Binge drinking and associated factors among adolescents in a city in southeastern Brazil: a longitudinal study

Consumo excessivo de álcool e fatores associados entre adolescentes de cidade do Sudeste brasileiro: um estudo longitudinal

Consumo excesivo de alcohol y factores asociados entre adolescentes de ciudad del sudeste brasileño: un estudio longitudinal

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Abstract

The aim of this study was to investigate changes in the frequency of binge drinking and associated factors in the city of Belo Horizonte, Minas Gerais State, Brazil. The sample consisted of 436 adolescents. Data collection involved the Alcohol Use Disorders Identification Test *and the* Alcohol, Smoking and Substance Involvement Screening Test. *Ordinal logistic regression was used in the multivariate analysis. An increase in the frequency of binge drinking was found among adolescents who lived in areas of greater social vulnerability (OR = 1.64; 95%CI: 1.01-2.68), those whose mothers consumed alcoholic beverages (OR = 1.75; 95%CI: 1.05-2.92), those whose fathers consumed alcoholic beverages (OR = 2.02; 95%CI: 1.11-3.68), those with an increased risk of tobacco use (OR = 2.82; 95%CI: 1.07-7.42) and those who attended religious services (OR = 2.10; 95%CI: 1.30-3.38). Knowledge regarding factors associated with a change in the frequency of binge drinking among adolescents can assist in the establishment of public policies directed at health promotion and the prevention of adverse health conditions.*

Binge Drinking; Alcoholic Beverages; Adolescent

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Introduction

The excessive consumption of alcoholic beverages is a major public health problem in many countries [1]. Binge drinking (the consumption of five or more alcoholic drinks on a single occasion) [2] seems to be associated with a number of biological, cultural, economic, environmental, psychological and social consequences [3,4] and can predispose adolescents to traffic accidents, violence and a greater risk of alcoholism [5,6].

The prevalence of alcohol use among adolescents varies in different parts of the world. In a study carried out in northwest England, the majority of adolescents between 15 and 16 years of age (84%) reported drinking alcohol at least occasionally and over one third of the drinking participants (36.3%) reported binge drinking [2]. In Brazil, Sanchez et al. [7] found a binge drinking rate of 32% among students in all five Brazilian macro regions. A similar prevalence rate was found among students aged 15 to 19 years in the city of Belo Horizonte (36%) [8].

Among socio-demographic factors associated with alcohol consumption, age [9], the male gender, Caucasian ethnicity, a lower level of education [10,11,12] and engaging in substance use [10,13] are generally related to a greater prevalence rate of alcohol use. The increase in age is related to a greater occurrence of the use of psychoactive substances. According to Kalaydjian et al. [11], the onset of each stage of alcohol use, whether first use, regular use, abuse or dependence, undergoes the sharpest increase in the decade between the early teens and the early 20s. Half of all projected lifetime users begin use by age 16 to 17 and more than half of all projected lifetime abusers and individuals with lifetime dependence meet the criteria for these disorders by the age of 21. The vast majority (over 90%) of projected lifetime abuse-dependence begins by the mid-30s.

A family problem, such as substance use, is also an important predictor of alcohol problems [1]. In a study conducted in Canada, Mistry et al. [14] found that adolescents who live with parents who consume alcohol tend to exhibit the same behavior. In an epidemiological study conducted in the city of São Paulo, Brazil, the authors concluded that living with family members that do not consume alcoholic beverages reduces the chance of binge drinking by 44% [4].

Some studies have demonstrated that adolescents with a low socioeconomic status have a greater propensity toward the use of alcoholic beverages and binge drinking [14,15,16]. A meta-analysis of marijuana and alcohol use by socioeconomic status in adolescents concluded that adolescents with lower socioeconomic status have greater risk behavior than adolescents with higher socioeconomic status [17]. On the other hand, Brazilian epidemiological studies have found an association between a higher socioeconomic status and binge drinking [7,8,18,19]. According to a review about the relationship between socioeconomic status and health-related behaviors in adolescence, the existence of an association between socioeconomic status and alcohol use is not evident in the studies analyzed, but would require further analysis in different countries to improve the evidence [20].

