Published in final edited form as:

Addiction. 2009 September ; 104(9): 1503–1511. doi:10.1111/j.1360-0443.2009.02579.x.

Differences in the measured alcohol content of drinks between black, white and Hispanic men and women in a US national sample:

Ethnicity and drink alcohol

William C. Kerr, Deidre Patterson, and Thomas K. Greenfield

Alcohol Research Group 6475 Christie Avenue, Suite 400 Emeryville, CA 94608

Abstract

Aims—To measure and describe drink alcohol content differences between Hispanic, non-Hispanic white and non-Hispanic black men and women in the US.

Design—A telephone survey re-interview of 397 respondents who originally participated in the 2005 National Alcohol Survey of whom 306 provided complete information on home drinks.

Setting—United States

Participants—Adults 18 and older from across the US.

Measurements—Direct measurement by respondents of simulated drink pours in respondents' own glassware using a provided beaker and reported beverage brands were used to calculate drink alcohol content.

Findings—Black men were found to have the largest overall mean drink alcohol content at 0.79oz (23ml) of alcohol. This was significantly larger than the mean for white men or for black women and added 30% to black men's monthly alcohol intake when applied to their reported number of drinks. Spirits drinks were found to be particularly large for men. Multivariate models indicated that drink alcohol content differences are attributable more to income and family structure differences than to unmeasured cultural factors tied to race or ethnicity per se. Models predicting alcohol-related consequences and dependence indicate that adjusting drink alcohol content improves model fit and reduces differences between race/ethnicity defined groups.

Conclusions—Differences in drink alcohol content by gender, race/ethnicity and beverage type choice should be considered in comparisons of drinking patterns and alcohol-related outcomes. Observed differences can be partially explained by measured characteristics regarding family structure and income.

Keywords

alcohol content; ethnic differences; race; ethnicity; gender; beverage type

INTRODUCTION

Differences in both drinking patterns and alcohol-related outcomes have been found in US comparisons of Hispanic, Non-Hispanic white and Non-Hispanic black race/ethnicity groups. Hispanic and black groups have been found to have more extreme drinking patterns relative

to whites with higher levels of abstinence, a higher proportion of heavy drinking among drinkers and less reduction of heavy drinking with age (1-3). The stability of heavy drinking among blacks moving into older age groups has been linked to substantially higher cirrhosis mortality rates relative to whites (4), a difference that also exists for Hispanics (5). Ethnic differences in beverage choice have also been found with Hispanics being more likely to drink beer, African Americans more likely to drink spirits and both groups less likely to drink wine as compared to white drinkers (3). African American male drinkers have been found to be more likely to consume spirits and malt liquor beer and to have particularly large drinks and high daily intake from these beverage types in a community sample (6). In a community sample of pregnant women, African Americans were found to be more likely to drink malt liquor beer than white or Native American women (7). This study found especially large drink alcohol contents for malt liquor beer, fortified wine and spirits drinks for all respondents (8), however, given power considerations, ethnic comparisons were not made.

A puzzling finding in this literature has been that black drinkers report more problems and higher rates of alcohol abuse and dependence for any given level of alcohol consumption (9). Possible explanations suggested by Herd (9) include drier drinking cultures with more abstainers and a greater susceptibility to problems due to socioeconomic disadvantage among blacks. Other research finds that socioeconomic status (SES) interacts with ethnicity, such that alcohol problems for blacks as compared to whites are much higher in a low SES group, but fewer in a high SES group (10), indicating further complexity in these relationships (11). Additionally, ethnic interactions found in the relationship between number of alcohol dependence symptoms and help seeking underscore the importance for health disparities in understanding ethnic/racial differences in heavy drinking in relation to alcohol problems (12). Previous research has also found differences in the number of drinks reported to feel drunk by those reporting episodes of drunkenness in the past year (13). Multivariate models predicting the self-reported number of drinks to feel drunk found that black race was a significant predictor of less drinks for both men and women compared to the white reference group. No differences were seen between whites and Hispanics of either gender.

Another potential contributor to the differential risk of alcohol problems and relatively low reported number of drinks to feel drunk, suggested by a previous study of drink ethanol content (14), is that black drinkers consume larger drinks than whites such that alcohol volume measures that do not account for drink size are not directly comparable between racial groups. The earlier study, based on a methodological sub-sample follow-up survey of the 2000 National Alcohol Survey (NAS), had very few black and Hispanic drinkers, and therefore this inference could not be adequately tested. The present study, using a methodological sub-sample of the 2005 NAS, was designed to address questions related to ethnic differences in drink alcohol content by sampling roughly equal proportions of black, white and Hispanic drinkers from across the US.

