Published in final edited form as:

Alcohol Clin Exp Res. 2011 July ; 35(7): 1256–1264. doi:10.1111/j.1530-0277.2011.01460.x.

The Hispanic Americans Baseline Alcohol Survey (HABLAS): Is the “prevention paradox” applicable to alcohol problems across Hispanic national groups?

Raul Caetano, MD, PhD and Britain A. Mills, PhD

University of Texas School of Public Health, Dallas Regional Campus

Abstract

Background—The “prevention paradox”, a notion that most alcohol-related problems are generated by non-heavy drinkers, has significant relevance to public health policy and prevention efforts. The extent of the paradox has driven debate over the type of balance that should be struck between alcohol policies targeting a select group of high-risk drinkers versus more global approaches that target the population at-large. This paper examines the notion that most alcohol problems among four Hispanic national groups in the U.S. are attributable to moderate drinkers.

Methods—A general population survey employing a multistage cluster sample design, with face-to-face interviews in respondents' homes was conducted in five metropolitan areas of the U.S. Study participants included a total of 2,773 current drinkers 18 years and older. Alcohol consumed in the past year (bottom 90% vs. top 10%), binge drinking (binge vs. no binge), and a four-way grouping defined by volume and binge criteria were used. Alcohol-related harms included 14 social and dependence problems.

Results—Drinkers at the bottom 90% of the distribution are responsible for 56% to 73% of all social problems, and for 55% to 73% of all dependence-related problems reported, depending on Hispanic national group. Binge drinkers are responsible for the majority of the social problems (53% to 75%) and dependence-related problems (59% to 73%), also depending on Hispanic national group. Binge drinkers at the bottom 90% of the distribution are responsible for a larger proportion of all social and dependence-related problems reported than those at the top 10% of the volume distribution. Cuban Americans are an exception.

Conclusion—The prevention paradox holds when using volume-based risk groupings and disappears when using a binge-drinking risk grouping. Binge drinkers who drink moderately on an average account for more harms than those who drink heavily across all groups, with exception of Cuban Americans.

Keywords

U.S. Hispanics; alcohol problems; prevention paradox

Introduction

The “prevention paradox,” the notion that most of the problems caused by alcohol consumption are attributable to non-heavy drinkers, has significant relevance to public health policy and prevention efforts. The extent of the paradox has driven extensive debate

Send correspondence to: Raul Caetano, MD, PhD, 6011 Harry Hines Blvd. Room V8.112, Dallas, Texas 75390-9128, Phone: (214) 648-1080, Fax: (214) 648-1081, Raul.Caetano@UTSouthwestern.edu.

No conflict of interests to disclose.

over the type of balance that should be struck between targeted initiatives that focus on a select group of high-risk drinkers versus more global approaches that target the population at-large. Kreitman (1986) (see also Moore and Gerstein, 1981) published the first empirical demonstration of the phenomenon, and subsequent studies have replicated the finding across a variety of social problems using volume-based definitions of heavy drinkers (Gmel et al., 2001; Jones et al., 1995; Leifman, 1996; Poikolainen et al., 2007; Rossow and Romelsjo, 2006; Skog, 1999; Stockwell et al., 1996) (for exceptions, see Dawson, 1999; Wyllie et al., 2000). Skog (1999) also documented important boundaries of the effect, showing that the paradox will hold primarily in situations where problems increase linearly with consumption (in contrast to problems with more convex risk functions, such as cirrhosis; see also Norström, 1995).

As noted by Skog (2006), the prevention paradox is less paradoxical in retrospect than it was at the time of Kreitman's (1986) paper, although certainly even then the notion that alcohol could be linked to problems among non-alcohol dependent individuals would not have been surprising to most alcohol researchers. Curiously, it was over a decade later when Stockwell et al. (1996) empirically articulated this intuition: When heavy drinking was defined in terms of acute intoxication episodes – as opposed to measures of volume consumed over some extended interval – the paradox disappeared. Shortly after, Gmel et al. (2001) qualified this resolution by demonstrating that the majority of high-risk binge drinkers actually met criteria for moderate volumetric intake. Crucially, this “moderate volume, high binge” group also accounted for the majority of societal problems among all high-risk binge drinkers, indicating what Gmel et al. (2001) dubbed a “second order” paradox.

The shifts in the debate over when, and to whom, the prevention paradox applies highlight the role that drinking *pattern* plays in the distribution of alcohol problems in society. Individuals may exceed recommended volumetric guidelines but not show any problems because they binge infrequently. Alternatively, staying within those recommended volumetric guidelines is less relevant to the prevalence of problems linked to acute intoxication (such as DUI). Equally importantly, the individuals contributing a substantial portion of alcohol-related problems in society often are not “alcoholics” in any traditional sense of the term. Out of convenience and for consistency with the past literature, we will continue to use the phrase “prevention paradox” in describing these types of findings, although we acknowledge that binge drinking among otherwise light drinkers is perhaps unparadoxical. Given the important role of drinking pattern in the manifestation of alcohol-related problems, it is not surprising that researchers (e.g. Skog, 2006) have called for assessments of the paradox (or lack thereof) in cultures or subgroups known to exhibit unique patterns of drinking behavior. Such studies have the potential to not only verify that the predicted mitigating effect of using a binge criterion holds across diverse samples, but also to investigate whether the extent of mitigation – and the second order paradox – varies across groups with distinct drinking patterns and drinking norms. The call for these types of investigations has been answered in part with studies focused on youth, a subgroup that exhibits elevated rates of binge drinking (Rossow and Romelsjo, 2006; Stockwell et al., 2004), but cross-cultural investigations of the prevention paradox among groups that vary in the prevalence of binge drinking have not been a major focus of research to date.