The influence of religious factors on substance use has piqued the interest of researchers. Studies report a lower chance of exposure to alcohol and lifetime use among adolescents involved in religious practices [21,22,23]. The *National Longitudinal Study of Adolescent Health* in the USA found that both public and private domains of religiosity were protective against cigarettes, alcohol and marijuana use. The public religiosity variable combines two items measuring frequency of attendance at religious services and frequency of participation in religious youth group activities. The private religiosity variable combines two items measuring the frequency of prayer and importance of religion. Upon closer examination, it appeared that private religiosity was more protective against experimental substance use, while public religiosity was more associated with regular use of alcohol [24].

Despite concerns regarding excessive alcohol use among adolescents, little information has been published on factors associated with the progress of excessive drinking throughout the course of one's life [1,11]. The lack of information on socio-demographic predictors of the transition of alcohol intake constitutes an obstacle to the identification of high risk individuals and the planning of prevention programs [11]. Alcohol consumption, especially when initiated at a young age, places health and wellbeing at risk [9]. Special attention should be given to habits developed in adolescence as predictors of alcohol abuse in adulthood [1]. The analysis of changes in the frequency of binge drinking among adolescents and associated factors is essential to the establishment of early interventions aimed at preventing negative impacts in adulthood.

Considering the possible influence of substance use, family factors, socioeconomic status and religiosity on excessive alcohol consumption among adolescents, the aim of the present longitudinal study was to investigate the association of these factors in relation to changes in the frequency of binge drinking among adolescents at public and private high schools in the city of Belo Horizonte, Brazil.

The following hypotheses were tested: (i) Substance use by adolescents increases the frequency of binge drinking; (ii) Alcohol consumption by parents is associated with the frequency of binge drinking by adolescents; (iii) A better socioeconomic status is associated with an increase in the frequency of binge drinking among adolescents; (iv) Participating in religious services is a protective factor against the increase in the frequency of binge drinking by adolescents.

Methods

Subjects, setting and period of recruitment

A longitudinal study was conducted in the city of Belo Horizonte, involving two evaluations of alcohol intake with two-year intervals between evaluations. Belo Horizonte is the capital of the state of Minas Gerais in southeastern Brazil; it has approximately 2.4 million inhabitants and is geographically divided into nine administrative districts (Instituto Brasileiro de Geografia e Estatística. http://www.ibge.gov.br/home/estatistica/populacao/contagem, accessed on 10/Jul/2013). A total of 117,547 and 25,569 15-to-19-year-old students are enrolled in 820 public and 434 private schools, respectively (Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. http://portal.inep.gov.br/basica-censo-escolar-matricula). A full list of all students enrolled in public and private schools was obtained from the Belo Horizonte Education Secretariat and the distribution of students in each of the nine administrative districts was calculated. At the baseline assessment in 2010, a study was conducted with a representative sample of 936 high school students aged 15 to 19 years attending public schools (n = 717; 81%) and private schools (n = 174; 19%) in the city of Belo Horizonte. Further details on the sample are found in a previously published study [25].

As the intention was to evaluate high school students over a two-year period, the sample was limited to students who were 15 and 16 years of age in the baseline survey (2010) and who were expected to still be in high school two years later (n = 529). In 2012, a new data collection procedure was carried out with these adolescents when they were aged 17 to 19 years. However, 26 of them were not identified due to incomplete demographic data, 19 had dropped out of their respective schools and 48 had moved to a different address. Thus, the follow-up study involved a sample of 436 adolescents (with a loss of 17.5%).