METHODS

Sample

The 2005 (NAS) involved a random digit dialed (RDD) sample including all US states and Washington D.C. with over-samples of black and Hispanic residents and 13 low population states interviewed by Computer Assisted Telephone Interviewing (CATI) methods. A total of 6,919 respondents included 1,610 Hispanics and 1,054 Non-Hispanic blacks. Fieldwork was conducted by DataStat Inc. of Ann Arbor Michigan and the number of interviews as a percentage of eligible contacted households (AAPOR cooperation rate 3) (15) was 56%. The 2006 Methodologic Follow-up (NAS Methods) of the 2005 NAS involved a re-interview of 397 respondents recruited at the end of the original interview out of 827 approached. Telephone interviews took place between July 2005 and July 2006 with 95% occurring within 4 months

of the original interview, lasting about 30 minutes with respondents paid \$25 for participating. Analyses included data from the original 2005 NAS interview. Utilizing the ethnic minority over-samples, the NAS Methods study purposefully over-sampled black and Hispanic respondents who completed the original interview in English such that the sample included 155 black, 123 Hispanic and 119 white individuals. Data were weighted to the US population by combining each respondent's 2005 NAS weight with additional selection weights by gender, ethnicity, and age group to weight the NAS Methods sample back to the full NAS sample and the US general population. All analyses were conducted using linearized standard error estimates in STATA 10 to account for sampling design and post-stratification weighting (16). Not all of the respondents drank at home and some respondents did not provide complete information needed to calculate home drink ethanol content, resulting in a final sample of 306 for home drink ethanol analyses, with 302 having complete data for model-based analyses.

Measurement

Alcohol consumption was measured in the original 2005 NAS survey through beverage-specific graduated frequency (GF) questions (17). Respondents first reported the number of days on which they consumed each of the three beverage types and then the relative frequency of 1 to 2, 3 to 4, and 5 or more drinks. From this information the number of days drinking at each level was calculated. The average number of drinks at the two lower levels was taken as the mean (1.5 and 3.5 drinks) and the value for 5 or more drinks was calculated from separate combined beverage GF questions (18) in which the frequency of 5 to 7, 8 to 11 and 12 or more drinks was assessed, such that individual's mean number of drinks on 5+ occasions could be estimated. Total volume was calculated as the sum of the resultant beverage-specific (i.e., beer, wine and spirits) volume measures. The combined beverage GF measure was also used to calculate the volume measure used in models predicting drink alcohol content (17). This measure assessed the frequency of consuming 1, 2 and 3 to 4 drinks in addition to the levels reported above.

Drink alcohol content estimates were based on a pouring and measuring exercise for those reporting drinking at home out of a glass, or based on reported container size. Respondents were instructed to prepare for the scheduled interview by having available a pitcher of water, ice, and the pre-mailed plastic funnel and cone-shaped measuring beaker (the Perfect Beaker®), specifically designed to accurately measure both small and large amounts. At the time of the interview, they were instructed to get the glasses from which they usually consume beer, wine and spirits drinks at home and to simulate usual pours of each beverage using water. They were then instructed to pour the water from the glass into the beaker and to report the closest number of ounces (or half ounces at low levels), rounding down. For spirits drinks involving ice, the funnel was used and an adjustment of 6% was made for ice melt (based on prior testing). For spirits with multiple alcohol brands, having measured the first ingredient, respondents poured the water back into the glass and then added the next ingredient and measured again. The alcohol content of each beverage, beer, wine or spirits, was obtained from the reported brand or from the average percentage alcohol concentration by volume (%ABV) for the reported beverage sub-type when a specific brand was not reported. Alcohol content was then calculated as the volume of the beverage multiplied by the associated %ABV or the sum of this in the case of multiple alcohol products in a mixed spirits drink.

The reported number of alcohol-related problems in the past year was the sum of positive responses to 29 negative experiences people have reported in connection to drinking including both DSM IV dependence symptoms and 15 tangible social consequences (19). Indicator variables for endorsing 3 or more dependence symptom items and reporting 2 or more consequences in the past year were created. The respondent's greatest number of drinks in any day in the past year was taken from an open-ended question following questions asking the

respondent think about the time they had the most drinks in a day in the past year and to identify the type of location and with whom they were drinking on that day (20). The reported number of drinks to feel drunk was asked directly as “How many drink does it take you to feel drunk?” (13).

