI arrest data are available. In 2012, the last year for which data for Puerto Rico are available, the DUI arrest rate was 221.6/100,000 population (Puerto Rico Traffic Safety Commission, 2014). In the U.S., in this same year, the arrest rate was 406.4/100,000, almost two times higher than the rate in Puerto Rico (Puerto Rico Traffic Safety Commission, 2014).

However, arrest rates are not ideal indicators of DUI rates in a population. These rates are influenced by existing DUI laws, the extent to which police enforce the laws and driving and drinking behavior in the population. There is some similarity between DUI-related laws in Puerto Rico and the U.S. mainland, but there are also differences. For example, the legal drinking age in Puerto Rico is 18, and for those 18–20 years of age, BAC levels must be lower than .02 g/dL. In contrast, on the U.S. mainland, the legal drinking age is 21, and for 18–20-year-old drivers, the BAC must be zero.

Given the importance of DUI as a public health problem, the lack of updated information about DUI rates in Puerto Rico is surprising and unfortunate. Puerto Rico has received little attention from the U.S. federal government regarding research on the effects of substance use. The island has not been part of the sample in SAMHSA's National Survey on Drug Use and Health, nor of the NIAAA's four national surveys conducted in 1992 (National Longitudinal Alcohol Epidemiologic Survey - NLAES), and 2002/2003, 2005/2006, 2012/2013 (National Epidemiologic Study of Alcohol Related Conditions – NESARC I, II and III). Puerto Rico participates in the CDC's Behavioral Risk Factor Surveillance System (BRFSS), but the special questionnaire module that covers drinking and driving apparently has not been used there.

To address this lack of information on DUI on the island, this paper examines 12-month rates of self-reported DUI without an arrest (hereafter, self-reported DUI), self-reported 12-month DUI arrest rates (hereafter, DUI arrest), and self-reported lifetime DUI arrest rates (hereafter, lifetime DUI arrest) in San Juan, Puerto Rico. In addition, this paper examines selected alcohol-related data for drinkers who reported DUI compared to those who did not report such events. Sociodemographic and drinking-related correlates of DUI and lifetime DUI arrests are identified. Attitudes about DUI as a problem and knowledge of DUI laws are also examined.

Given the foci of the analyses, the hypotheses to be tested are as follows: Regarding attitudes and knowledge of DUI laws, those who self-report DUI will be less likely to see DUI as a

problem, and their knowledge of DUI laws will be lower than those not self-reporting DUI. Regarding sociodemographic correlates of DUI, a higher number of hours of driving/day, male gender, younger age, more liberal drinking norms, more positive attitudes about drinking, illicit drug use, and lower income will be positively related to both self-reported DUI without an arrest and lifetime arrest for DUI; unemployment and non-participation in the workforce will be protective against DUI (Caetano, Ramisetty-Mikler, & Rodriguez, 2008a, 2008b; Caetano, Vaeth, & Mills, 2013). Understanding general attitudes toward DUI and assessing population knowledge about this behavior allows public policy officials to know whether this problem is recognized as such and whether the community is receptive to public policies to address DUI. This also provides information about whether community members think that engaging in DUI is a serious threat to themselves and the community. Identifying sociodemographic correlates of DUI assists in targeting DUI-related prevention and intervention efforts to population subgroups who are at risk of engaging in this behavior. This may lead to more effective prevention efforts in San Juan, and perhaps Puerto Rico as a whole.

2. Methods

2.1 Sample and Procedure

Interviews were conducted with 1,510 residents of the metropolitan area of San Juan between May 2013 and October 2014. San Juan was selected as the area for interviews because it is the capital of Puerto Rico and the largest city on the island. Because San Juan is a dense urban area, household sampling in the area would thus involve less interviewer travel, which served to contain expenses. Respondent selection followed a multistage cluster sampling procedure, with 220 Primary Sampling Units represented by Census Block Groups. Each selected Block was divided into segments of 10 households, with a segment then randomly selected in each Block.