Measures

The adolescents were interviewed on two separate occasions. The *Alcohol Use Disorders Identification Test* (AUDIT C) validated for use in Brazil [26] was employed for the evaluation of alcohol intake. AUDIT helps identify whether an individual exhibits hazardous (or risky) drinking, harmful drinking or alcohol dependence [27]. AUDIT C (the first 3 questions on the AUDIT instrument, which are related to the frequency and amount of alcohol consumed) was used, as this version can be employed as a stand-alone screening measure to detect hazardous drinkers among adolescents [28,29]: (a) *"How often did you have a drink containing alcohol in the past year?"*; (b) *"How many drinks containing alcohol did you have on a typical day when you were drinking?"*; and (c) *"How often do you have five or more drinks on one occasion?"*. The latter item was used to identify binge drinking [4]. The response options are: never, less than monthly, monthly, weekly and daily or almost daily. Responses of "never" were coded as 0 in the analysis. "Less than monthly" and "monthly" were coded as 1. "Weekly" and "daily or almost daily" were coded as 2.

The dependent variable was a change in the frequency of binge drinking and was determined based on the difference in consumption between 2010 and 2012 and categorized as "reduced frequency intake", "unaltered frequency intake" and "increased frequency intake". The independent variables were

demographic and socioeconomic characteristics [gender, type of school, Social Vulnerability Index (SVI), mother's schooling and frequency of attending religious services], family behavior regarding alcohol intake (relatives who drink, father who drinks and mother who drinks) and the concomitant use of other drugs (risk of tobacco and marijuana use). The following independent variables were collected on both occasions: gender, type of school (public or private), SVI, mother's schooling and members of the family who drink (yes/no). For statistical purposes, however, data on SVI, mother's schooling and members of the family who drink collected during the first interview were considered, as no significant differences were found between 2010 and 2012.

The SVI was used for the socioeconomic classification. The SVI has 20 variables grouped into five dimensions of citizenship: environmental (access to housing and basic infrastructure); cultural (access to education); economic (access to income and employment); legal (access to legal assistance); and security (access to health, food security and welfare) [30]. The score ranges from 0 to 1, with higher values denoting worse community conditions or greater vulnerability to social exclusion in the community in question. The Belo Horizonte database of SVI scores for each district was used, based on the address of each family. The students' addresses were collected individually. Each street is located in a region categorized into one of five classes. The SVI was dichotomized as less vulnerable (social classes III, IV and V; coefficients ≤ 0.49) and more vulnerable (social classes I and II; coefficients > 0.49).

The *Alcohol, Smoking and Substance Involvement Screening Test* (ASSIST), validated for use in Brazil [31], was used for the evaluation of tobacco and marijuana use. This questionnaire is composed of eight questions on the use of nine classes of psychoactive substances (tobacco, alcohol, marijuana, cocaine, stimulants, sedatives, inhalants, hallucinogens and opiates). The items address frequency of use and related problems. A risk score ranging from 0 to 4 is provided for each substance and the total ranges from 0 to 20. The scores are grouped as follows: 0 to 3 indicates occasional use; 4 to 15 indicates abuse; and ≥ 16 indicates dependence. The difference in scores between 2010 and 2012 was calculated to determine the change in risk of tobacco and marijuana use: unaltered risk, increased risk and reduced risk. For statistical purposes, the unaltered and reduced risk categories were pooled.

Religious participation among the adolescents and alcohol intake patterns among family members were evaluated during the second evaluation (2012) through the following questions: (a) *"Do you have a religion? Which?"*; (b) *"How often do you frequent your place of worship?"*; and (c) *"Does anyone in your family drink alcoholic beverages? Who? (father/mother/siblings/others)"* [21,22].

Administration of questionnaires

The participants filled out a socio-demographic form that was numbered and collected by the researcher. Questionnaires with the same numbering as the form were then distributed in the classroom by a researcher and assistant and collected immediately after being filled out. The questionnaires were used at baseline (2010) and follow-up (2012). The students were informed that the questionnaires would be under the responsibility of the researcher with no access allowed to parents or school officials. To guard against biases that may occur due to variability in reading proficiencies, the principal investigator (K.O.J.) read each question aloud. Students could refuse to participate and return incomplete questionnaires in the envelopes.

Ethical considerations

This study received approval from the Human Research Ethics Committee of the Federal University of Minas Gerais (protocol number 124/08) in accordance with the recommendations of the *Declaration of Helsinki*. Authorization was obtained from the selected schools to undertake the study. The participants and their parents/guardians signed a statement of informed consent.