Analysis

Mean drink alcohol content and alcohol consumption volume measures were estimated by gender and ethnic groups and compared using survey-weighted Wald tests in Stata 10 (16). Weighted least squares models predicting the natural log of respondents’ mean alcohol content for all drink types reported were estimated. Logged values in milliliters were used to address the skewed distribution evident in Figure 1. Explanatory variables were taken from the original 2005 NAS survey. These are: gender, age group (coded as an indicator for those 55 aged and older), race/ethnicity (coded as Hispanic, white and black), and indicator for being married, an indicator for having children in the household, reported household income, geographic region, and educational attainment, alcohol volume (from the combined beverage GF) and the number of alcohol-related problems reported for the past year. Separate logistic regression models predicting 2+ consequences and 3+ dependence symptoms were estimated to compare the fit and effect on race/ethnicity indicators from using alcohol volume from standard drinks with volume adjusted by measured drinks.

RESULTS

Drink ethanol comparisons

The consumption-weighted average alcohol content of respondents’ usual drink at home was 0.65oz (19ml), about 15 grams of ethanol and 8% more than the standard drink of 0.6oz (18ml). Drink alcohol content was found to vary widely by beverage type. Beer drinks contained the least alcohol with a mean of 0.56oz (17ml), less than the standard drink amount (due to a proportion drinking light beer at approximately 4% ABV). Wine drinks had substantially more alcohol with a mean content of 0.71oz (21ml) and spirits drinks had the most with 0.8oz (24ml) on average.

Mean drink alcohol content for groups defined by gender and ethnicity are presented in Table 1. Men were generally found to have stronger drinks than women with significant differences seen for both beer and spirits. Men’s drinks were about 11% larger overall and for beer and 37% larger for spirits drinks. Black men were found to have significantly larger drinks than black women overall and for beer. White men were found to have larger spirits drinks and Hispanic men were found to have larger beer drinks compared to women of the same ethnicity.

Differences were also seen by ethnicity within each gender, but were not significant except that black men were found to have significantly larger drinks overall than white men, a difference of 20%. This indicates a lack of comparability for reported drinks between these groups as further illustrated in Figure 1. White drinkers had the most concentrated distribution while Hispanic, and particularly black drinkers, had a wider distribution of drink alcohol contents with more individuals reporting a range of stronger drink amounts.

Ethnic differences in rates of current drinking

Differences in the rates of drinking and abstention between the gender and ethnicity defined groups are substantial and should be considered in the interpretation of other alcohol measures. In the 2005 NAS sample the highest rates of current drinking were found for white men 73.4% (95% CI= 71.2, 75.5) and for white women 70.7% (95% CI= 68.5, 72.8). The lowest rate of current drinking was among Hispanic women at 38.0% (95% CI= 34.1, 42.0), who also had a high rate of lifetime abstention at 40.8% (95% CI= 37.1, 44.6). Black women also had a low

rate of current drinking at 44.2% (95%CI= 40.0, 48.5), but abstainers were more likely to be former drinkers in this group. Rates of current drinking among black and Hispanic men were also lower than those for white men at 57.5% (95%CI= 52.0, 62.8) and 63.8% (95%CI= 60.1, 67.4), respectively. These rates indicate that the population of drinkers considered in the NAS Methods sample is a more selected group for black and Hispanic ethnicities, especially among women.