All households in the selected segment were screened by trained interviewers who listed all eligible household members in a pre-prepared interview list form (Kish table) (Kish, 1949). Eligibility to participate in the survey was based on age (18–64 years), ability to speak Spanish, no incapacitating cognitive impairment, and self-identification as Puerto Rican. A total of 2,952 subjects were approached to complete the screening; 658 subjects did not meet the eligibility criteria for age, nationality, and/or medical condition, 165 potential participants refused to be screened and 317 subjects could not be located after 6 or more attempts. This left 1812 potential participants to be interviewed. Interviews were then carried out with a household member randomly selected from the list using the Kish table. The response rate for the survey was 83% (1510/1812).

Face-to-face Computer Assisted Personal Interviews (CAPI) were conducted by trained interviewers at the respondents' homes. Interviews lasted about 1 hour. The pre-programmed questionnaire was originally developed in Spanish by the fieldwork research team led by the Puerto Rican and U.S. Principal Investigators (GC, RC), both Spanish-speaking. Interviewers were hired and underwent a 3-day training by the Puerto Rican PI (GC), who directs the field work agency, the Behavioral Sciences Research Institute of the University of Puerto Rico. Respondents received a \$25 incentive for participation and provided written

informed consent. The survey was approved by the Committee for the Protection of Human Subjects of the authors' universities.

2.2 Measurements

2.2.1 Self-reported DUI: This was assessed for all respondents who had driven a car in the previous year and who were current drinkers (i.e., those respondents who reported having consumed at least one drink of alcohol in the past 12 months). A drink was defined as a 5-ounce glass of wine, a 12 ounce can of beer, and a 1.5 ounce shot of spirits. These respondents 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?" Based on their response, respondents were classified as "no" or "yes". Respondents who answered affirmatively were then asked to specify how many times that had happened in the previous 12 months. These are self-reported DUI events that did not result in an arrest. Previous papers that used the same question to assess self-reported DUI are, for example, Caetano et al. (2008c), Caetano et al. (2008b), Caetano et al. (2013), Caetano and Raspberry (2001).

2.2.2 Twelve-month and lifetime self-reported arrests for DUI: Respondents were asked if they had ever been arrested for driving after drinking. Those who responded affirmatively were next asked the number of times that had occurred in their lifetime and the number of times that had occurred in the previous 12 months. These events are identified in the text as DUI arrests.

2.2.3 Number of drinks one can consume before driving is impaired: All respondents, independent of whether they self-reported a DUI event or an arrest for DUI, were asked to report on how many drinks they think they could consume over a two-hour period before their ability to drive became impaired.

2.2.4 Average number of hours driven a car per day in the past 12 months: This continuous variable was used as an exposure measure rather than vehicle miles travelled because Puerto Rico is a relatively small island and per local researchers, most residents do not pay attention to miles, but instead, to the time it takes to get from one place to another. Respondents who reported that they had driven a car or other vehicle in the past 12 months were asked, "About how many hours a day do you drive a car or any other vehicle?"

2.2.5 Attitudes towards DUI: Using a four-point scale, participants were asked to report the extent to which they agreed or disagreed with four opinions stating that drinking and driving is 1) dangerous, 2) a sign of alcoholism, 3) excusable or permissible, and 4) a choice that will certainly get you arrested (see Table 3 for the exact wording of the items). Answers from those who responded with "strongly agree" or "somewhat agree" were combined for data analysis.

2.2.6 Knowledge of DUI-related laws: The two items in this area were asked in different formats. The item about the legality of driving with open containers, given its nature, was dichotomous (yes or no). The specific question was, "In Puerto Rico, is it illegal

to have an open container of alcohol inside the car when someone is driving?” The item on the legal BAC limit offered 13 choices, ranging from 0 to 1.5 BAC. The specific question was: “To the best of your knowledge, what is the specific blood alcohol content limit?” This variable was coded as a dichotomy: 0 to .07 versus .08, given that the focus of the analysis was to learn the proportion of respondents who knew and who did not know the legal limit

2.2.7 Number of drinks consumed before most recent self-reported DUI

occasion: Respondents who self-reported a DUI event in the past 12 months were asked to report the number of drinks they consumed on the most recent occasion when they drove a car after drinking enough to be in trouble if stopped by police.