Statistical analysis

Data analysis was performed using the Stata 12.0 statistical package (StataCorp LP, College Station, USA). The prevalence of binge drinking was calculated for both evaluations (2010 and 2012) and the comparison between proportions was performed using the McNemar test. Associations between the

change in the frequency of binge drinking (the ordinal qualitative variable) and the independent variables were tested using the chi-square test (linear trend) (p < 0.05). Variables significantly associated with a change in binge drinking (p < 0.25 in the bivariate analysis) and those considered important in the literature regardless of the p-value were incorporated into the ordinal logistic regression analysis. The score test was performed to check the proportional odds assumption (chi-square = 22.58; p = 0.002). The partial odds proportional model was chosen using the *gologit2* Statas' command [32] with the autofit option. The *gologit2* command tests the assumption of proportional odds using the autofit option and adjusts coefficients for the different categories of the independent variables for which this assumption is violated. For the multiple regression analysis, frequency of religious services was dichotomized with the combination of the "monthly" and "never" categories. The post hoc test was used to evaluate the test power of the sample considering the formula for the comparison of proportions with the prevalence and odds ratios obtained in the present study.

Results

Among the 436 participants, 260 (59.6%) were female and 176 (40.4%) were male, with a mean age of 17.6 ± 0.52 years. A total of 75.9% (n = 331) studied at public schools and 24.1% (n = 105) studied at private schools. The majority of participants (n = 227; 52.1%) lived in areas of lesser social vulnerability (social classes III, IV and V) and 338 (77.5%) reported that a member of the family consumed alcoholic beverages. Regarding religiosity, 398 students (91.3%) reported having a religion and 285 (65.4%) reported attending services only once a month or not at all.

The prevalence of binge drinking was 35.6% in 2010 and 39.9% in 2012, which corresponds to a 4.3% increase in the period analyzed (McNemar test = 14.20; p = 0.003). Among the 281 adolescents who reported consuming five or more alcoholic drinks on a single occasion in 2010, 75 had engaged in binge drinking with greater frequency in 2012. Among those who engaged in binge drinking up to once a month in 2010 (n = 138), 21 had begun to engage in binge drinking once a week or almost daily in 2012. Thus, 96 (22%) of the 436 adolescents demonstrated an increase in the frequency of binge drinking. Among the binge drinkers in 2010, 61 (13.9%) demonstrated a reduction in this practice by either not engaging in binge drinking (n = 56) or reducing the frequency of binge drinking (n = 5) (Table 1).

Changes in binge drinking patterns were associated with the frequency of participation in religious activities (p = 0.004), having a family member who consumed alcoholic beverages (p < 0.001),

Table 1

Distribution of sample in relation to changes in alcohol consumption (frequency of binge drinking) in 2010 and 2012. Belo Horizonte, Minas Gerais State, Brazil, 2012.

Frequency of binge drinking (2010)	Frequency of binge drinking (2012)			
	Never	**Less than once a month to once a month**	**Once a week to nearly every day**	**Total**
Never	206	56 *	19 *	281 (64.4%)
Less than once a month to once a month	47 **	70	21 *	138 (31.7%)
Once a week to nearly every day	9 **	5 **	3	17 (3.9%)
Total	262 (60.1%)	131 (30.0%)	43 (9.9%)	436 (100.0%)

Note: McNemar test: 14.20; p-value = 0.003. Cells on diagonal of table represent adolescents with unaltered binge drinking frequency.

* Adolescents with increased binge drinking;

** Adolescents with decreased binge drinking.

having a father who drinks (p = 0.001), having a mother who drinks (p < 0.001) and a change in the risk of tobacco use on the part of the adolescent (p = 0.016) (Table 2).

Using the autofit command, five constraints were imposed on the final model corresponding to five variables constrained to have their effects meet the parallel-lines assumption (frequency of religious services, mother drinks, mother's schooling, SVI and gender). The effects of these constrained variables were the same in both regressions. However, the effect of the variables "father drinks" and "increased risk of tobacco use" differed between the two regression models. The adjusted multiple

Table 2

Change in frequency of binge drinking according to independent variables among adolescents in two years of follow-up (n = 436). Belo Horizonte, Minas Gerais State, Brazil, 2012.