The present paper seeks to fill this gap by examining the prevention paradox in a sample of people of Latin American descent in the U.S., a group identified by the U.S. Census Bureau as Hispanics. Hispanic samples also offer an excellent opportunity to examine the prevention paradox because of the large heterogeneity they exhibit in drinking patterns. For example, the frequency of binge drinking at least once in the past year (consuming four/five or more drinks on a single occasion) is substantially lower among Cuban American men (27%) than among Mexican Americans (46%), South/Central Americans (43%) and Puerto

Ricans (49%) (Ramisetty-Mikler et al., in press). Cuban Americans also have a lower prevalence of alcohol-related problems (18% of the men report at least one problem), when compared to other groups (Puerto Rican men: 34%; Mexican American men: 37%; South/Central American men: 30%) (Vaeth et al., 2009).

Beyond the incidental relevance of Hispanic drinking patterns to the prevention paradox, U.S. Hispanics are a particularly important group to examine because of their diversity and growing size. Roughly 15% of the U.S. population was Hispanic in July 2007, and this percentage should reach 30% by 2050 (U.S. Census Bureau, 2008a; U.S. Census Bureau, 2008b). In some U.S. states, the proportion of Hispanics is already approaching these higher levels: Texas, 32%; New Mexico, 42%; Arizona, 25%; and California, 32%. Although members of U.S. ethnic minorities acculturate to U.S. society, adopting American drinking norms and patterns, these groups also retain a strong ethnic identity which shapes alcohol use. The present study was purposively designed to study alcohol use and associated problems across the four largest national groups of U.S. Hispanics: Puerto Ricans, Cuban Americans, Mexican Americans and South/Central Americans. The analysis also takes into account two broad groups of distinct alcohol problems, social and dependence-related (details in the Methods section below). These two groups of problems have been recognized before in survey research in the U.S. (Hilton, 1991).

Skog (1999) noted that the prevention paradox is determined by two factors: the relative size of the low risk to the high risk group (“T”) and the relative problem risk of the high risk to the low risk group (“R”). The paradox holds – that is, problems are primarily attributable to the low risk group – as long as R is smaller than T. The first order prevention paradox for volume-based criteria is largely a consequence of the large number of individuals with moderate average intake who occasionally binge (which overwhelms that group's comparatively low conditional probability of exhibiting a problem). Previous studies (Rossow and Romelsjo, 2006) have reported that the first order prevention paradox is more prominent in subpopulations with a higher overall prevalence of binge drinking, and we predict the same pattern will hold across different cultural groups that vary in binge prevalence. Specifically, the first and second order prevention paradox should be less likely (or alternatively, less pronounced) for Cuban-Americans relative to other Hispanic groups. Furthermore, we will employ methods that constrain the relative size of the risk groupings to equality across the Hispanic groups, leaving differences across ethnic groups in relative problem risk as the lone factor driving differences in the extent of the paradox. If Cuban Americans exhibit a dampened prevention paradox for volume, it must therefore be attributable to a larger relative increase in the conditional risk of exhibiting a problem across low- and high-risk drinking categories, *despite* lower baseline levels of alcohol consumption. Finally, we will explore the interesting additional possibility that this mechanism behaves consistently across binge and volume-based criteria: Despite lower baseline levels of binge drinking (and lower baseline problem risk), the relative increase in the risk of exhibiting a problem across Cuban non-bingers and bingers should be larger than other Hispanic groups.

Methods

Sampling 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. After being appropriately weighted, respondents are a representative sample of the Hispanic civilian non-institutionalized population aged 18 and

older in these sites. A total of 5,224 individuals were interviewed (Mexican Americans: 1,288; Puerto Ricans: 1,335; Cuban Americans: 1,327; South/Central Americans: 1,274) for a weighted response rate of 76% (out of all possible people selected into the study, whether reached or not). The analysis in this paper includes 2,773 current drinkers only (drank any alcohol in the past 12 months).

Computer Assisted Personal Interviews (CAPI) lasting one hour on average were conducted in respondents' homes by trained interviewers, all of which were bilingual English/Spanish. Once the English questionnaire was pre-tested and finalized, the questionnaire was translated into Spanish and then independently translated back to English. Informed consent was obtained after respondents were given a complete study description.

Measurements

Alcohol-related problems in the previous 12 months—A total of 14 different alcohol-related problems were covered with 30 questions (Hilton, 1991). The items asked for dichotomous (yes × no) responses to questions about whether specific types of problems had occurred within the last 12 months. Alcohol dependence-related problems included the salience of drinking, need to drink, increased tolerance, impaired control, withdrawal symptoms, and prolonged intoxication. The items exhibited a unifactor structure and had acceptable reliability (Cronbach's $\alpha = .76$). Social consequences included belligerence, police problems, accidents, health-related problems, problems with spouse, problems with other people, work-related problems, and financial problems. These items also showed a unifactor structure with acceptable reliability (Cronbach's $\alpha = .75$). All problem questions explicitly referred to problems that occurred during or as a direct result of drinking. To facilitate comparison with other examinations of the prevention paradox, a dichotomized version of these summed scales were used for cross tabulation with various risky drinking criteria (described below); in addition, the summed scales (representing the total number of distinct problem types experienced in the last 12 months) were used in cross tabulations and regression models to assess the association between various drinking criteria and how many types of problems were experienced.