2.2.8 Location where alcohol was consumed in the most recent self-reported

DUI occasion: Respondents were asked to think about their most recent DUI occasion and specify where they drank on that occasion. Places included: bar/pub/club; friend’s house; while traveling/on vacation; hotel/motel; cinema/sports event; relative’s home; party/wedding; restaurant; own home; park/outdoor activity/beach/camping.

2.2.9 Average number of drinks consumed per week: This was based on the self-reported frequency and quantity (in standard drinks as defined above in 2.2.1) of drinking any type of alcohol, and was estimated using the “graduated frequencies” method (Clark & Hilton, 1991). Values for this variable ranged from zero (abstainers) to 91 drinks per week. For a more detailed description of the graduated frequencies measurement, see Greenfield and Kerr (2008).

2.2.10 Binge drinking: This was defined as drinking four or more (women) or five or more (men) standard drinks (as defined above in 2.2.1) per occasion (within two hours) in the past 12 months. Because of the highly skewed distribution of this variable (78% of respondents did not report binge), the variable representing binge drinking was coded as a dichotomy with respondents divided into those who reported any binge drinking in the past 12 months and those who did not report this type of drinking including abstainers (reference group).

2.2.11 Alcohol use disorder: Alcohol use disorder (AUD) was based on DSM-5 criteria (American Psychiatric Association, 2013) and implemented with the Spanish version of the World Health Organization’s Composite Diagnostic Interview (CIDI). The instrument was translated from English and adapted for use in Spanish speaking populations following a cultural adaptation model described by Alegria et al. (2004). The Spanish version of the instrument has adequate concordance in clinical reappraisal studies with the Structured Clinical Interview for Axis I Disorders (SCID) (kappa=.51; specificity=.82 for lifetime substance use disorders and .67 for major depressive episode) (Alegria et al., 2009). According to DSM-5 criteria, respondents reporting the presence of any two or more indicators of the 11 indicators in the criteria during the 12 months prior to the interview were identified as positive for DSM-5 AUD.

2.2.12 Positive and negative attitudes toward drinking and

drunkenness: Alcohol attitudes were measured with eight positive items (e.g., “having a

drink is one of the pleasures of life”; $\alpha = 0.60$) and four negative items (e.g., “alcohol brings out the worst in people”; $\alpha = 0.69$), scored on binary agree–disagree scales. Higher scores indicate more positive and more negative attitudes towards drinking, respectively. A higher score on the items on positive attitudes has been positively associated with the average number of drinks consumed per week and binge drinking in Puerto Rico (Caetano, Vaeth, & Canino, 2016).

2.2.13 Drinking norms: Drinking norms were assessed with nine items regarding whether drinking is considered acceptable in various circumstances (e.g., friends at home, with coworkers out for lunch). These items were scored as zero and one, and summed to a total score of nine. Higher scores indicate more liberal norms; $\alpha = .87$. A higher score on these items has been previously found to be associated with a higher volume of drinking and heavier drinking in Puerto Rico (Caetano, Vaeth, & Canino, 2016).

2.2.14 Illicit drug use: This was assessed with eight questions that covered the frequency of drug use in the 12 months before the interview. The drugs covered were: amphetamines/speed, cocaine/crack, hallucinogens, heroin/opium, marijuana, methadone, opiates, and tranquilizers. Questions about the use of amphetamines, tranquilizers, methadone, and opiates also covered how often these drugs had been medically prescribed (always, sometimes, never). All respondents who answered “always” prescribed for a specific drug were excluded from the estimation of that drug use rate and from the overall drug use rate.

2.2.15 Sociodemographic variables:

Age.: The age of respondents was used as a categorical variable: 18–29, 30–39, 40–49, and 50 years and older (reference).

Income.: Respondents were asked to identify the category into which their total household income fell from a list of 12 categories, beginning with <\$4,000 and ending with a highest category of > \$100,000. For the present analyses, respondents’ income was grouped into less than \$10,000 (reference), \$10,001 to \$20,000, \$20,001 to \$30,000, \$30,001 to \$40,000, \$40,001 to \$60,000, and \$60,001 and more.

Level of education.: 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; d) completed 4-year college or higher (reference group).

Marital status.: This included four categories as follows: a) married or living with someone, b) separated or divorced, c) widowed, d) never married/single (reference).