Categories	Total sample n (%)	Without change in binge drinking (n = 340) n (%)	Increase in binge drinking (n = 96) n (%)	p-value (chi-square test for trend)
Socio-demographic and economic factors				
Gender				
Female	260 (59.6)	178 (68.5)	48 (18.5)	0.260
Male	176 (40.4)	101 (57.4)	48 (27.3)	
Type of school				
Public	331 (75.9)	211 (63.8)	72 (21.8)	0.630
Private	105 (24.1)	68 (64.8)	24 (22.9)	
Mother's schooling (years)				
≥ 8	220 (61.5)	95 (68.4)	28 (20.3)	0.740
Up to 8	138 (38.5)	136 (61.8)	50 (22.7)	
SVI (adolescent's residence)				
Less vulnerability	227 (52.1)	139 (61.2)	48 (21.1)	0.100
Greater vulnerability	209 (47.9)	140 (66.9)	48 (22.9)	
Frequency of religious services				
Weekly/Daily	151 (34.6)	102 (67.6)	21 (13.9)	0.004
Monthly	203 (46.6)	125 (61.6)	54 (26.6)	
Never	82 (18.8)	52 (63.4)	21 (25.6)	
Behavior of family members regarding alcohol intake				
Family member drinks				
No	98 (22.5)	70 (71.4)	8 (8.2)	< 0.001
Yes	338 (77.5)	209 (61.8)	88 (26.0)	
Father drinks				
No	215 (49.3)	153 (71.2)	29 (13.5)	0.001
Yes	221 (50.7)	126 (57.0)	67 (30.3)	
Mother drinks				
No	276 (63.3)	187 (67.8)	45 (16.3)	< 0.001
Yes	160 (36.7)	92 (57.5)	51 (31.9)	
Change in risk of use of other drugs *				
Hazardous tobacco use				
Unaltered/Reduced	411 (94.3)	271 (65.9)	83 (20.2)	0.016
Increased	13 (5.7)	8 (32.0)	13 (52.0)	
Hazardous marijuana use				
Unaltered/Reduced	420 (96.3)	274 (65.2)	89 (21.2)	0.463
Increased	16 (3.7)	5 (31.3)	7 (43.8)	

SVI: Social Vulnerability Index.

* Difference between risk of tobacco and marijuana use between 2010 and 2012.

regression analysis revealed a greater chance of increase in binge drinking among adolescents who lived in areas of greater social vulnerability, those whose mothers consumed alcoholic beverages, those whose father consumed alcoholic beverages, those with an increased risk of tobacco use and those who attended religious services on a monthly basis rather than a weekly or daily basis in comparison to those with unaltered or decreased consumption. When the category "no change in frequency of binge drinking" was added to the "increased" category and evaluated in comparison to adolescents who demonstrated a reduction in the frequency of binge drinking, "father drinks" and "increased risk of tobacco use" lost statistical significance (Table 3).

Table 4 displays the beta values of the post hoc test.

Discussion

In the present study, changes in the frequency of binge drinking were analyzed in a group of adolescents enrolled at public and private schools in the city of Belo Horizonte and an increase in the prevalence of binge drinking was found in the follow-up period. Binge drinking is a serious problem in adolescence [33], as the adolescent brain is sensitive to the impact of early alcohol exposure during this critical developmental period [34]. It is important to note that these effects may be influenced by the age of exposure to alcohol and the amount consumed [34]. Some researchers state that the age of onset is associated with alcohol use among adolescents, binge drinking and the transition to both alcohol abuse and dependence [7,9,11,35]. The increase in the prevalence of binge drinking in the present investigation was expected, considering the increase in age among the participants in this longitudinal study. In Brazil, the consumption of alcoholic beverages among adolescents is commonplace despite the law prohibiting the sale and consumption of alcohol beverages among individuals under the age of 18 [36]. A previous study developed in the 27 Brazilian state capitals with a sample of 14,714 adolescent students from public and private schools revealed that 32% engaged in binge drinking in the previous year and 20.9% engaged in this practice in the 30 days prior to the study [7].

