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Binge drinking among Brazilians: Higher drinking frequency increases related problems

Running title: Binge drinking frequency and related problems in Brazil

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Abstract

Aims: To correlate binge drinking (BD) with alcohol-related problems (ARP) in the Brazilian population.

Methods: A representative cross-sectional survey was conducted in 143 Brazilian cities. Associations between the frequencies of BD and ARP were gathered using an ordered logit regression model.

Results: Higher BD frequencies significantly increased the chance of injury in accidents, job loss, and involvement in intense arguments and assaults over the year. High frequency in BD increases the odds of all ARP.

Conclusion: There is a dose-response association between the frequency BD and ARP and is therefore a possible target for public prevention policies.

1. Introduction

Alcohol consumption is the third most important risk factor for the global burden of disease ^[1-3] and the first in developing countries in Latin America^[4]. Additionally, it accounts for 4% of all deaths worldwide ^[1]. More than half of these deaths (over 1.25 million per year;) ^[5] are associated with binge drinking (BD), a term that refers to a pattern of consuming four or more drinks for women and five or more drinks for men per occasion ^[6].

BD is particularly problematic because of its prevalence and consequences ^[3]: BD is correlated with various problems, such as violence, especially intimate partner conflicts ^[7, 8], physical injuries ^[9], negative labour market outcomes ^[10], legal problems concerning social marginalisation ^[11], traffic crashes victimization^[12] and family disruptions ^[13].

Research has consistently found a relationship among the volume of alcohol use, blood alcohol concentration, and alcohol-related problems ^[14, 15] however, scarce research exists concerning the relationship between the frequency of BD and alcohol-related problems. This lacuna is especially true in Brazil, where comprehensive population studies on the pattern of alcohol consumption have only recently been conducted ^[16].

The present study tested the hypothesis that the frequency of BD is related to the problems that result from alcohol abuse.

2. Methods

2.1 Sampling procedure and data collection

The present study analysed data from the First National Survey on the Patterns of Alcohol Consumption in the Brazilian Population. This study was conducted from November 2005 to April 2006. Three thousand seven household interviews were conducted across 143 Brazilian cities selected using a three-stage stratified probability sampling method. Stage 1 consisted of the random selection of municipalities using the probability proportional to size (PPS) method by which the sample size varies by the population of each city. The selection of census sectors was performed using the same method in Stage 2. Finally, a count and a simple random drawing of households were performed in Stage 3 followed by the selection of one member of each household to be interviewed using the “next-birthday method”.

The participation rate was 66%. Hour-long, face-to-face interviews were conducted in the respondents’ homes by trained interviewers using a close-ended, standardised questionnaire. A detailed description of the questionnaire and methods can be found in Pinky et al, 2010, Laranjeira et al, 2010 and Caetano et al, 2012. ^[15-17]. The potential bias associated with the relatively high non-response rate was addressed in part with the use of post-stratification weights ^[15].

Only the participants who reported drinking over the past year were included in this analysis (n = 1,333 participants).

2.2 Measurements

The instrument used for data collection was based on the *Hispanic Americans Baseline Alcohol Survey* (HABLAS) ^[18], which was developed for epidemiological studies of alcohol consumption patterns among Hispanic-American residents of the US. Our version was translated and adapted to the Brazilian culture through both qualitative and quantitative pilot studies, to evaluate the applicability and acceptability in the Brazilian population. It's original content and structure was retained. The data from the sections on BD and alcohol related-problems were analysed.

2.3 Dependent variable

Male (female) participants were classified as binge drinkers when they consumed five or more (four or more) servings of alcohol over approximately two hours in the 12 months preceding the study. The average prevalence of BD was calculated by dividing the number of respondents who reported at least one BD episode over the previous year by the total number of respondents who reported drinking in the past 12 months.

2.4 Statistical analyses

The analyses were performed using Stata, Version 11. Homogeneity tests based on the Pearson's chi-square statistic were used to establish an association between the frequency of BD and the occurrence of harm associated with alcohol use. An ordered logistic regression model (i.e., the generalised logistic regression for ordinal polynomial responses) was used to establish associations between the frequency of BD and the occurrence of harm associated with alcohol use. The results of this analysis are presented as crude and adjusted odds ratios (ORs). The dependent variable of the logistic regression was binary (present or absent); the ordered logistic

model enabled the analysis of an ordinal dependent variable. BD in the year prior to the study was the dependent variable and was used to classify the participants into four ordinal categories based on consumption frequency: 0 = no BD, 1 = low (1 or 2 episodes of BD), 2 = medium (3 to 11 episodes of BD); 3 = high (12+ episodes of BD). Participants who drank over the past year but did not engage in any episodes of BD served as the reference group in the analysis. The ordered logit regression provided an OR for each independent variable, which represents an increment in the chance that the participant belongs to the next category compared with the previous one ^[19]. The ordered logistic model assumes the proportionality of the OR. This assumption was tested, and the model was adequate ($p = 0.60$). In addition, the probability of F ($P > F$) was less than 0.005; thus, the model was sufficient ^[20].

