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Short communication

Sociodemographic characteristics associated with binge drinking among Brazilians

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ABSTRACT

Background: Binge drinking (BD) is a harmful pattern of alcohol use. This study describes this pattern of drinking and the sociodemographic variables associated with it in a representative sample of Brazilians. **Methods:** A cross-sectional survey of 3007 individuals using a multistage probabilistic sample was conducted in 143 Brazilian municipalities. The frequency of BD in the year preceding the study was assessed. BD was defined as the consumption of four drinks of alcohol within a two-hour period for women and five drinks in two hours for men. Weighted-ordered logit regression was used to assess the relationship between sociodemographic factors and BD.

Results: Most respondents had not engaged in binge drinking (69.7%; 95% confidence interval (CI) 67.0–72.2%). Binge drinking was more common among participants who were male (odds ratio (OR) 2.9; 95% CI 2.3–3.6) or single (OR 1.5; 95% CI 1.1–2.1) or had higher family income (OR 2.3; 95% CI 1.3–3.8). Individuals between 18 and 44 years of age were four times more likely to engage in binge drinking than adolescents (OR 4.7; 95% CI 3.3–6.8). Evangelicals/Protestants were less likely to engage in binge drinking (OR 0.7; 95% CI 0.2–0.5).

Conclusions: Our study, which is the first representative survey of BD in Brazil, showed that the age range of adults who engaged in BD is wider than the age range observed in other countries. These individuals are at increased risk for the adverse consequences of binge drinking, including addiction, car accidents, involvement in crime, absenteeism, and family violence.

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1. Introduction

Alcohol consumption accounts for 4% of all deaths worldwide or 2.5 million deaths per year (World Health Organization, 2011). More than half of these deaths (Brewer and Swahn, 2005) are associated with “binge drinking” (BD). BD is defined as the consumption of five or more drinks of alcohol (i.e., a 5 ounce glass of wine at 12% alcohol, a 1.5 ounce of spirits 80 proof or a 12 ounce can of beer at approximately 4% alcohol) on one occasion for males and four or more drinks for females (NIAAA, 1994; Wechsler and Nelson, 2001).

Binge drinking exposes the drinker to a variety of risks, including damage to physical health; unprotected sex; unwanted pregnancy; overdose; falls; violence, including fights, domestic violence and

homicides; car accidents; difficulties in school; and suicide (Brewer and Swahn, 2005; Naimi et al., 2003; NIAAA, 2000).

Worldwide, about 11.5% of drinkers have weekly binge drinking episodes, with men outnumbering women by four to one. Binge drinking is also more common in poorer countries (WHO, 2011), among single individuals (Naimi et al., 2003; U.S. Department of Health and Human Services, 2002; Grucza et al., 2009) and among those with lower educational level (Almeida and Grzywacz, 2008; Naimi et al., 2003; Dawson et al., 2004; Slutske, 2005; SAMHSA, 2003).

Most of the scientific evidence on patterns of alcohol consumption comes from studies in developed countries. Little is known about patterns of drinking, especially binge drinking, in developing countries, where most of the world’s population resides (World Health Organization, 1999). As an attempt to fill this lack of information about binge drinking in the developing world, this paper describes the prevalence and sociodemographic predictors of binge drinking in Brazil.

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2. Methods

2.1. Sampling procedure and data collection

The present study analyzes data from the First National Survey on Patterns of Alcohol Consumption of the Brazilian Population (Pinsky et al., 2010). The study was conducted from November 2005 through April 2006. A total of 3007 household interviews were conducted in one hundred and forty-three Brazilian municipalities selected through a three-stage stratified probability sampling method. Stage 1 consisted of a systematic random selection of municipalities, which were probabilistically selected by the PPS method (Probability Proportional to Size) according to the population of each municipality. In stage 2, the probabilistic selection of census sectors was performed using the same method. Finally, in stage 3, a count and simple random drawing of households were performed, followed by the selection of one member of each household to be interviewed through the “next-birthday method,” starting from the date of household enrollment.

The participation rate was 66%. Hour-long, face-to-face interviews were conducted in the respondents' homes by trained interviewers using a close-ended, standardized questionnaire. A detailed description of the questionnaire and methods can be found in Caetano et al. (2012), Laranjeira et al. (2010), and Pinsky et al. (2010). The bias for the high non-response rate was lowered by post-stratification calibration and sample weights (Caetano et al., 2012).