Employment status.: Respondents were categorized into four employment categories: a) employed part-time; b) employed full-time (35 or more hours of work per week; reference); c) unemployed (unemployed, and looking for work); d) not in the workforce (retired, homemaker, never worked, unemployed and not looking for work, students).

Religion.: This variable had four categories: Protestant, no religious preference, Catholic (reference), and “other religion.”

2.3 Statistical analyses

To take into account the multistage, multicluster design used in the survey sampling frame, all analyses were conducted using Stata 14.0 (Stata, 2015) “svy” prefix. 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 nonresponse and adjusts the sample to known population distributions on certain demographic variables (age and gender). Bivariate analyses (Table 1, 2, and 3) include both chi-square tests and *t* tests to detect statistically significant differences. Bivariate analyses were conducted separately for men and women because of significant gender differences in drinking and AUD (Vaeth, Wang-Schweig, & Caetano, 2017). Logistic regression (Table 4) was used to examine the correlates of self-reported DUI in the past 12 months and of lifetime arrest for DUI, both are dichotomous variables coded yes or no. Correlates of an arrest in the past 12 months could not be analyzed with multivariate analysis because only three respondents in the sample reported an arrest during this time frame. Covariates in all multivariate analyses were gender, age, employment status, marital status, education, religion, drinking norms, positive and negative attitudes toward drinking, average number of drinks per week, binge drinking, and illicit drug use. These were selected based on previous findings of analyses of this data set. See, for example, (Caetano, Vaeth, Mills, & Canino, 2016). Widowers (N=46) did not report lifetime arrests and were dropped from the logistic analysis of these arrests. Missing data for the variables analyzed in this paper ranges from none to .6%, with the exception of income for which 7% of the respondents have missing data.

3. Results

3.1 Sample description

The mean age of respondents was approximately 40 years (data not shown). Slightly over half (53%) of the sample were women. Approximately 37% of respondents were married or cohabitating. Respondents were primarily Catholic (51%) and just over a quarter were Protestant (26%). The educational level of respondents was relatively high, with 43% reporting some type of college degree. Only 8% reported never having received a high school diploma. Roughly half (48%) of respondents reported being employed to their satisfaction in either a part- or full-time position: 13% reported being unemployed and 12% reported under-employment. The mean household family income was \$23,062 (median income: \$15,360). About 74% (517/694) of the men and 63% (504/816) of the women were current drinkers, which means that they reported having consumed at list one drink of an alcoholic beverage in the 12 months prior to the interview.

3.2 Prevalence of self-reported DUI, past 12-month and lifetime arrest for DUI, and place of last drinking before most recent DUI.

About one fifth of the men and a little less than one tenth of the women self-reported a DUI event in the past 12 months (Table 1). The mean number of DUI events was almost two times higher for men than for women. The self-reported DUI arrest rate, however, was much

lower than the self-reported DUI rate and was similar for men and women. The self-reported lifetime arrest rate was also higher among men than among women. The mean number of lifetime arrests among men was a little above one. Mean data for women could not be estimated because of the low number of arrests.

A total of 95% of the men and 94% of the women who self-reported DUI in the past 12 months stated that the place where they drank prior to the most recent DUI event was a public drinking establishment such as a “bar, pub, or club” (data not shown). Other locales such as a friend’s home, during travel or vacation, hotel/motel, cinema/sports event, a relative’s home, party/wedding, restaurant, home, park/outdoor activity/beach/camping were reported by 2% or less of the respondents.

3.3 Drinking indicators, DSM-5 AUD, and illicit drug use among drinkers who reported and who did not report DUI

Among men who drink, the proportion of those who engaged in binge drinking was two times higher among those who self-reported DUI than among other men (Table 2). DSM-5 AUD was more than three times higher among drinkers who reported self-reported DUI than among those who did not. It is important to notice that DSM-5 criteria include drinking in situations where such behavior is hazardous, such as drinking and driving. About 15% (58 out of 397) of those identified as DSM-5 positive were also positive for the hazardous criterion, which includes drinking and driving.