Effects on volume

The effect of adjusting the monthly volume of consumption by applying individual drink alcohol content estimates to the reported number of drinks, as compared to assuming a 0.6oz (18ml) of ethanol standard drink, is illustrated in Table 2 for each of the gender and ethnicity defined groups. As was the case for drink alcohol content, results were found to differ by gender and ethnicity group ranging from a decline of 23% in alcohol volume for Hispanic women's beer consumption to an increase of 126% in Hispanic men's alcohol volume from spirits. However, none of the differences for Hispanics were significant due to the large variance in consumption volume for this group. All groups involving white or black race had at least one beverage type for which mean consumption volume changed significantly, with particularly large changes seen for spirits consumption. In terms of overall alcohol intake, only black men were found to have significantly increased volume, 31% higher, when individual drink alcohol content estimates were applied. Adjustments based on drink alcohol content estimates were also applied to respondents' reports of the most drinks they reported consuming in a day in the past year and the number of drinks it takes them to feel drunk, assessed in the 2005 NAS administration. Previous research has found that both black men and women reported requiring fewer drinks to feel drunk than did white or Hispanic drinkers (13). A similar, but not statistically significant, pattern is found for men in the current sample. When individual drink ethanol estimates were applied, the difference between white and black men disappeared, with both ethnicities requiring a mean of 6.7 ethanol-adjusted standard drinks to feel drunk, while the mean for Hispanic men increased to 7.6 drinks. Similarly, for the most drinks consumed on any day in the past year, white male drinkers reported drinking a larger number, although these differences were not significant. After drink ethanol content adjustment was applied, the differences were no longer seen and all groups were estimated to have a mean largest daily intake of over 8 ethanol-adjusted standard drinks. For women these comparisons were not found to be affected by drink ethanol content adjustments.

Models of drink alcohol content variation

Multivariate models predicting individual's overall average drink alcohol content included Hispanic and black group indicators and other potential predictors were estimated for men and women separately and for both genders combined. No significant effect on drink alcohol content was found for either the Hispanic or black group indicator when other factors are controlled. Additional step-wise backward elimination analyses indicate that removing the variables for income groups, marital status and children in the household results in a significant positive effect for black race among men. This suggests that these factors, which differ between the black and white groups, help to account for differences in drink alcohol content between white and black men. The number of drinks consumed in the past year (a measure of average volume), derived from graduated frequency questions, was found to positively predict drink alcohol content among women, but not among men or overall. In contrast, the variable representing the reported number of alcohol-related problems in the past year was a significant positive predictor in the models for men and overall, but not for women. Male gender was found to be a significant positive predictor in the combined gender model. Both being married and having children in the household were found to reduce mean drink alcohol content with a significant and stronger effect of marriage seen for men, and a significant and stronger effect of children seen for women. Age was found to be negatively related to drink alcohol content

with a significant effect for being in the 55 and older group, as compared to all drinkers under 55, for men and overall. Both income and educational attainment were found to predict drink alcohol content. The lowest drink alcohol content was associated with the less than \$20,000 income group, while the largest drink alcohol content was found in the relatively low \$20,000 to \$40,000 income group for men and in the \$40,000 to \$60,000 group for women. Similarly, those with less than a high school education were found to have the lowest alcohol content drinks. For men and overall, the college graduate group was found to have the highest alcohol content drinks, while for women, higher alcohol content drinks were found for the high school graduate only group.

Models predicting alcohol problems

The effect of adjusting the reported number of drinks for measured alcohol content on the prediction of alcohol dependence symptoms and related consequences is illustrated in Table 3. For both outcomes the Naglerke R-squared measure is larger in the models with models adjusted for measured drink ethanol and the size and significance level of the black and Hispanic indicators is reduced (although neither indicator is a significant predictor of problems in any model). Further, separate models by race/ethnic group show increases in the Naglerke R-squared with the exception of the dependence model for the white group. The largest improvements in fit from drink ethanol adjustment are seen in the models predicting consequences among blacks and dependence among Hispanics.

DISCUSSION

Significant differences in the measured alcohol content of drinks consumed at home were found by beverage type, gender and ethnicity. Black men were found to have the largest drink alcohol content, 0.79oz (23ml) overall, which added 30% to the group's mean estimated monthly ethanol intake when applied to reported drinks on an individual basis. Spirits drinks were especially strong for this group; the average alcohol content was about 1.0 ounce (29.6ml), 70% larger than the standard drink. White and Hispanic men were also found to have particularly large spirits drinks, about 50% larger than the standard drink. Importantly, our results also indicate that attention to the measurement of drink alcohol content can improve the fit of models predicting alcohol-related problems and dependence symptoms from reported drink volume. The larger drink sizes reported by ethnic minorities may partially explain the higher risks, for given volume and patterns, often observed among black at Hispanic drinkers as compared to white drinkers with similar volume and pattern (9).