2.2. Measurements

The instrument used for data collection was based on the *Hispanic Americans Baseline Alcohol Survey – HABLAS* questionnaire (Caetano et al., 2008), which was developed for epidemiological studies on patterns of alcohol consumption among Hispanic-American residents of the USA. Our version was adapted for the Brazilian culture. Data from the sections on BD and sociodemographic factors were included.

2.3. Dependent variable

Participants were classified as binge drinkers if they consumed five or more drinks of alcohol on one occasion (i.e., during a period of approximately two hours) for males and four or more servings of alcohol on one occasion for females in the 12 months preceding the study. The average prevalence of binge drinking was calculated by dividing the total number of respondents who reported at least one binge drinking episode during the previous year by the total number of respondents in Brazil as a whole.

2.4. Statistical analysis

The analyses were performed using Stata software, version 11. Descriptive analyses were performed to characterize the total sample and the results that were obtained from the investigation of BD using contingency tables. Homogeneity tests based on Pearson's Chi-square statistics were used to establish the association between BD and sociodemographic variables. The ordered logit regression model, which corresponds to a generalization of logistic regression for ordinal polytomous responses, was used to establish associations between the frequency of BD and sociodemographic variables and its results are presented as crude and adjusted odds ratio. The dependent variable is binary (either present or absent) in the logistic regression model; the ordered logit model enabled the analysis of an ordinal dependent variable. BD in the year preceding the study was considered the dependent variable and was used to classify the subjects into four ordinal categories based on frequency as follows: 0 = no binge, 1 = low (1 or 2 episodes of BD), 2 = medium (3–11 episodes of BD); 3 = high (12+ episodes of BD). Subjects who did not engage in any episode of binge drinking in the past year served as the reference group in the analysis. Ordered logit regression offers one odds ratio for each independent variable that represents the increment of chance to be part of the next category compared to the previous one, as described by Liao (1994) and Sloane and Morgan (1996). The ordered logit model assumes the proportionality of the OR. This assumption was tested, and there was no evidence that the model was inadequate ($p=0.7$). Also probability of F ($p > F$) was <0.005 , showing adequacy of the model, proposed by DeMaris (2004).

All of the analyses considered the complex structure of the sample and were run using *svy* (survey set) commands that considered stratum (5 socioeconomic regions of Brazil: South, Northeast, North, Southeast, and Middle West), the primary sample unit – *psu* (census tract from IBGE – Brazilian Institute of Geography and Statistics of the Federal Government), and sampling weight (according to IBGE data from the 2000 Brazilian population census for each census tract), as described by Heeringa et al. (2010). The level of significance for the analyses was set at 5%.

2.5. Ethics

The present study was approved by the Research and Ethics Committee of the Federal University of São Paulo (registration number: CEP1672/04), and all participants signed an informed consent form.

3. Results

3.1. Characteristics of the sample

Women accounted for slightly more than half (52.0%; 95% confidence interval (CI) 49.7–54.4%) of the 3007 respondents. Adolescents comprised 10.4% (95% CI 9.5–11.4%) and the elderly comprised 13% (95% CI 11.5–14.6%) of the studied population. One-fifth of the sample was individuals between 25 and 34 years of age, which was the largest subgroup of participating adults.

Slightly more than one-third (39.1%; 95% CI 35.9–42.3%) of respondents had a low family income, defined as R\$450.00/month (US\$250.00) or less and 34% had only an elementary school education (95% CI 31.8–36.4%). Slightly more than half of the respondents consisted of married, white individuals, and nearly two-thirds were Catholic. Two-thirds of the sample (69.7%; 95% CI 67.0–72.2%) denied engaging in BD ever in their lifetime, 3.6% (95% CI 2.7–4.9%) declared no binge drinking in the past year but at least once in their lifetime and 6.9% (95% CI 4.9–7.6%) reported engaging in this behavior at least once a week in the past year. Of the 685 subjects who engaged in BD in the past year, almost half did so at least once a month (48.0%; 95% CI 42.9–53.2%).

3.1.1. Bivariate analysis. The bivariate analysis shows that single men between ages of 18 and 44 (and especially between 18 and 24 years of age) with higher family income who were Catholic or not religious were more likely to engage in past year BD (Table 1).

Regarding education, the difference between participants with lower education levels (up to middle school) and with higher education levels (completed or in progress) tended to decrease while number of binge drinking episodes increased. Adolescents (12.1%; 95% CI 10.9–13.3%) and elderly adults (16%; 95% CI 14.2–18.0%) were less likely to have practiced binge drinking in the year preceding the study.

3.1.2. Multivariate analysis. Men were 2.9 times more likely to engage in binge drinking in the year preceding the study than women (95% CI 2.3–3.6; $p < 0.001$) (Table 2).