The mean number of drinks consumed per week was about two times higher among drinkers who reported DUI than among those who did not report the event. Drinkers who reported DUI thought that they could consume almost four drinks within a two-hour period before their driving would become impaired compared to approximately three drinks for drinkers who did not report DUI. However, when drinkers who reported a DUI event were asked about how many drinks they had actually consumed before the most recent DUI event, the average number of drinks reported was just over eight drinks. The prevalence of illicit drug use in the past 12 months was almost two times higher among drinkers who reported DUI than among those who did not report the behavior. Drinkers who reported DUI also spent a higher average number of hours driving per day during the past 12 months than drinkers not reporting DUI.

Among women who drink, all the drinking indicators and rates of DSM-5 AUD were higher among those who reported DUI compared to those who did not report this event. Binge drinking was about two times higher, the rate of DSM-5 AUD was about five times higher, and the mean number of drinks consumed per week was about 3.5 times higher. Further, female drinkers who reported DUI thought they could consume approximately three drinks on average within a two-hour period before their driving became impaired, compared to just a couple of drinks among female drinkers who did not report DUI. But when female drinkers who reported DUI were asked about how many drinks they had actually consumed before their most recent DUI event; the average was close to seven drinks. The proportion of illicit drug use among women who reported DUI was 2.5 times higher than among women who did not report DUI. Finally, the difference in the average number of hours spent driving per

day between drinkers who reported and those who did not report DUI was not statistically significant.

3.4 Attitudes about DUI and knowledge of DUI laws

Most men and women who drink, independent of whether they self-reported a DUI event or not, agreed that DUI is a threat to their personal and family safety (Table 3). However, a significantly lower proportion of men and women who self-reported a DUI event compared to those who did not report DUI, agreed that those who drive after drinking too much are alcoholics or problem drinkers. Also, a quarter to less than a quarter of men and women who drink, independent of whether they self-reported DUI, thought that it was “okay to drive when one feels the effects of alcohol a little bit.” But differences between those who self-reported DUI and those who did not were not statistically significant. Finally, a lower proportion of men and women who self-reported DUI, compared to those who did not report the event, agreed that “it is almost certain that one will be stopped by police if one drives after having too much to drink.”

Regarding DUI laws, most men and women, more than 90%, knew that it is illegal to drive a car in Puerto Rico with an open alcohol container and that the legal blood alcohol content to drive a car is less than .08.

3.5 Multivariate analyses: Sociodemographic and drinking related correlates of past 12-month self-reported DUI and self-reported lifetime arrest for DUI

Among sociodemographic variables, the average number of hours driving a car, religion, employment status, age, gender and education were all significantly associated with self-reported DUI (Table 4). Each additional hour driving a car per day increased the probability of a self-reported DUI by 8%. Respondents with a high school diploma were less likely than those with a college degree to report DUI. Respondents with “other religious preference” were about four times more likely than Catholics to report DUI. Unemployment, part-time employment and not being part of the workforce were all protective against DUI compared to fulltime employment. Being 50 years of age and older was also protective against DUI compared to being 18 to 29 years of age. Men were almost two times more likely than women to report DUI. Among the drinking related variables, liberal drinking norms and positive attitudes towards drinking were strong factors of risk for DUI. The same was true for the average number of drinks consumed per week and binge drinking in the past 12 months.

A lifetime arrest for DUI was associated with marital status, religion, male gender, drinking norms, negative attitudes towards drinking, and illicit drug use (Table 4). Respondents who were separated from their spouses or divorced were about 2.5 times more likely than married respondents to report a lifetime DUI arrest. Protestants were less likely to report a lifetime arrest for DUI than Catholics. Men were more than five times more likely than women to report a lifetime DUI arrest, and those with liberal drinking norms were almost seven times more likely to report a lifetime DUI arrest. Respondents who reported illicit drug use in the past 12 months were almost three times more likely to report a lifetime arrest than those who did not engage in drug use.