Average number of drinks per week—Alcohol consumption was estimated from answers to question on the quantity and frequency of drinking that used a “graduated frequencies” method (Clark and Hilton, 1991). For more detailed description of the graduated frequencies approach to measurement, see Greenfield and Kerr (2008). The time frame covered was the past 12 months. Overall alcohol consumption in number of drinks per week was assessed by combining the self-reported frequency and quantity of drinking “all kinds of alcoholic beverages combined”.

Binge drinking—This was defined as drinking four or more drinks (for women) or five or more drinks (for men) per occasion within a two-hour period in the past 12 months. A drink was defined as a 5 ounce glass of wine, a 12 ounce can of beer, or a 1.5 ounce shot of liquor.

Drinkers' classification—Following previous examinations of the prevention paradox (e.g., Poikolainen et al., 2007; Rossow and Romelsjo, 2006), drinkers were first divided into those in the top 10% of the volume distribution and all others. This division is not entirely arbitrary, as in the U.S. the top 10% of drinkers consume approximately 60% of all alcohol (Greenfield and Rogers, 1999). In addition, although alcohol use disorders are not synonymous with consumption, the rate of abuse or dependence hovers close to 10% in many populations, and the fact that a variable closely related to consumption is partitioned in a similar way gives some meaning to a 90-10 split. Eight distinct cutoffs corresponding to all combinations of the four Hispanic groups and gender were used. That is, each gender-

ethnic group's cutoff divides drinkers into the bottom 90 and top 10% drinkers by volume *relative to that group's volume distribution*. This ensured that relative differences in the size of the risk groups – a contributing factor to whether the prevention paradox is observed – were held constant over the groups being compared.¹ However, this also implies distinct absolute thresholds of drinking for each subgroup. For Puerto Ricans, these cutoff points for the top 10% of drinkers by volume (in standard drinks per week) were females: 24, males: 59; for Cuban Americans, females: 8, males: 24; for Mexican Americans, females: 7, males: 56; and for South/Central Americans, females: 14, males: 33. Second, also following previous reports (e.g., Gmel et al., 2001), drinkers were reclassified according to whether or not they had binge (defined above) at least once in the past 12 months. The decision to use an absolute criterion for binge drinking (rather than a relative criterion such as the top 10%) was based on the fact that alcohol-related problems are more closely tied to episodes of binge drinking, a key finding in the prevention paradox literature. Third, these volume and binge classifications were combined to form four groups: 1) current drinkers at the bottom 90% of the volume distribution who did not engage in binge drinking in the past 12 months; 2) current drinkers at the bottom 90% of the volume distribution who engaged in binge drinking in the past 12 months; 3) current drinkers at the top 10% of the volume distribution who engaged in binge drinking in the past 12 months; and 4) current drinkers at the top 10% of the volume distribution who did not engage in binge drinking in the past 12 months.

Hispanic national origin—This is based on 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, and Central American.” In this paper, Dominicans are grouped with South/Central Americans.

Statistical Analyses

Stata 11.0 (STATA Corporation, 2009) was used for all analyses. 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). Cross tabulations were used to examine the distribution of problems across different drinking groups. Logistic regression was used to assess the independent association of volume of drinking and binge to social and dependence-related problems. The interaction effect of binge drinking and volume of drinking was also tested.

Results

Proportion of Problem Drinkers by Volume Distribution

Binge prevalence among Puerto Ricans, Cuban, Mexican, and South/Central Americans who drank moderately were 46%, 22%, 36%, and 34% and among high volume drinkers was 88%, 53%, 69%, and 74%, respectively. In all four Hispanic national groups the proportion of drinkers reporting at least one social problem was lower among drinkers at the bottom 90% of the volume distribution than at the top 10% (Table 1). The proportion of problem drinkers among the bottom 90% ranged from 7% (Cuban Americans) to 32% (Mexican

¹An extensive set of sensitivity analyses probing alternative approaches to demarcating risk groups were performed in the initial stages of this study. These analyses compared seven different relative and absolute thresholds and seven alternative binge criteria across variations in problem scale (dichotomized versus continuous), paradox “type” (first vs. second order), and problem type (social, dependence, and aggregated social and dependence problems). Across all analyses, different thresholds had little effect on the extent of the prevention paradox beyond what would be expected due to changes in the size of the risk groupings (i.e., relative differences in the conditional risk of exhibiting an alcohol-related problem across the risk groups stayed largely the same).

Americans), while among the top 10% the range was from 34% (Cuban Americans) to 74% (Puerto Ricans). A majority of all problem drinkers were at the bottom 90% of the distribution for all Hispanic groups. Drinkers at the bottom 90% of the volume distribution were responsible for 56% to 73% of all social problems reported by all drinkers, depending on Hispanic national group. This is an indication that the prevention paradox holds when problems are thus analyzed.