All of the analyses considered the complex structure of the sample and were conducted using survey set (*svy*) commands that considered stratum (five socioeconomic regions of Brazil: South, Northeast, North, Southeast, and Middle West), the primary sample unit (*psu*; the census tract from the Brazilian Institute of Geography and Statistics of the Federal Government; IBGE), and a sampling weight (using the IBGE data from the 2000 Brazilian population census for each census tract) ^[21]. The level of significance for the analyses was set at 5%.

2.5 Ethics

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

3. Results

Of the 3,007 participants who composed the initial sample, 1,333 (44%) reported using alcohol over the past year and 841 participants (28%) reported at least one occasion of binge drinking in the 12 months prior to the interview.

Table 1 shows that the increment in the prevalence of each negative event is proportional to the increase in frequency of binge drinking in each category.

It is noteworthy that most negative events, such as intense argument and memory loss have proportional and very large increase of prevalence by the increase in the frequency of binge drinking, going from 2-3% among those who haven't engage in binge drinking to 22-25% among those that engaged in at least one episode of BD per month.

In a less number of cases, the difference in prevalences is clear for the first two frequencies of binge drinking, but not for the last one. For instance, the prevalence of financial harm is twice from the first to the second level and three times greater from the second to the third and fourth level, but without difference between the latter two categories.

Table 2 shows the results of the ordered logistic regression. The increase in each level of frequency of BD increased up to 17 times the odds of been injured in an accident (OR = 17.2; 95% CIs = 4.2-70.2). The odds for job loss due to alcohol consumption increased proportionally to the increase in the frequency of BD over the year, which was five times greater at each successive frequency level of BD (OR = 5.2; 95% CI = 1.9-14.5). The chance of having had an intense argument was 6 times greater in each next category of BD frequency (OR = 6.0; 95% CI = 4.1-8.9). The odds of having started fights or assaulted in the previous year increased around 4 times for each next category of frequency of BD.

Those who reported alcohol-related harms to their social, familial, financial, or professional lives were three to four times more likely to have engaged in higher frequencies of BD in the year prior to the survey.

Table 1. Bivariate analysis of the prevalence of drinking-related harm and BD frequency over the past year (N = 1,333).

Table 2. Ordered logistic model of ordinal frequencies of BD over the past year by drinking-related harms adjusted for age, gender and socioeconomic stratum. No BD over the past year as reference. (N = 1,333).

4. Discussion

The present article is the first to associate the frequency of BD with the occurrence of alcohol-related problems in Brazil. Accidental injury is one of the problems generally associated with alcohol use^[9], and evidence exists that recurrent intoxication increases the risk of injury^[22]. Our study found that the risk of being involved in an accident was 17 times higher among those who had more BD episodes. This information is important to policy makers and to help prevent accidents that involve binge drinkers, especially by regulating the alcohol market and drinking-and-driving^[12].

The portion of our sample who exhibited a greater frequency of BD was five times more likely to have lost their job due to alcohol use compared with those who had a lower frequency of BD. Henkel, 2010 reported a similar result: Those who drank alcohol in a high-risk pattern were six times more likely to be unemployed than those who drank in a low risk pattern. A household survey found that 0.2% to 0.5% of Americans reported that they lost or nearly lost their jobs due to alcohol use^[23]. In Brazil, five per cent of the population have work problems

due to alcohol use ^[16]. This information is important for employers and the government because it represents great financial and social losses, given that unemployment can continue for an extended period of time ^[24]. An important Swedish study found an disparate result than ours: those who practiced binge drinking in a high frequency were not more likely to be unemployed in short or long term. It is probable that specific characteristics of the labor laws and the unemployment level, that are so discrepat between the two countries, may explain this finding^[25].

In our sample, intense arguments without physical aggression were six times more likely to occur among those with a higher frequency of BD. This problem is one of the most common in the international literature on alcohol use ^[26, 27].

Our data revealed a significant increase in the risk of physical aggression among those who binge drink with great frequency. This finding highlights the importance of public policies regarding education and prevention. Physical aggression (e.g., fighting and assaults) holds a prominent position in the list of alcohol-related problems ^[26]. Approximately 10% of Brazilians report that violence is problem resulting from alcohol use ^[16].

According to Javier Alvarez, 2006 ^[27], the number of BD episodes per week increased alcohol-related injuries; however, it was not associated with social harm. The amount of alcohol ingested was related to social harm (but not consumption frequency or BD). Methodological and sample selection differences (e.g., only one Spanish area was analysed, and it did not represent the national pattern), as well as culturally disparate ways of drinking, might be responsible for these differences.

All of the alcohol-related problems in the current study increased in a way that was directly proportional to BD frequency. Thus, our article implies that any reduction of BD

frequency will reduce the harms associated with this practice because this harm is lower among those who engaged in fewer BD episodes. In our opinion, this concern should be primary among policy-makers and all of Brazilian society. Importantly, however, BD was associated with an enhanced risk for alcohol-related problems, even among those who presented this behaviour less often compared with those who did not present BD at all.