These observed differences by beverage and across gender, race, ethnicity, income, family structure and other individual characteristics in the US highlight the cultural and environmental determinants of what constitutes a "drink" and the importance of obtaining individual-level information about drink choices. Because most studies are limited in their ability to address this issue, detailed assessments such as ours are needed to determine the most useful questions and mean values to apply for the relevant drinks, contexts and drinker characteristics. Unfortunately, this type of information is very specific to a country and often to particular sub-groups or drinking contexts. For example, a recent study our group conducted in several states of India highlights the importance of determining popular beverages (and estimates of their % ABV), containers and pour sizes in particular local areas when designing alcohol consumption pattern assessments (21). More developed countries tend to have a different problem due to the wide variety of brands and container sizes available as well as more variety in glassware, which was highly standardized in particular areas of India though it varied across the areas (21). General population surveys in New Zealand (22) and Australia (23) have achieved a relatively high degree of coverage as compared to alcohol sales data through the use of detailed drink type and matching container or glass size options.

Recent studies by our group on the alcohol content of drinks served in bars and restaurants indicates that these drinks are typically larger than both standard drinks and home drinks for draught beer, wine and spirits drinks (24). The two bars in our sample with mainly black patrons were found to have significantly more alcohol in spirits drinks than bars with mainly white patrons or a mix of ethnicities (25). While not conclusive, this parallels the findings of the current study and suggests the importance of further work on this issue. Having developed drink alcohol content estimates in both the home and on-premise contexts we are able to apply these proportionally to drinks in the 2005 NAS and will incorporate these into future studies.

Limitations

Despite considerable efforts to reach and enroll the methodological sample, the combined response rate for the 2005 NAS and Methods follow-up was low, suggesting that the results may not be perfectly representative of the US population. However, the sample was well dispersed, including respondents in 49 of 50 states, and was a follow up of a carefully conducted large-scale general population RDD sample. The drinkers in this sample did differ from drinkers in the 2005 NAS in that they had higher volume except among white women and drank a higher proportion of wine and beer. They were similar on most demographic characteristics but were on average younger and had higher incomes. By design, only drinks consumed at home were measured, not those drunk in other people's houses, or in bars or restaurants (for which a separate study was conducted (24,25)). Because of resource limitations, only primary English speaking respondents were included, so Hispanics who took original survey in Spanish were omitted and the results for Hispanics do not represent this group. Primary Spanish speakers were younger, had lower incomes, were less educated and were more likely to have children. Spanish speaking men drank more per usual occasion and drank relatively more beer and less spirits but had about the same overall volume, while women had a much lower volume of all beverages but a similar number of drinks per occasion. Since Hispanic women who took the survey in Spanish drink very little and men drink mostly beer, which is highly standardized in 12 ounce containers, we do not expect the results to be significantly biased by this limitation.

The %ABV estimate was taken from beverage sub-type averages in some cases, especially for wine, reducing accuracy somewhat in these instances compared to those who provided specific brand and wine varietal information. There is a potential for measuring, rounding or reporting errors due to self-completion of measuring tasks. For spirits drinks, ice melt could vary from the 6% adjustment applied depending on the size of the cubes and the temperature of the ice and water. Only the usual drink of each beverage type was measured. Some drinkers may consume a variety of drinks or brands, including malt liquors, and these may differ from the usual. Differences in drinking patterns and preferences in subpopulations within race/ethnic groups by sub-groups have been noted such that these results may not apply to all sub-groups (3). Nonetheless, this represents the most comprehensive study of home drink ethanol content so far mounted in the U.S. and we do not believe that the results are greatly biased by these limitations.

Conclusions

Future research studies in the US and other countries should either include relevant aspects of drink alcohol content variation such as pour size, brand and particularly beverage type or should at minimum be aware of these differences in the interpretation of results or recommendations. Further research to incorporate individual drink alcohol content estimates into analyses of the relationships between alcohol intake and pattern and alcohol-related outcomes by gender and race/ethnicity is warranted and is of international importance (26). Education regarding drink size and interventions incorporating drink size information should pay particular attention to spirits drinks and may be improved through culturally-targeted approaches. More research is

needed to confirm and refine these findings and to expand knowledge into on-premise and party drinking contexts as well as to other ethnic groups and sub-groups in the US. While the specific results of this study should not be applied in other countries the methods can be adapted and are likely needed to achieve more accurate alcohol intake assessments (17), especially in countries where drink sizes are not standardized.

Acknowledgements

This research was supported by grant P30-AA05595 to the Alcohol Research Group, Public Health Institute from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). The authors would like to thank Sarah Zemore and Lee Ann Kaskutas for comments on an earlier draft.