A similar picture emerges from the results on dependence-related problems. The proportion of drinkers reporting at least one dependence-related problem among the bottom 90% of drinkers ranges from 12% (Cuban Americans) to 34% (Puerto Ricans), while the proportion of such drinkers among the top 10% is higher, varying from 51% (Cuban Americans) to 75% (Puerto Ricans). Again, at least two thirds of all problems drinkers are at the bottom 90% of the volume distribution, and in each of the four Hispanic national groups these drinkers are responsible for 55% (Cuban Americans) to 73% (South/Central Americans) of all the reported dependence-related problems. This, too, is an indication that the prevention paradox holds on these data. For both social and dependence-related problems, Cuban Americans present a picture different from the other groups in two ways. First, they report both social and dependence-related problems at lower overall rates. Second, among Cuban drinkers reporting problems, relatively smaller percentages are attributable to the moderate risk group than the other Hispanic groups.

Proportion of Problem Drinkers by Binge Drinking

The proportion of non-binge drinkers reporting at least one social problem varies from 6% to 24% across Hispanic national groups (Table 2). Among binge drinkers, the proportion reporting such problems is higher, varying from 21% to 53%. Binge drinkers constitute 53% (Cuban Americans) to 75% (Puerto Ricans) of the drinkers reporting social problems in each national group. Binge drinkers are responsible for the majority of the social problems, reporting from 53% (Cuban Americans) to 75% (Puerto Ricans) of all such problems depending on Hispanic national group. Thus, consistent with past reports, the prevention paradox does not hold for social problems when using a binge criterion in these data. It is worth noticing that among Cuban Americans, social problems are roughly equally split between non-binge and binge drinkers.

The distribution of dependence-related problems among non-binge and binge drinkers is similar to that of social problems. About 9% (Cuban Americans) to 25% (Puerto Ricans) of non-binge drinkers report at least one dependence-related problem. Among binge drinkers, these proportions are higher and vary from 38% (Cuban Americans) to 52% (Mexican Americans). Binge drinkers also represent the majority of the drinkers reporting dependence-related problems, although as with social problems, these proportions were lower among Cuban Americans. Binge drinkers also report the majority of all dependence-related problems, with the proportion varying from 59% among Cuban Americans to 73% among Puerto Ricans. Again, these results replicate past findings showing that the prevention paradox is eliminated when risk groupings are defined by a binge criterion.

Proportion of Problem Drinkers by High/Low Volume Binge/No Binge Drinking

Grouping drinkers by combining volume and binge is difficult because naturally there are fewer drinkers in groups with contrasting dimensions, say, drinkers at the top 10% of the volume distribution but who do not binge (e.g., second column, Table 3). Thus, some of the results in Table 3 should be interpreted with caution. First, in all Hispanic national groups, the proportion of drinkers reporting at least one social problem is higher among binge drinkers than among non-binge drinkers, independent of volume. Among non-binge drinkers at the bottom 90% of the volume distribution, the proportion reporting a social problem

ranges from 5% (Cuban Americans) to 22% (Mexican Americans). Among non-binge drinkers at the top 10% of the volume distribution, the range of drinkers with social problems varies from 17% (Cuban Americans) to 54% (Mexican Americans). Among binge drinkers at the bottom 90% of the volume distribution, the proportion reporting a social problem varies from 11% (Cuban Americans) to 48% (Mexican Americans). Among binge drinkers at the top 10% of the volume distribution, the proportion reporting a social problem varies from 50% (Cuban Americans) to 81% (Mexican Americans).

The percentage of all problem drinkers attributable to the “bottom 90% volume-binge” groups varies from 21% (Cuban Americans) to 53% (Puerto Ricans). This same percentage in the “top 10% volume-binge” group is smaller, varying from 12% (South/Central Americans) to 31% (Cuban Americans). Thus, most problem drinkers who binge are in the bottom 90% of the volume distribution. The only exception is the Cuban American group, for which the proportion of all problem drinkers who binge are primarily high volume drinkers (31% vs. 21%). Binge drinkers in the bottom 90% of the distribution are responsible for a large proportion of all social problems reported. This proportion ranges from 21% (Cuban Americans) to 47% (Puerto Ricans).

The distribution of dependence-related problems across these different groups of drinkers is similar to that for social problems. The proportion of drinkers reporting dependence-related problems in the “bottom 90%-no binge” group varies from 8% (Cuban Americans) to 25% (Puerto Ricans). These percentages in the “top 10%-non binge” group are higher, going from 30% (Cuban Americans) to 64% (Mexican Americans). Turning to the binge drinkers, the percentage reporting problems in the bottom 90% of the volume distribution varies from 29% (Cuban Americans) to 48% (Mexican Americans). Binge drinkers at the top 10% of the volume distribution have the highest rate of problem reporting. Between 70% (Cuban Americans) and 79% (Puerto Ricans and South/Central Americans) of these drinkers reported dependence-related problems.