Other studies have emphasized problems related to BD, for example, Wechsler et al, 2000 and 2002, ^[28, 29] found that poor academic performance, injuries, and property damage were eight times more likely to occur among frequent BD college students compared with those occasionally practiced BD. The negative outcomes and consequences of alcohol use were five times more likely to occur among those who occasionally practiced BD and 22 times more likely to occur among frequent binge drinkers compared with those who did not engage in BD.

Another Brazilian household survey conducted in 2012 by Silveira et al ^[30] showed that the proportion of participants who had experienced negative consequences increased with the quantity and frequency of the drinking pattern.

However, even though the increase in the frequency of binge increases the chances of alcohol related harm, we must remember that in accordance to the paradox of prevention, most social damage caused by alcohol comes from non-binge drinkers. In Brazil, roughly half of the alcohol-related harm came from drinking by non-binge drinkers. ^[15]

4.1 Study limitations

People in non-residential settings were not included. Certain subclasses of violence, such as intimate partner violence, were not evaluated. Because this study was cross-sectional, the associations found cannot be assumed to be causal.

Another limitation was the acceptance rate of 66%.

5. Conclusion

In conclusion, our study contributes to the understanding of drinking patterns and their association with alcohol-related problems in Brazil. The methodological approach of this well-designed epidemiological study shows strong evidence that reinforces the finding that more frequent episodes of BD are strongly associated with increased problems in Brazil. We encourage the establishment of additional and effective prevention policies, like the new traffic law on drinking and driving introduced in Brazil in 2008 (Law 11,705), as well as treatment programs, not only for those who are alcohol-dependent but also for frequent binge drinkers to reduce the significant mortality, morbidity, and burden of disease effects due to BD worldwide.

6. Acknowledgements

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Table 1. Bivariate analysis of the prevalence of drinking-related problems and BD frequency over the past year (N = 1,333).

	Variable	No BD over the past year		1 or 2 BD episodes over the past year		3 to 11 BD episodes over the past year		At least 1 BD episode per month		P-value
		wgt%	95%CI	wgt%	95%CI	wgt%	95%CI	wgt%	95%CI	
Harm that resulted from	Social/friendships	3.9	2.5; 5.9	10.6	6.1; 17.7	14.5	8.6; 23.4	18.8	13.8; 24.9	<0.0001
	Family/marriage	4.3	2.9; 6.4	8.0	4.6; 13.5	17.8	11.1; 27.3	18.3	13.4; 24.6	<0.0001
	Financial	2.8	1.6; 4.6	5.3	2.9; 9.4	17.9	10.9; 27.9	17.5	13.0; 23.1	<0.0001
	Work	2.1	1.1; 3.9	3.5	1.7; 7.1	7.8	3.6; 16.1	13.4	8.8; 19.9	<0.0001
Occurrences that resulting from drinking	Heated argument	1.9	1.0; 3.3	7.7	4.7; 12.3	17.1	10.7; 26.3	25.0	19.4; 31.6	<0.0001
	Job loss	0.3	0.07; 1.9	0.2	0.03; 1.4	5.9	2.2; 14.9	5.6	3.2; 9.8	<0.0001
	Colleagues alerted about drinking less	1.2	0.6; 2.5	3.6	1.3; 9.5	10.5	5.6; 19.0	15.7	11.4; 21.2	<0.0001
	Irritated family members/significant other	6.4	4.3; 9.4	11.6	7.9; 16.7	18.7	12.4; 27.2	22	17.1; 28.1	<0.0001
	Family members threatened to leave	1.3	0.7; 2.5	1.9	0.8; 4.5	5.9	2.5; 13.3	9.4	6.2; 14.0	<0.0001
	Started fights	1.5	0.7; 3.0	7.5	4.2; 13.2	10.1	5.4; 18.0	15.2	10.8; 21.0	<0.0001
	Hit/assaulted someone	0.5	0.2; 1.4	1.6	0.6; 4.2	7.8	3.7; 15.9	7.5	4.8; 11.5	<0.0001
	Memory loss	3.5	2.1; 5.6	9.7	5.5; 16.8	13.7	8.3; 21.8	24.4	19.5; 30.1	<0.0001

Table 2. Ordered logistic model of ordinal frequencies of BD over the past year by drinking-related harms adjusted for age, gender and socioeconomic stratum. No BD over the past year as reference. (N = 1,333).

	Variable	Adjusted Odds Ratio	95% CIs		P-value
			Min	Max	
Harm that resulted from drinking	Social/friendships	2.8	1.8	4.4	<0.0001
	Family/marriage	2.7	1.8	4.0	<0.0001
	Financial	3.5	2.4	5.2	<0.0001
	Work	3.8	2.1	7.1	<0.0001
Occurrences that resulted from drinking	Heated argument	6.0	4.1	8.9	<0.0001
	Getting hurt in an accident	17.2	4.2	70.2	<0.0001
	Job loss	5.2	1.9	14.5	0.002
	Irritated family members/significant other	2.6	1.8	3.9	<0.0001
	Family members threatened to leave	3.7	2.0	7.0	<0.0001
	Started fights	3.9	2.4	6.4	<0.0001
	Hit/assaulted someone	4.5	2.5	8.1	<0.0001
	Memory loss	4.2	2.8	6.3	<0.0001