References

1. Caetano R, Kaskutas LA. Changes in drinking patterns among Whites, Blacks and Hispanics: 1984-1992. *Journal of Studies on Alcohol* 1995;56(5):558-565. [PubMed: 7475037]
2. Caetano R, Kaskutas LA. Changes in drinking problems among Whites, Blacks and Hispanics: 1984-1992. *Substance Use and Misuse* 1996;31(11-12):1547-1571. [PubMed: 8908707]
3. Dawson DA. Beyond black, white and Hispanic: race, ethnic origin and drinking patterns in the United States. *Journal of Substance Abuse* 1998;10(4):321-339. [PubMed: 10897287]
4. Herd D. Migration, cultural transformation and the rise of Black liver cirrhosis mortality. *British Journal of Addiction* 1985;80(4):397-410. [PubMed: 3910073]
5. Yoon, Y-H.; Yi, H-y. Liver Cirrhosis Mortality in the United States, 1970-2004. National Institute on Alcohol Abuse and Alcoholism; Arlington, VA: Aug. 2007 Surveillance Report #79
6. Bluthenthal RN, BrownTaylor D, Guzmán-Becerra N, Robinson PL. Characteristics of malt liquor beer drinkers in a low-income, racial minority community sample. *Alcoholism: Clinical and Experimental Research* 2005;29(3):402-409.
7. Graves K, Kaskutas LA. Beverage choice among Native and African American urban women. *Alcoholism: Clinical and Experimental Research* 2002;26(2):218-222.
8. Kaskutas LA, Graves K. An alternative to standard drinks as a measure of alcohol consumption. *Journal of Substance Abuse* 2000;12(12):67-78. [PubMed: 11288475]
9. Herd D. Predicting drinking problems among Black and White men: Results from a national survey. *Journal of Studies on Alcohol* 1994;55:61-71. [PubMed: 8189728]
10. Jones-Webb RJ, Hsiao C-Y, Hannan P. Relationships between socioeconomic status and drinking problems among Black and White men. *Alcoholism: Clinical and Experimental Research* 1995;19(3):623-627.
11. Mulia N, Ye Y, Greenfield TK, Zemore SE. Disparities in alcohol-related problems among white, black, and Hispanic Americans. *Alcoholism: Clinical and Experimental Research*. In press
12. Schmidt LA, Ye Y, Greenfield TK, Bond J. Ethnic disparities in clinical severity and services for alcohol problems: results from the National Alcohol Survey. *Alcoholism: Clinical & Experimental Research* 2007;31(1):48-56.
13. Kerr WC, Greenfield TK, Midanik LT. How many drinks does it take you to feel drunk? Trends and predictors for subjective drunkenness. *Addiction* 2006;101(10):1428-1437. [PubMed: 16968344]
14. Kerr WC, Greenfield TK, Tujague J, Brown S. A drink is a drink? Variation in the alcohol content of beer, wine, and spirits drinks in a U.S. methodological sample. *Alcoholism: Clinical and Experimental Research* 2005;29(11):2015-2021.
15. American Association for Public Opinion Research. Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. Vol. 5th edition. AAPOR; Lexena, KS: 2008.
16. Stata Corporation. Stata Corp. Stata Statistical Software. Vol. Release 10.0 ed.. College Station; Texas: 2007.
17. Greenfield TK, Kerr WC. Alcohol measurement methodology in epidemiology: recent advances and opportunities. *Addiction* 2008;103(7):1082-1099. [PubMed: 18422826]
18. Greenfield TK. Ways of measuring drinking patterns and the difference they make: experience with graduated frequencies. *Journal of Substance Abuse* 2000;12(1):33-49. [PubMed: 11288473]

19. Midanik L, Greenfield TK. Trends in social consequences and dependence symptoms in the United States: the National Alcohol Surveys, 1984-1995. *American Journal of Public Health* 2000;90(1): 53–56. [PubMed: 10630137]
20. Greenfield TK, Nayak M, Bond J, Ye Y, Midanik LT. Maximum quantity consumed and alcohol-related problems: assessing the most alcohol drunk with two measures. *Alcoholism: Clinical and Experimental Research* 2006;30(9):1576–1582.
21. Nayak M, Kerr WC, Greenfield TK, Pillai A. Not all drinks are created equal: implications for alcohol assessment in India. *Alcohol and Alcoholism* 2008;43(6):713–718. [PubMed: 18832137]
22. Casswell S, Huckle T, Pledger M. Survey data need not underestimate alcohol consumption. *Alcoholism: Clinical and Experimental Research* 2002;26(10):1561–1567.
23. 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(6):919–928. [PubMed: 18482414]
24. Kerr WC, Patterson D, Koenen MA, Greenfield TK. Alcohol content variation of bar and restaurant drinks in Northern California. *Alcohol: Clinical and Experimental Research* 2008;32(9):1623–1629.
25. Kerr WC, Patterson D, Koenen MA, Greenfield TK. Large drinks are no mistake: glass size, not shape, affects alcoholic beverage drink pours. *Drug and Alcohol Review*. in press
26. Stockwell, T.; Chikritzhs, T., et al., editors. *International Guide for Monitoring Alcohol Consumption and Related Harm*. World Health Organization; Geneva: 2002.