The present investigation has important limitations that may affect the interpretability of findings. First, since data collection was carried out in schools, it is possible that students who were

Table 3

Final partial odds proportional model *.

	OR	95%CI	p-value
Increased frequency of binge drinking vs.			
Unaltered + decreased frequency			
Male	1.25	0.79-1.98	0.331
Greater social vulnerability	1.64	1.01-2.68	0.047
Mother drinks	1.75	1.05-2.92	0.030
Father drinks	2.02	1.11-3.68	0.021
Increased risk of tobacco use	2.82	1.07-7.52	0.036
Frequency of religious services: never + monthly	2.10	1.30-3.38	0.002
Increased + unaltered frequency of binge drinking vs. Decrease in binge drinking			
Male	1.25	0.79-1.98	0.331
Greater social vulnerability	1.64	1.01-2.68	0.047
Mother drinks	1.75	1.05-2.92	0.030
Father drinks	0.88	0.42-1.72	0.727
Increased risk of tobacco use	0.70	0.19-2.57	0.591
Frequency of religious services: never + monthly	2.10	1.30-3.38	0.002

95%CI: 95% confidence interval; OR: odds ratio.

* Model adjusted for mother's schooling.

Table 4

Results of post hoc test computed to determine sample power (1-β probability of error).

Independent variables	Increased frequency of binge drinking vs. Unaltered + decreased frequency	Increased + unaltered frequency of binge drinking vs. Decreased frequency
Gender	0.56	0.15
Type of school	0.05	0.06
Mother's schooling	0.07	0.20
SVI	0.07	0.61
Frequency of religious services	0.86	0.48
Family members drink	0.99	0.55
Father drinks	0.98	0.10
Mother drinks	0.97	0.31
Hazardous tobacco use	0.71	0.04
Hazardous marijuana use	0.45	0.24

SVI: Social Vulnerability Index.

often absent from class and those who developed serious alcohol-related problems and dropped out of school were left out of the sample. Second, despite emphasizing the importance of giving honest responses, the findings may have been underestimated due to self-censuring and/or a suspicion that school authorities could demand access to the answers on the questionnaires. Third, as the data were derived from self-administered questionnaires, memory lapses and a lack of attentiveness should be taken into consideration, despite the attempt to minimize these effects by showing the respondents pictures of standard portions of different types of alcoholic beverages. Fourth, information on the influence of friends and characteristics of friendship networks, such as density, size, quality of contacts, proximity and centrality, was not collected in the present study, despite the fact that binge drinking has been associated with such factors. Fifth, no investigation was conducted into the quality of the relationships between the adolescents and their parents, how long they had lived together or whether they engaged in regular conversations. According to the results of the post hoc test, the sample power was low for some variables, which may represent a type II error and fail to reveal significant associations. However, the test power for the variables of interest (risk of increased tobacco use, religiousness and family members who drink) demonstrates that the sample was sufficient for the evaluation of associations with binge drinking. The frequency of the response variable cannot be extrapolated to the student population of the city of Belo Horizonte.

In the present study, the increase in the frequency of binge drinking was fourfold greater among adolescents who exhibited an increase in hazardous tobacco use. Binge drinking is often associated with the use of other substances, such as cigarettes [37]. This association may be explained by common predisposing factors, such as the influence of peers, parental behavior regarding alcohol, tobacco and supervision [1] as well as aspects related to religious participation [8,38]. In contrast to the present findings, Fisher et al. [39] conducted a cohort study in the United States and concluded that smoking did not appear to increase the risk of binge drinking among individuals who had initiated alcohol use. However, a longitudinal study conducted in Finland found a strong role of adolescent smoking in excessive alcohol use in adulthood, especially among females [1]. The authors suggest that studies on gender differences in the association between smoking and the future risk of alcohol problems are needed in current societies, since the predictive role of smoking in adolescence on future substance use and related problems is not entirely consistent.