4. Discussion

In 2014–2015, with data covering a span of 12 months, one in five men and almost one in ten women in San Juan, Puerto Rico, reported driving after drinking. These proportions are higher than those reported by Puerto Ricans in the U.S. (Caetano et al., 2008), a fact that could be associated with a lower rate of access to cars for socioeconomic reasons in the U.S. (Kochar, Fry, & Taylor, 2011). Among Puerto Rican men and women on the U.S. mainland, the 12-month rate of self-reported DUI was 7.8% and 1.9%, respectively (Caetano et al., 2008b). Regarding 12-month DUI arrest rates, these are similar in San Juan and among Puerto Ricans on the mainland both for men (.8%) and women (0.0%) (Caetano et al., 2008b). These rates indicate that the probability of a DUI arrest in San Juan is lower than in the U.S. In fact, 2012 arrest data reported by the FBI for the U.S. and by Puerto Rico indicate that the 12-month arrest rate on the U.S. mainland was 1.8 times higher than the arrest rate on the island (Puerto Rico Traffic Safety Commission, 2014).

Comparison of results in Table 2 for drinkers who did and did not self-report DUI with findings in the literature is more difficult because previous papers did not report gender specific rates. Still, the mean number of drinks consumed before the most recent self-reported DUI was higher in San Juan than that reported on the U.S. mainland. According to Moulton et al. (2010), male and female drivers in the U.S. consumed 2.7 and 2.1 drinks, respectively on their most recent DUI event. The number of drinks reported by both men and women are about three times higher in San Juan.

Other results show that drivers self-reporting DUI in San Juan, as on the U.S. mainland, report a higher mean number of drinks consumed per week and a higher mean number of drinks they think they can consume before their driving is impaired. On the U.S. mainland drivers who self-report DUI are also more affected by alcohol dependence and report higher rates of binge drinking than those who do not self-report DUI (Caetano & McGrath, 2005). However, it is important to consider that two thirds of the drivers who self-reported DUI in San Juan were not positive for AUD. This confirms the importance of having policies to deter DUI that are broad and that are directed at the general population of drivers and not only at individuals who have an AUD. Illicit drug use was also considerably more present among men and women who reported DUI than among those who did not. This is not surprising given consistent reporting of a positive association between drinking and drug use and AUD and drug use disorder (Grant et al., 2015; Kelly, Darke, & Ross, 2004). Finally, men who self-reported DUI drive a higher number of hours per day on average than those who did not report DUI. Thus, the suggestion made by Puerto Rican researchers that this indicator should be used a measure of exposure to DUI seems correct.

Results also indicate that there is widespread support for the seriousness of DUI and for the notion that one should not drive when feeling the effects of alcohol. The percentage of respondents supporting these statements are similar to those found among Hispanics in general, and Puerto Ricans on the U.S. mainland (Caetano et al., 2008a). Also, the large majority of respondents from San Juan know the legal BAC to drive, and also know that it is illegal to drive with an open alcohol container in the car. On the U.S. mainland, 85% of the driving-age population know the legal BAC limit (Moulton et al., 2010). Altogether, these

findings suggest that it is not lack of knowledge that leads to DUI, but the inability to control drinking behavior and perhaps the notion that in Puerto Rico, one can engage in DUI with a certain level of impunity.

Regarding sociodemographic and alcohol-related correlates of self-reported DUI and lifetime DUI arrest, most of the hypotheses in this paper were confirmed: A higher number of driving hours per day, male gender, younger age, liberal norms and positive attitudes towards drinking, and a higher level of drinking and binge drinking were all positively associated with DUI. These variables are commonly reported predictors of DUI among Hispanics (Caetano et al., 2008a, 2008b; Caetano et al., 2013). Illicit drug use is also a factor of risk for DUI, which is an important finding because it has not been previously identified as a factor of risk for Hispanics on the U.S. mainland or for Puerto Ricans on the island. This variable has a statistically significant association only with lifetime arrest, which may be because those with lifetime arrest for DUI may be repeated DUI offenders with a higher risk of arrest and heavier substance use patterns than those who self-report DUI but have not been arrested. The hypothesis that unemployment and non-participation in the workforce would be protective factors against DUI was also confirmed, for self-reported DUI, but not for arrests. These two groups may have fewer chances for social interaction because of acute or chronic medical conditions that makes it impossible for them to work and drive. All together, these correlates indicate that certain lifestyle factors that are associated with an increased tendency for risk taking and increased alcohol consumption are associated with DUI both in San Juan, Puerto Rico, and on the U.S. mainland.