Figure 1. Distribution of mean drink ethanol content by white, black and Hispanic race/ethnicity group. Ounces of ethanol per drink. (1oz =29.6ml)

Table 1

Mean drink ethanol content by gender and ethnic group by beverage type and for a weighted average of all types. (1oz =29.6ml)

	Men (95% CI)	Women (95% CI)	Men > women (p < 0.05)
Total Alcohol	0.68 (0.61, 0.74)	0.61 (0.57, 0.66)	
White	0.66 ^a (0.59, 0.74)	0.61 (0.56, 0.66)	
Black	0.79 ^a (0.69, 0.90)	0.64 (0.55, 0.74)	yes
Hispanic	0.69 (0.59, 0.81)	0.61 (0.52, 0.70)	
Wine	0.72 (0.59, 0.86)	0.69 (0.62, 0.76)	
White	0.72 (0.55, 0.88)	0.70 (0.62, 0.78)	
Black	0.72 (0.62, 0.82)	0.67 (0.53, 0.80)	
Hispanic	0.77 (0.64, 0.90)	0.68 (0.58, 0.79)	
Beer	0.58 (0.54, 0.61)	0.52 (0.49, 0.55)	yes
White	0.57 (0.53, 0.61)	0.52 (0.49, 0.56)	
Black	0.65 (0.56, 0.74)	0.52 (0.48, 0.56)	yes
Hispanic	0.61 (0.51, 0.71)	0.49 (0.44, 0.54)	yes
Spirits	0.89 (0.78, 1.00)	0.65 (0.54, 0.76)	yes
White	0.87 (0.74, 1.00)	0.62 (0.50, 0.74)	yes
Black	1.02 (0.81, 1.23)	0.85 (0.64, 1.05)	
Hispanic	0.92 (0.69, 1.15)	0.71 (0.47, 0.95)	

Note: CI = Confidence interval

^aSignificant (p<0.05) difference between white men and black men

Table 2
Overall and beverage-specific alcohol intake in the past month based on the reported number of drinks and converted into ounces of ethanol using either 0.6 ounce standard drinks or the individual's beverage-specific beaker-measured drink ethanol content estimate. (1oz =29.6ml)

	Standard (0.6oz) EtOH per Drink		Beaker Measured EtOH per Drink		% Difference
	Mean	95% CI	Mean	95% CI	
Overall					
White women	8.6	(5.5, 11.7)	8.8	(5.7, 11.8)	+2.3
Black women	11.3	(5.5, 17.1)	11.1	(6.3, 15.9)	-1.8
Hispanic women	17.7	(5.0, 30.3)	16.9	(7.4, 26.5)	-4.5
White men	29.9	(10.5, 49.4)	31.8	(13.9, 49.7)	+6.4
Black men ^a	38.8	(19.3, 58.3)	50.7	(24.5, 76.9)	+30.7
Hispanic men	19.3	(11.5, 27.1)	25.3	(11.9, 38.7))	+30.8
Wine					
White women ^a	6.2	(3.6, 8.8)	7.1	(4.2, 10.0)	+ 14.5
Black women	7.0	(-0.2, 14.2)	6.5	(1.3, 11.7)	-7.1
Hispanic women	7.0	(3.2, 10.7)	8.7	(3.6, 13.9)	+24.3
White men	7.6	(4.2, 11.0)	11.4	(4.2, 18.5)	+50.0
Black men	25.3	(-7.0, 57.7)	28.6	(-7.7, 64.9)	+13.0
Hispanic men	9.8	(1.4, 18.3)	12.3	(2.4 22.2)	+25.5
Beer					
White women ^a	6.1	(3.0, 9.3)	5.0	(2.5, 7.5)	-18.0
Black women ^a	10.0	(3.7, 16.3)	8.4	(3.1, 13.7)	-16.0
Hispanic women	16.3	(0.9, 31.7)	12.5	(2.2, 22.8)	-23.3
White men	28.0	(5.2, 50.7)	25.4	(5.7, 45.0)	-9.3
Black men	24.4	(9.7, 39.1)	32.7	(9.0, 56.5)	+34.0
Hispanic men	11.4	(7.3, 15.5)	12.0	(7.2, 16.9)	+5.3
Spirits					
White women	3.6	(0.9, 6.2)	4.0	(0.7, 7.3)	+11.1
Black women ^a	4.1	(0.8, 7.4)	7.7	(1.20, 14.3)	+87.8
Hispanic women	10.3	(1.8, 18.9)	10.4	(4.1, 16.7)	+1.0