Residents of the Southern region of the country were twice as likely to engage in past year binge drinking than residents of the Southeast region, which is the most populous of the country (95% CI 1.3–2.9; $p = 0.001$). Participants between 18 and 44 years of age were four times more likely to engage in binge drinking than adolescents, with the mean adjusted OR ranging from 4.1 to 4.7. Participants with the highest income – those who earned more than R\$2500.00/month or US\$1390.00 – were 2.3 times more likely to engage in BD than those who earned up to R\$450.00/month or US\$250.00 (95% CI 1.3–3.8; $p = 0.003$). Single individuals were 50% more likely to have engaged in BD in the preceding year (95% CI 1.1–2.1; $p = 0.007$) than married ones. Participants with higher in-progress or completed education were 50% less likely to engage in BD than those who only completed middle school (95% CI 0.3–0.9; $p = 0.028$). Protestants/Evangelicals were 70% less likely to engage in BD (95% CI 0.2–0.5; $p < 0.001$) than Catholics, who were chosen as reference for being the most populous group.

4. Discussion

Approximately 70% of our respondents denied any episode of BD in the year before the study. However, 6.9% of the total sample reported at least weekly BD. This group comprised half of those who engaged in BD.

This rate of BD is lower than the rates found in the United States (Serdula et al., 2004) and some European and Scandinavian countries (Kuntsche et al., 2004); however, it is similar to the rates of

Table 1
Sociodemographic variables and binge drinking in the year preceding the study adjusted for the complex sample design (N = 3007).