5. Conclusions

San Juan, Puerto Rico, has a relatively high rate of self-reported past 12-month DUI and relatively low rates of self-reported 12-month and lifetime arrest for DUI. This may be why only two thirds of the men and women who self-reported a DUI event in the past 12 months agreed that it was almost certain that drivers who drive after having had too much to drink will be stopped and arrested by police, even though almost all adults in the population were aware of the legal limit to drive and agree that drinking and driving is a threat to personal and family safety. Evidence-based deterrents and strict enforcement of DUI laws are therefore needed.

6. Strengths and Limitations

The study has many strengths. It analyzes data from a random sample of the adult population of San Juan interviewed face-to-face with a particularly high response rate of 83%. Data collection covered several drinking outcomes in detail and used state of the art interviewing techniques and questions. The study also has limitations. Data collection was based on self-reports, which may lead to under-reporting of alcohol consumption and other information. The study design was cross-sectional, which does not allow for assessments of temporal associations. Results are only applicable to the San Juan metropolitan area, and should not be generalized to all of Puerto Rico.

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Table 1:

Past 12 months self-reported DUI and 12 month and lifetime driving under the influence (DUI) arrest by gender.

	Men	Women
Past 12 months		
Self-reported DUI, % (N) ^{a***}	20 (692)	8 (813)
Number of times self-reported DUI, mean ± SE (N) ^{b*}	5.87 ± .87 (136)	3.26 ± .49 (63)
Arrested for DUI, % (N) ^{ans}	.1 (692)	.2 (813)
Lifetime		
Arrested for DUI, % (N) ^{a***}	6 (692)	.7 (813)
Number of times arrested for DUI, mean ± SE ^c	1.26 ± 0.8 (41)	--

Note: Weighted %; Unweighted N; Significance tests rates and means for men versus women:

*
p<.05;

p<.001;

ns: not significant. Parentheses contain unweighted denominators; SE = Standard error;

^a = Denominator represents all men and all women in the sample;

^b = Denominator represents respondents who self-reported DUI in past 12 months;

^c = Denominator represents respondents who reported a lifetime arrest.

Table 2.

Selected drinking, alcohol use disorder (AUD), illicit drug use and driving indicators among drinkers who report and who do not self-report driving under the influence (DUI) by gender.

	Men		Women	
	Self-report DUI	No DUI	Self-report DUI	No DUI
Binged in past 12 months % (N)	56 (136)	27 (326) ***	52 (62)	23 (380) ***
DSM-5 AUD % (N)	36 (110)	11 (310) ***	33 (58)	7 (362) ***
Drinks consumed per week, mean $\pm$ SE (N) ^a	19.48 $\pm$ 1.58 (136)	8.62 $\pm$.80 (326) ***	15.25 $\pm$ 2.10 (62)	4.37 $\pm$.38 (380) ***
Drinks can consume before driving is impaired, mean $\pm$ SE (N) ^a ***	3.84 $\pm$.20 (136)	3.02 $\pm$.14 (326) ***	2.79 $\pm$.19 (62)	2.00 $\pm$.06 (380) ***
Drinks consumed by respondents before the most recent self-reported DUI event, mean $\pm$ SE (N) ^a	8.06 $\pm$.24 (136)	--	6.6 $\pm$.35 (62)	--
Illicit drug use in the past 12 months (%) (N)	35 (139)	20 (326) ***	35 (63)	14 (382) ***
Hours driven per day by respondents in the past 12 months, mean $\pm$ SE (N) ^a	3.61 $\pm$.24 (139)	2.94 $\pm$.13 (325) **	2.48 $\pm$.29 (64)	2.73 $\pm$.09 ^{ns} (377)

Note: Numbers in parenthesis are unweighted denominators; percentages are weighted. a = Denominators represent current drinkers. Statistical tests assess significance of differences between rates within genders:

*
p< 0.05,

**
p<0.01,

p<0.001.

^aContinuous variable; Significance noted for *t* test. SE= standard error.

Table 3:

Attitudes about DUI and knowledge of driving under the influence (DUI) laws by gender and DUI event reporting.