Most problem drinkers reporting dependence-related problems are bingers in the bottom 90% of the volume distribution. Depending on Hispanic national group, this proportion varies from 33% among Cuban Americans to 49% among Puerto Ricans. The group of bingers in the top 10% of the volume distribution accounts for a smaller proportion of the problem drinkers reporting a dependence-related problem, with the percentage ranging from 14% among Mexican Americans to 25% among Cuban Americans. Finally, when looking at the total problems reported, the binge drinkers at the bottom 90% of the volume distribution account for a higher proportion of all problems reported than the binge drinkers at the top 10% of the volume distribution in three of four Hispanic groups; Cuban Americans are the exception.

Independent Association of Volume of Drinking and Binge to Social and Dependence-Related Problems

Results from the multiple logistic regressions are in Table 4. Social and dependence-related problems were analyzed separately in each of the four national groups. The dependent variables were dichotomies (problems: yes × no). The independent variables were dichotomies as well (binge × no binge; bottom 90% of the volume distribution × top 10%). A variable representing the interaction effect between binge and volume was also tested, but the effect was not statistically significant in any of the models. Results show that binge drinking and volume of drinking are both independently and positively associated with the occurrence of social and dependence-related problems.

Discussion

Results indicate that when U.S. Hispanic drinkers are classified by volume of consumption, the prevention paradox holds for both social and dependence-related problems across all four national groups. More “moderate” drinkers by volume standards generate more problems than heavier drinkers, as described by Kreitman (1986) and others (Gmel et al., 2001; Rossow and Romelsjo, 2006). Differences in drinking patterns across the four national groups under focus do not influence this finding.

If drinkers are classified according to binge drinking, the prevention paradox is eliminated, replicating past results by Stockwell et al. (1996) and Gmel et al. (2001). That is, most social and dependence-related problems are associated with the drinkers who binge, those who would be considered higher risk drinkers. Yet, it is also worth noticing that most of these “higher risk” drinkers are not at the top 10% but at the bottom 90% of the volume distribution, replicating findings by Gmel et al. (2001) and Skog (1999). Cuban Americans are an exception to this pattern, where problems are almost split equally between bingers and non-bingers (Table 2), and among bingers, problem drinkers are generally high volume drinkers (Table 3). Rossow and Romelsjo (2006) suggest that the prevention paradox may be less applicable in subgroups where intoxication is not common, which is true of Cuban Americans in the present study.

Why is the drinking among Cuban Americans different from the other three groups? Cuban Americans in the U.S. are unique in many ways compared to other Hispanic immigrant groups. Most Cuban Americans have come to the U.S. as political refugees. From the first wave of migration, after the 1959 Cuban revolution until now, Cuban Americans have had a higher educational level and a higher income level than other U.S. Hispanics. They also are older than other Hispanic groups. For this and other reasons, their drinking levels, problem prevalence, and prevalence of DSM-IV alcohol abuse and dependence is also lower (Caetano et al., 2008; Ramisetty-Mikler et al., in press; Vaeth et al., 2009).

However, the present results also demonstrate that the factor driving the discrepant results for Cuban Americans is that their risk of having an alcohol problem appears to increase more rapidly with drinking, *despite* 1) consuming the lowest overall amount of alcohol and 2) binge drinking at the lowest rates. Recall that the extent of the prevention paradox (or whether it holds) is driven by two factors: the relative risk of a problem in the high risk to the low risk group (Skog's “R”) and the relative size of the low risk group to the high risk group (Skog's “T”), with the paradox holding as long as $R < T$ (Skog, 1999). Clearly, the extent of the paradox will dampen as one chooses cutoffs that decrease T (i.e., simultaneously decreasing the size of the low risk group and increasing the size of the high risk group). Because Hispanic groups differ in the annual volume of alcohol consumed, we employed a cutoff strategy that equated the Hispanic groups on the relative sizes of the risk groupings. That is, “T” values were held constant at a value of 9 across ethnic groups. The ratio of the conditional risk of a problem across the risk groupings was however free to vary, and as expected, Cubans consistently showed elevated rates.

Note that in Table 1, the conditional risk of a problem for Cubans increases by a factor of 4.9 (34/7) for social problems and 4.3 (51/12) for dependence problems, the largest percentage increase across volume categories than any other group. Likewise, that ratio is also largest for Cubans when using a binge criterion (Table 2), with problem risk increasing by factors of 3.5 (21/6) for social problems and 4.2 (38/9) for dependence problems, the largest among the four ethnic groups. Furthermore, Cuban Americans were the only group to show a violation of the “second order” paradox: Among (social) problem drinkers who binge, a majority of those drinkers were *high* volume drinkers (fifth and sixth columns of

Table 3). This phenomenon could be a consequence of more conservative social norms against binge drinking that discourage occasional binge drinking by otherwise light drinkers. Alternatively, given sociodemographic differences that characterize Cuban Americans relative to other Hispanic groups, it could also reflect differences in social structures (e.g., law enforcement, education) that facilitate the detection of alcohol problems early on. A third possibility is that it reflects experiential factors: If a group has a lower prevalence of binge drinking, perhaps they are more susceptible to problems when they binge; such experiential factors could operate at the individual or environmental level. Future research will be necessary to explore the relative contribution of these alternative mechanisms, several of which may be involved.