Variable	Categories	No binge in the last year			1 or 2 binge occasions in the last year			3–11 binge occasions in the last year			At least 1 binge per month			p value ^a
		N	wt%	95% CI	N	wt%	95% CI	N	wt%	95% CI	N	wt%	95% CI	
Gender	Male	845	40.6	38.0; 43.2	128	57.6	49.7; 65.1	74	72.6	63.3; 80.3	205	70.5	64.9; 75.6	<0.001
	Female	1424	59.4	56.8; 62.0	123	42.4	34.8; 50.3	40	27.4	19.7; 36.7	115	29.5	24.4; 35.1	
Age	14–17	555	12.1	10.9; 13.3	38	6.6	4.6; 9.2	17	6.6	3.6; 11.5	47	6.1	4.256; 8.592	<0.001
	18–24	222	14.6	12.9; 16.5	46	22.8	17.0; 29.8	30	32.9	23.6; 43.7	63	26.7	20.84; 33.47	
	25–34	378	18.2	16.4; 20.1	72	30.1	24.0; 37.0	38	35.0	25.4; 46.0	82	23.6	19.3; 28.5	
	35–44	350	18.0	16.4; 19.7	45	17.7	12.2; 24.9	16	15.2	9.0; 24.5	66	23.5	18.3; 29.7	
	45–59	399	21.2	19.2; 23.3	38	16.2	11.5; 22.4	12	9.9	5.6; 16.9	44	14.1	10.1; 19.5	
	60+	365	16	14.2; 18.0	12	6.5	3.7; 11.4	1	0.5	0.1; 3.3	18	5.9	3.6; 9.6	
Family income	Up to R\$450.00	965	41.5	38.1; 45.1	98	33.4	26.4; 41.3	39	31.9	21.5; 44.5	120	34.1	28.6; 40.0	0.008
	R\$451.00–750.00	444	21.8	19.6; 24.2	29	13.2	8.6; 19.8	27	24.1	16.1; 34.4	70	21.3	16.2; 27.5	
	R\$751.00–1200.00	346	19.1	16.8; 21.7	56	24.9	18.3; 32.9	18	16.0	9.9; 25.0	51	19.0	14.2; 25.0	
	R\$1201.00–2500.00	201	12.2	10.1; 14.6	39	21.0	14.9; 28.9	15	15.3	8.9; 25.1	41	18.4	13.2; 25.2	
	More than R\$2500.00	82	5.3	3.9; 7.1	15	7.4	3.7; 14.0	5	12.6	5.0; 28.1	16	7.1	4.0; 12.2	
Marital status	Married	1081	56.5	54.0; 59.0	129	56.1	48.9; 63.0	54	49.1	38.7; 59.7	150	49.2	42.5; 56.0	<0.001
	Single	851	31.0	28.8; 33.3	98	37.2	30.16; 44.9	50	43.4	32.8; 54.6	142	42.5	36.0; 49.3	
	Widowed	178	6.5	5.4; 7.9	7	2.3	0.9; 5.4	6	3.4	1.4; 8.0	6	2.1	0.7; 5.7	
	Divorced	159	5.9	5.0; 7.0	17	4.3	2.4; 7.6	4	4.0	1.4; 11.0	22	6.1	3.5; 10.4	
Education	None/primary	830	37.6	35.0; 40.3	60	23.0	17.1; 30.3	27	20.1	12.7; 30.4	83	27.0	20.3; 35.0	<0.001
	Middle	645	27.5	25.4; 29.9	68	27.2	20.2; 35.6	29	26.0	17.9; 36.0	113	34.4	27.4; 42.1	
	Secondary	673	25.5	23.2; 28.1	103	36.9	29.3; 45.1	48	39.0	29.6; 49.2	112	32.6	26.2; 39.8	
	University	121	9.3	7.3; 11.7	20	12.9	7.4; 21.5	10	15.0	7.0; 28.9	12	6.0	2.9; 11.9	
Region of Brazil	Southeast	988	45.5	42.8; 48.1	99	42.1	34.5; 50.2	34	34.9	24.6; 46.8	124	37.4	30.2; 45.13	0.010
	Midwest	177	6.3	5.4; 7.4	14	3.2	1.5; 6.6	8	6.2	2.5; 14.7	29	6.9	3.501; 13.11	
	Northeast	656	26.0	23.9; 28.3	85	30.9	23.8; 39.0	45	36.2	24.8; 49.3	85	25.1	19.2; 32.1	
	North	162	8.6	6.4; 11.3	7	2.4	0.9; 6.2	5	3.6	2.0; 6.5	33	10.9	7.1; 16.3	
	South	286	13.6	11.7; 15.6	46	21.3	15.0; 29.2	22	19.0	12.8; 27.2	49	19.7	13.6; 27.7	
Race	White	1134	51.2	47.9; 54.5	133	56.9	47.8; 65.4	48	43.1	32.2; 54.7	134	49.1	41.7; 56.6	0.661
	Black	228	11.1	9.3; 13.1	30	11.6	7.3; 18.0	17	11.9	6.8; 20.0	43	12.1	8.5; 16.8	
	Mulato/pardo	852	35.2	32.2; 38.2	79	29.1	22.0; 37.4	43	40.9	30.9; 51.6	130	35.1	28.9; 42.0	
	Indigenous	50	2.6	1.8; 3.7	8	2.3	1.0; 5.1	5	4.1	1.5; 10.6	12	3.6	1.5; 10.6	
Religion	Catholic	1474	63.9	60.7; 67.0	189	78.2	71.0; 83.9	86	72.9	61.7; 81.8	241	76.3	70.5; 81.2	<0.001
	Protestant/Evangelical	616	28.3	25.6; 31.3	32	9.5	6.2; 14.2	13	11.3	6.6; 18.7	33	10.7	7.0; 16.1	
	Spiritist	35	2.0	1.3; 3.1	5	3.9	1.2; 12.3	4	6.1	1.5; 21.8	4	1.2	0.4; 3.6	
	Other	43	1.8	1.2; 2.7	5	1.3	0.3; 4.5	1	0.7	0.9; 4.6	5	1.0	0.4; 2.6	
	No religion	101	3.9	2.9; 5.1	20	7.1	3.9; 12.4	10	9.0	4.5; 17.1	37	10.8	7.7; 14.9	

^a p value for the Pearson Chi-square test adjusted for complex survey sample design.

Table 2
Ordered logit model for frequency of binge drinking over the last year and sociodemographic variables, adjusted for the complex sample design ($N=2946^a$). The adjusted model considered only the significant variables in the bivariate analysis.