	Men DUI (139)	Men No DUI (328)	Women DUI (64)	Women No DUI (378)
Attitudes about DUI				
Agreed that drinking and driving by other people is a threat to my personal safety and to that of my family (men ^{ns} ; women ^{ns})	97%	97%	97%	99%
Most people who drive after drinking too much alcohol are alcoholics or problem drinkers (men ^{***} ; women ^{***})	66%	83%	62%	80%
Agreed that it is okay to drive when you feel the effects of alcohol a little bit. (men ^{ns} ; women ^{ns})	24%	17%	25%	16%
Agreed that if you drive after having too much to drink it is almost certain that you will be stopped and arrested by the police (men ^{***} ; women ^{**})	67%	84%	70%	83%
Knowledge of DUI laws				
Correctly agreed that it is illegal to have an open container inside the car when someone is driving in Puerto Rico (men ^{ns} ; women ^{ns})	95%	93%	92%	94%
Correctly answered that the legal blood alcohol content (BAC) limit is 0.08 or lower, (men [*] ; women ^{ns})	99%	93%	92%	95%

Notes: Statistical tests assess significance of differences between rates within genders:

ns Not statistically significant;

*
p> .05;

**
p>.01;

p<.001. Weighted percentages; unweighted denominators in parentheses.

Table 4:

Multiple logistic regression of self-reported driving under the influence (DUI) and lifetime DUI arrest on sociodemographic characteristics, illicit drug use and drinking related variables.

	DUI past 12 months		Lifetime DUI arrest	
	OR	95% CI	OR	95% CI
Average Number of Hours Driving per Day				
Past 12 months	1.08 *	1.01–1.17	1.12	.98–1.27
Marital Status (Ref: Married/living with someone)				
Married but separated/divorced	1.06	.52–2.23	2.77 *	1.04–7.36
Widowed	1.02	.11–9.48	-	-
Never married	1.18	.67–2.08	2.42	.88–6.66
Income (Ref: \$0-\$10,000)				
\$10,001-\$20,000	.48	.22–1.02	1.59	.55–4.57
\$20,001-\$30,000	.67	.30–1.52	.57	.11–2.84
\$30,001-\$40,000	.94	.45–1.95	1.3	.38–5.36
\$40,001-\$60,000	.96	.41–2.28	1.54	.29–8.04
\$60,001+	.70	.26–1.86	2.3	.48–10.88
Education (Ref: College degree)				
Less than high school	.58	.21–1.59	.43	.05–3.23
High school diploma	.47 *	.24-.93	1.14	.33–3.93
Some college/technical/vocational	1.15	.69–1.89	.83	.33–2.08
Religion (Ref: Catholic)				
Protestant	1.55	.94–2.56	.26 *	.08-.85
Other religious preference	4.39 **	1.31–14.72	1.77	.35–8.82
No religious preference	.98	.55–1.75	1.38	.55–3.49
Employment Status (Ref: Employed full-time)				
Unemployed	.40 *	.17-.93	1.81	.49–6.60
Employed Part-time	.41 *	.20-.83	.56	.18–1.72
Not in workforce	.46 *	.24-.89	.68	.20–2.30
Age (Ref: 18–29 years)				
30–39 years	1.19	.66–2.13	1.60	.46–5.55
40–49 years	.52	.24–1.10	1.42	.38–5.29
50+ years	.28 **	.12-.69	2.71	.76–9.64
Gender (Ref: Female)				
Male	1.67 *	1.07–2.60	5.39 ***	2.02–14.34
Drinking Norms	4.71 ***	2.54–8.71	6.50 ***	2.12–19.91
Positive Attitudes	4.37 *	1.21–15.72	.49	.07–3.45
Negative Attitudes	.73	.32–1.63	2.72	.85–8.67
Average N drinks/week	1.05 ***	1.03–1.07	1.01	.98–1.04
Binge Drinking at least Once in Past 12 Months	2.60 ***	1.62–4.17	1.42	.61–3.31

	DUI past 12 months		Lifetime DUI arrest	
	OR	95% CI	OR	95% CI
Illicit Drug Use Past 12 Months	1.39	.91–2.14	2.82 ***	1.25–6.35

Notes:

*
< 0.05;

**
p < 0.01;

p < 0.001.