The multiple logistic regression shows that both volume and binge are independently associated with social and dependence-related problems. However, the strength of the association between volume of drinking and binge drinking and problems is but one indicator of the importance of each of these factors in problem generation. Other factors to consider are the nature of the problem (e.g. acute vs. chronic), and for the prevention paradox in particular, the number of drinkers reporting high or low volume and binge or no binge. All other things being equal, the larger the number of drinkers reporting the risk factor the larger the number of problems generated by the factor.

What are the policy implications associated with these findings? The existence of the prevention paradox is an indication of the need to implement prevention policies that target the population as a whole and not a special group of heaviest drinkers only. This approach is supported not only by the data on the prevention paradox but also by other epidemiological data showing no threshold in the association between alcohol consumption and problems. That is, even drinkers at relatively low levels of consumption can be harmed by drinking. However, the consistent finding in the literature, replicated here, of high binge prevalence among light drinkers suggests that the motivating logic of such policy recommendations need not reference anything paradoxical: It can be grounded in the sheer prevalence of risky drinking patterns alone (for similar arguments, see Stockwell et al., 1996; Stockwell et al., 2008). Some examples of effective prevention policies at the population-level are those regulating physical availability (e.g., controlling hours and places of sale, minimum legal drinking age, server liability), and taxation and pricing (Babor et al., 2003). Furthermore, the results here and in previous research also highlight the importance of a balanced and comprehensive approach to prevention. This approach should address moderate drinkers with problems linked to risky drinking patterns and also include more intense interventions for targeted groups of risky drinkers (e.g., brief interventions and treatment for populations with a high prevalence of risky drinking behaviors). Although Cuban Americans showed a weaker form of the paradox in the present study, the differences were not substantial enough to warrant any differential policy recommendations.

Regarding binge drinking, in the U.S., the development of standardized definitions for binge as four drinks for women and five drinks for men in a two-hour drinking occasion, has made the identification of such a pattern of drinking easier, which should facilitate prevention. Although information and education efforts have not been seen as effective in the field (Babor et al., 2003), the population can still be informed about the risks associated with the consumption of this much alcohol. Such educational efforts can attract attention to the behavior in question and build support for other prevention policies. Other strategies, such as training bar servers not to serve intoxicated patrons, can also be implemented, although this strategy may have more limited effectiveness given that most alcohol is consumed in private settings, in general and also among Hispanics (Caetano and Raspberry, 2001; Padilla and Morrissey, 1993). In places where access to cars and driving is common, policies on lowered

blood alcohol content will help lower overall consumption, minimize binge drinking, and lower the rate of alcohol-related car crashes.

As the paragraph above suggests, the combination of policies chosen to prevent alcohol problems must take into consideration cultural characteristics of the target population and the existing infrastructure that will support implementation of the policies. Policies must be culturally acceptable to the population, and must be regularly enforced to be effective. Enforcement capability may have to be addressed and built, and close attention should be paid to local drinking patterns in designing the most effective approach.

Strengths and Limitations

This study collected comprehensive information on alcohol consumption and alcohol use disorders 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 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 (76%). 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 (e.g., of problems or consumption), and if under-reporting is higher in the high risk groups, this would bias results in favor of the prevention paradox. However, in this regard it is worth noting that a previous report that used verifiable records of alcohol-related harm also found a prevention paradox (Rossow and Romelsjo, 2006).

An important limitation is that the survey did not measure the frequency and severity of alcohol-related problems. So, it is possible that if drinkers at the top 10% of the volume distribution present problems with a higher frequency and with more severity, than the weight of the problems generated by these drinkers is under-estimated. However, Gmel et al. (2001) demonstrated that a similar set of problem items exhibited a parallel (i.e., equal loading) factor structure, justifying the use of the item sum as a proxy for problem severity. Another strength of the present report is that, unlike some previous papers, the measures of consumption and binge, as well as the problem measures, all reference the same time frame (i.e. 12 months previous to the survey interview). Finally, the analyses were conducted on weighted data. The results, therefore, although not representative of the U.S. Hispanic population, are representative of Hispanics living in the five metropolitan areas sampled.

Acknowledgments

Source of funding: 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

- Babor, TF.; Caetano, R.; Casswell, S.; Edwards, G.; Giesbrecht, N.; Graham, K.; Grube, J.; Gruenewald, PJ.; Hill, L.; Holder, H.; Homel, R.; Osterberg, E.; Rehm, J.; Room, R.; Rossow, I. Alcohol: No Ordinary Commodity- Research and Public Policy. Oxford University Press; Oxford and London: 2003.
- Caetano R, Ramisetty-Mikler S, Rodriguez LA. The Hispanic Americans Baseline Alcohol Survey (HABLAS): rates and predictors of alcohol abuse and dependence across Hispanic national groups. *J Stud Alcohol Drugs*. 2008; 69:441–448. [PubMed: 18432387]
- Caetano R, Raspberry K. DUI-arrest characteristics among white and Mexican-American DUI offenders mandated for treatment. *J Stud Alcohol*. 2001; 62:750–753. [PubMed: 11838911]
- Clark, WB.; Hilton, M., editors. Alcohol in America: Drinking Practices and Problems. State University of New York Press; Albany, NY: 1991.