	Standard (0.6oz) EtOH per Drink		Beaker Measured EtOH per Drink		% Difference
	Mean	95% CI	Mean	95% CI	
White men ^a	6.1	(3.3, 9.0)	10.8	(4.1, 17.6)	+77.0
Black men ^a	13.1	(5.1, 21.1)	19.8	(8.8, 30.9)	+51.2
Hispanic men	7.0	(0.9, 13.1)	15.8	(-3.1, 34.6)	+126
Reported Number of Drinks to Feel Drunk	EtOH Unadjusted Mean		EtOH Adjusted mean		
White women	3.32	(2.82, 3.83)	3.32	(2.83, 3.81)	0
Black women	4.68	(3.20, 6.18)	5.26	(3.58, 6.94)	+12.4
Hispanic women	3.72	(2.93, 4.50)	3.90	(3.03, 4.76)	+4.8
White men	6.11	(5.22, 7.01)	6.75	(5.63, 7.87)	+10.5
Black men	5.31	(4.32, 6.31)	6.72	(5.47, 7.97)	+26.6
Hispanic men	6.07	(4.57, 7.57)	7.62	(4.63, 10.60)	+25.5
Most Drinks On a Day in Past Year					
White women	4.46	(3.38, 5.53)	4.63	(3.40, 5.86)	+3.8
Black women	3.33	(2.48, 4.20)	3.92	(2.65, 5.18)	+17.7
Hispanic women	4.26	(2.29, 6.22)	4.08	(2.66, 5.51)	-4.2
White men	7.80	(4.95, 10.64)	8.43	(5.72, 11.13)	+8.1
Black men	6.19	(4.28, 8.10)	8.16	(5.46, 10.87)	+31.8
Hispanic men	6.60	(5.16, 8.04)	8.61	(5.85, 11.37)	

Note: CI = Confidence interval

^aSignificant difference between monthly standard alcohol and monthly measured alcohol (p<0.05)

Table 3
Logistic Regression models predicting 3+ DSM IV dependence items and 2+ consequence items from alcohol volume in terms of standard drinks and adjusted for drink measurements

		Drinks		Drinks		Drinks	
	N	Standard	Measured	Standard	Measured	Standard	Measured
		Odds Ratio	Odds Ratio	Adj.-R ²	Adj.-R ²		
Consequences 2+							
Alcohol Volume	306	1.020 (p<.001)	1.018 (p<.001)	0.107		0.139	
Black Indicator		1.98 (p=.18)	1.73 (p=.28)				
Hispanic Indicator		2.27 (p=.11)	2.13 (p=.14)				
Volume White	99	1.020 (p=.030)	1.022 (p=.009)	0.080		0.122	
Volume Black	110	1.031(p=.001)	1.029 (p<.001)	0.200		0.274	
Volume Hispanic	97	1.010 (p=.151)	1.008 (p=.072)	0.025		0.041	
Dependence 3+							
Alcohol Volume	306	1.014 (p=.004)	1.011 (p=.001)	0.073		0.094	
Black Indicator		2.646 (p=.16)	2.409 (p=.21)				
Hispanic Indicator		2.409 (p=.22)	2.145 (p=.29)				
Volume White	99	1.020 (p=.084)	1.017 (p=.120)	0.083		0.069	
Volume Black	110	1.014 (p=.034)	1.011 (p=.026)	0.067		0.071	
Volume Hispanic	97	1.011 (p=.179)	1.010 (p=.028)	0.030		0.088	