		Crude odds ratio	95% CI		p value	Adjusted odds ratio	95% CI		p value
			Min	Max			Min	Max	
Gender	Female	Ref				Ref			
	Male	2.9	2.4	3.6	<0.001	2.9	2.3	3.6	<0.001
Brazilian Region	Southeast	Ref				Ref			
	Middlewest	1.1	0.6	2.0	0.797	1.1	0.6	2.1	0.701
	Northeast	1.3	0.9	1.7	0.092	1.1	0.9	1.9	0.083
	North	1.0	0.6	1.8	0.948	1.3	0.7	2.2	0.398
	South	1.7	1.2	2.5	0.004	2.0	1.3	2.9	0.001
Age	14–17	Ref				Ref			
	18–24	3.4	2.5	4.6	<0.001	4.7	3.3	6.8	<0.001
	25–34	2.8	2.1	3.7	<0.001	4.6	3.0	7.1	<0.001
	35–44	2.2	1.6	3.0	<0.001	4.1	2.6	6.5	<0.001
	45–59	1.3	0.9	1.8	0.177	2.2	1.3	3.7	0.004
	60+	0.6	0.4	1.0	0.061	1.2	0.6	2.3	0.679
Family income	Up to R\$450.00	Ref				Ref			
	R\$451.00–750.00	1.1	0.8	1.5	0.473	1.1	0.8	1.5	0.430
	R\$751.00–1200.00	1.3	0.9	1.7	0.067	1.1	0.9	1.7	0.221
	R\$1201.00–2500.00	1.8	1.3	2.6	<0.001	1.7	1.1	2.5	0.010
	More than R\$2500.00	1.8	1.2	2.7	0.007	2.3	1.3	3.8	0.003
Marital status	Married	Ref				Ref			
	Single	1.5	1.2	1.8	0.001	1.5	1.1	2.1	0.007
	Widowed	0.4	0.2	0.8	0.006	1.2	0.6	2.4	0.565
	Divorced	1.0	0.6	1.6	0.965	1.4	0.8	2.4	0.194
Education	No/primary	Ref				Ref			
	Middle	1.7	1.2	2.3	0.001	1.3	0.9	1.9	0.149
	Secondary	2.0	1.5	2.7	<0.001	1.2	0.8	1.8	0.321
	University	1.5	0.9	2.4	0.073	0.5	0.3	0.9	0.028
Religion	Catholic	Ref				Ref			
	Protestant/Evangelical	0.3	0.2	0.4	<0.001	0.3	0.2	0.5	<0.001
	Spiritist	1.1	0.5	2.4	0.826	1.0	0.5	2.1	0.999
	Other	0.5	0.2	1.0	0.037	0.6	0.2	1.4	0.233
	No religion	2.0	1.4	2.9	<0.001	1.7	1.1	2.6	0.021

^a 61 missing cases for the binge drinking outcome.

other countries that are undergoing economic development similarly to Brazil, such as South Africa (Peltzer and Ramlagan, 2009).

Individuals between 18 and 44 years of age were four times more likely to engage in BD than adolescents (adjusted OR between 4.1 and 4.7). Another recent Brazilian study (Moura and Malta, 2011) covering the adult population of the 26 state capitals and the Federal District showed very similar results. Brazilian law prohibits the sale of alcoholic beverages to people under the age of 18 years and likely contributes to the lower levels of binge drinking in adolescents. Furthermore, the greater purchasing power of young adults and older adults may also contribute to the results, given the relationship between the availability of money and BD among adolescents (Kouvonen and Lintonen, 2002; Lintonen et al., 2000).

In most countries, higher rates of BD occur during late adolescence and early adulthood (Johnston et al., 1996; Kuntsche et al., 2004; Quigley and Marlatt, 1996.). In South Africa, two studies have shown higher rates of binge drinking in people between the ages of 18 and 35 (Peltzer and Ramlagan, 2009) and 25 and 34 (Peltezer et al., 2011). In Spain, the highest prevalence of BD was in adults 18–24 years of age (Valencia-Martín et al., 2007), and in countries such as Finland, France, Germany, Sweden, and UK, BD was most common in adults 18–29 years of age (Hemström et al., 2002). In the United States and Canada, the highest rates of BD were found in 21–25 year olds (Naimi et al., 2003; U.S. Department of Health and Human Services, 2002).

Compared to other countries, Brazil has a wider age range of individuals who engage in BD. This group may be at higher risk for the adverse consequences of this pattern of alcohol consumption. These findings are relevant, not only because of the scarce

information available on BD in developing countries, but also because they provide further guidance for planning interventions for high-risk populations. This information may contribute to the creation of effective public health policies for the prevention and treatment of alcohol-related problems.

4.1. Study limitations

People in non-residential settings were not included. Since this study is cross-sectional, the associations found cannot be assumed to be causal.

Role of funding source

Funding for this study was provided by the SENAD (National Secretariat for Drug Policies) of the Brazilian Federal Government. SENAD have no further role in study design, the collection, analysis, and interpretation of data, the writing of the report or in the decision to submit the paper for publication.

Contributors

Authors Ilana Pinsky, Raul Caetano, Ronaldo Ramos Laranjeira, Marcos Zaleski developed the First National Survey on Patterns of Alcohol Consumption of the Brazilian Population from where the data analyzed in this study was taken. Author Zila M. Sanchez undertook the statistical analysis Author Daniel Sóccrates de Castro e Hamer Nastasy Palhares Alves managed the literature searches

and wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest

The authors declare that there are no conflicts of interest.

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