- Dawson DA. Alternative definitions of high risk for impaired driving: the overlap of high volume, frequent heavy drinking and alcohol dependence. *Drug Alcohol Depend.* 1999; 54:219–28. [PubMed: 10372795]
- Gmel G, Klingemann S, Müller R, Brenner D. Revising the preventive paradox: the Swiss case. *Addiction.* 2001; 96:273–284. [PubMed: 11182873]
- Greenfield TK, Kerr WC. Alcohol measurement methodology in epidemiology: recent advances and opportunities. *Addiction.* 2008; 103:1082–1099. [PubMed: 18422826]
- Greenfield TK, Rogers JD. Who drinks most of the alcohol in the US? The policy implications. *J Stud Alcohol.* 1999; 60:78–89. [PubMed: 10096312]
- Hilton, ME. Trends in drinking problems and attitudes in the U.S., 1979–1984. In: Clark, WB.; Hilton, M., editors. *Alcohol in America: Drinking Practices and Problems.* State University of New York Press; Albany, NY: 1991. p. 139–148.
- Jones S, Casswell S, Zhang JF. The economic costs of alcohol-related absenteeism and reduced productivity among the working population of New Zealand. *Addiction.* 1995; 90:1455–1462. [PubMed: 8528030]
- Kreitman N. Alcohol consumption and the preventive paradox. *Br J Addict.* 1986; 81:353–363. [PubMed: 3461846]
- Leifman, H. *Perspectives on Alcohol Prevention.* Coronet Books Inc.; 1996.
- Moore, M.; Gerstein, D., editors. *Alcohol and Public Policy: Beyond the Shadow of Prohibition.* National Academy Press; Washington, DC: 1981.
- Norström T. Prevention strategies and alcohol policy. *Addiction.* 1995; 90:515–524. [PubMed: 7773114]
- Padilla AM, Morrissey L. Place of last drink by repeat DUI offenders: a retrospective study of gender and ethnic group differences. *Hisp J Behav Sci.* 1993; 15:357–372.
- Poikolainen K, Paljärvi T, Mäkelä P. Alcohol and the preventive paradox: serious harms and drinking patterns. *Addiction.* 2007; 102:571–578. [PubMed: 17286638]
- Ramisetty-Mikler S, Caetano R, Rodriguez LA. The Hispanic Americans Baseline Alcohol Survey (HABLAS): alcohol consumption and sociodemographic predictors across Hispanic national groups. *Journal of Substance Use.* in press.
- Rossow I, Romelsjö A. The extent of the ‘prevention paradox’ in alcohol problems as a function of population drinking patterns. *Addiction.* 2006; 101:84–90. [PubMed: 16393194]
- Skog OJ. The prevention paradox revisited. *Addiction.* 1999; 94:751–757. [PubMed: 10563040]
- Skog OJ. Alcohol and the so-called prevention paradox: how does it look today? *Addiction.* 2006; 101:155–158. [PubMed: 16445540]
- STATA Corporation. *STATA Statistical Software: Release 11.0.* STATA Corporation; College Station, TX: 2009.
- Stockwell T, Hawks D, Lang E, Ryon P. Unravelling the preventive paradox for acute alcohol problems. *Drug and Alcohol Review.* 1996; 15:7–15. [PubMed: 16203346]
- Stockwell T, Toumbourou JW, Letcher P, Smart D, Sanson A, Bond L. Risk and protection factors for different intensities of adolescent substance use: when does the Prevention Paradox apply? *Drug and Alcohol Review.* 2004; 23:67–77. [PubMed: 14965888]
- Stockwell T, Zhao J, Chikritzhs T, Greenfield TK. What did you drink yesterday? Public health relevance of a recent recall method used in the 2004 Australian National Drug Strategy Household Survey. *Addiction.* 2008; 103:919–928. [PubMed: 18482414]
- U.S. Census Bureau. August 142008a [January 26, 2009]. Available at: <http://www.census.gov/Press-Release/www/releases/archives/population/012496.html>
- U.S. Census Bureau. May 12008b [December 10, 2008]. Available at: <http://www.census.gov/Press-Release/www/releases/archives/population/011910.html>
- Vaeth PAC, Caetano R, Ramisetty-Mikler S, Rodriguez LA. The Hispanic Americans Baseline Alcohol Survey (HABLAS): alcohol-related problems across Hispanic national group. *J Stud Alcohol Drugs.* 2009; 70:991–999. [PubMed: 19895778]
- Wyllie A, Zhang JF, Casswell S. Risk functions for frequency of alcohol-related negative consequences: New Zealand survey data. *Addiction.* 2000; 95:1821–1832. [PubMed: 11177497]

Table 1

Prevalence of problem drinkers and proportion of reported problems by drinkers at the bottom 90% and top 10% of the volume distribution.

	Percentage of drinkers with at least one problem			Percentage of low-volume drinkers among all problem drinkers	Percentage of problems attributable to low-volume drinkers
	Bottom 90%	Top 10%	Total		
Social Problems					
Puerto Ricans	25%	74%	30%	77%	70%
N	644	73	717	240	612
Cuban Americans	7%	34%	10%	60%	56%
N	585	73	658	94	173
Mexican Americans	32%	72%	35%	82%	71%
N	586	67	653	250	566
South/Central Americans	21%	50%	23%	85%	73%
N	655	74	729	192	348
Dependence Problems					
Puerto Ricans	34%	75%	37%	81%	69%
N	644	73	717	295	665
Cuban Americans	12%	51%	17%	66%	55%
N	585	73	658	122	235
Mexican Americans	30%	73%	34%	81%	70%
N	586	67	653	251	586
South/Central Americans	21%	70%	24%	80%	73%
N	655	74	729	195	360

Note 1. Percentages are weighted, Ns are unweighted.

Note 2. "Percentage of drinkers with at least 1 problem" corresponds to the probability of having a problem among the two volume classifications; "Percentage of low-volume drinkers among all problem drinkers" corresponds to the probability of being a low-volume drinker given that problems were experienced in the last 12mo. "Percentage of problems attributable to low-volume drinkers" corresponds to the sum of problem types among the bottom 90% divided by the sum of problem types reported by all drinkers.

Table 2

Prevalence of problem drinkers and proportion of reported problems by non-binge and binge drinkers.

	Percentage of drinkers with at least one problem			Percentage of binge drinkers among all problem drinkers	Percentage of problems attributable to binge drinkers
	Non-binge drinkers	Binge drinkers	Total		
Social Problems					
Puerto Ricans	15%	45%	30%	75%	75%
N	382	333	715	237	608
Cuban Americans	6%	21%	10%	53%	53%
N	527	131	658	94	174
Mexican Americans	24%	53%	35%	59%	58%
N	379	274	653	247	560
South/Central Americans	16%	35%	23%	56%	60%
N	459	269	728	191	346
Dependence Problems					
Puerto Ricans	25%	50%	37%	66%	73%
N	382	333	715	293	663
Cuban Americans	9%	38%	17%	58%	59%
N	527	131	658	121	230
Mexican Americans	21%	52%	33%	61%	65%
N	379	274	653	247	575
South/Central Americans	14%	42%	24%	64%	64%
N	459	269	728	194	358

Note 1. Percentages are weighted, Ns are unweighted.

Note 2. "Percentage of drinkers with at least 1 problem" corresponds to the probability of having a problem among the two binge classifications; "Percentage of binge drinkers among all problem drinkers" corresponds to the probability of being a binge drinker given that problems were experienced in the last 12mo. "Percentage of problems attributable to binge drinkers" corresponds to the sum of problem types among the binge group divided by the sum of problem types reported by all drinkers.

Table 3
Prevalence of problem drinkers and proportion of reported problems by drinkers in volume and binge drinking groups.

	Percentage of drinkers with at least one problem				Percentage of low and high volume binge drinkers among all problem drinkers		Percentage of problems attributable to low and high volume binge drinkers	
	Bottom 90% Volume, No Binge	Top 10% Volume, No Binge	Bottom 90% Volume, Binge	Top 10% Volume, Binge	Bottom 90% Volume, Binge	Top 10% Volume, Binge	Bottom 90% Volume, Binge	Top 10% Volume, Binge
Social Problems								
Puerto Ricans	14%	52%	39%	79%	53%	21%	47%	28%
N	361	17	276	55	237	237	608	608
Cuban Americans	5%	17%	11%	50%	21%	31%	21%	31%
N	488	38	95	35	93	93	172	172
Mexican Americans	22%	54%	48%	81%	45%	14%	36%	23%
N	354	22	227	44	246	246	557	557
South/Central Americans	15%	38%	32%	54%	44%	12%	39%	20%
N	434	25	220	49	191	191	346	346
Dependence Problems								
Puerto Ricans	25%	36%	44%	79%	49%	17%	46%	27%
N	361	17	276	55	293	293	663	663
Cuban Americans	8%	30%	29%	70%	33%	25%	25%	35%
N	488	38	95	35	121	121	230	230
Mexican Americans	20%	64%	48%	76%	47%	14%	43%	22%
N	354	22	227	44	247	247	575	575
South/Central Americans	13%	45%	36%	79%	47%	17%	45%	19%
N	434	25	220	49	194	194	358	358

Note 1. Percentages are weighted, Ns are unweighted.

Note 2. "Percentage of drinkers with at least 1 problem" corresponds to the probability of having a problem among the four classifications; "Percentage of low and high volume binge drinkers among all problem drinkers" corresponds to the probability of being low and high-volume (respectively) binge drinkers given that problems were experienced in the last 12mo. "Percentage of problems attributable to low and high volume binge drinkers" corresponds to the sum of problem types among the low and high-volume binge groups (respectively) divided by the sum of problem types reported by all drinkers.

Table 4

Logistic regression odds ratios and 95% CIs for social and dependence problems.

	Puerto Ricans	Cuban Americans	Mexican Americans	South/Central Americans
Social Problems				
Binge	3.73 [2.18 - 6.38]	2.71 [1.33 - 5.50]	3.24 [1.98 - 5.30]	2.62 [1.59 - 4.29]
Volume	5.98 [2.19 - 16.37]	5.7 [2.63 - 12.39]	4.3 [1.92 - 9.65]	2.75 [1.14 - 6.63]
Dependence Problems				
Binge	2.5 [1.40 - 4.45]	4.9 [2.50 - 9.61]	3.53 [2.14 - 5.82]	3.93 [2.28 - 6.79]
Volume	4.05 [1.50 - 10.97]	5.42 [2.54 - 11.57]	4.76 [1.89 - 11.97]	6.14 [2.87 - 13.16]

Note. For both social and dependence problems, no interaction terms reached significance.