The fact that parents consumed alcoholic beverages constituted another predictor of an increase in binge drinking among the adolescents in the present study. Mothers were found to have had the greatest influence on the drinking pattern of adolescents. A study involving European adolescents among whom substance use and the role of family structure were analyzed lends support to the

hypothesis that having confidence in one's mother is inversely associated with the regular use of alcoholic beverages [40]. Adolescents who have love and support from their parents are less likely to engage in drug use and other risky behaviors [41]. A number of studies have demonstrated the role of family factors in binge drinking [4,19,42]. The quality of an adolescent's relationship with his or her parents, which can be impaired by parental substance use, can also put adolescents at risk [40,41]. A recent longitudinal study evaluated a reduction in alcohol consumption by 5,106 high school and college adolescents and its association to their parent's alcohol consumption. The results of this study revealed that when the student's father was a moderate or heavy drinker it was associated to there being a lesser probability of those students reducing their alcohol consumption [43].

Despite being a well-established determinant, the influence of socioeconomic status on health is not well understood and little research has focused on the effects of this aspect on health during adolescence [44]. In the present study, lower socioeconomic status was associated with an increase in the frequency of binge drinking among adolescents. Some studies have demonstrated that adolescents with a higher socioeconomic status have a greater propensity towards the use of alcoholic beverages and binge drinking [7,44]. Goodman & Huang [44] studied a sample of 15,112 adolescents and found that better socioeconomic status (evaluated based on parental schooling and household income) was associated with alcohol intake as well as tobacco, marijuana and cocaine use. In a recent study conducted with students aged 14 to 18 years in the five major regions of Brazil, nearly 32% of the sample had engaged in binge drinking in the previous year, while being in the highest socioeconomic segment doubled the risk of binge drinking among adolescents [7]. However, other studies have found an association between a lower socioeconomic status and greater alcohol consumption [15,16,29,45], while still others have found no significant association between socioeconomic status and alcohol intake [46,47]. According to Pratta & Santos [48], adolescents who reside in an environment that constitutes a threat to their health may become more vulnerable to certain daily situations.

Religious factors have been identified as having a protective effect against substance use in adolescence [49]. In the present study, a lesser frequency of religious participation was directly associated with an increase or no change in the frequency of binge drinking. It is possible that greater religious participation instills moral values and self-control skills or helps adolescents develop healthy social networks [49]. Sanchez et al. [22] found an inversely proportional relationship between frequent engagement in religious services (almost daily or at least weekly) and the abusive consumption of alcohol, which is in agreement with the present findings. Foster et al. [50] stress the importance of considering potential cognitive factors in the etiology and prevention of drinking. In a recent study, the authors found that spirituality and religiosity was negatively associated with drinking behavior, such that individuals scoring high in spirituality, religiosity and "benefit finding" reported drinking less alcohol and experiencing fewer negative alcohol-related consequences. The potential explanation is that benefit finding may provide psychological relief without seeking tension reduction or self-medication through alcohol. Therefore, psychological relief may be the underlying mechanism that reduces perceived stress and reduces the need to cope through drinking.

In the present study, the incidence of an increase in binge drinking was not associated with gender, although the sample was too small to detect such an association. While alcohol intake may be interpreted as a demonstration of masculinity [51] and has a facilitating effect on social interactions [33], the consumption of alcoholic beverages has increased among females due to recent social advances, such as financial independence and the fact that adolescent girls currently have more freedom to frequent places that serve alcoholic beverages that were previously restricted to males [52]. An adolescent's self-perception regarding his/her lack of social skills and emotional involvement may favor the consumption of alcoholic beverages [19]. In a study conducted in the northwest of England, the strength of the association between alcohol use and the prevalence of sexual activity among adolescents aged 13 and 14 increased incrementally with the greater frequency of alcohol use [53]. While alcohol consumption may encourage adolescents to establish social ties, it can also lead to behaviors that place one's health at risk [3,54].

Health-associated behaviors in adulthood are often initiated in adolescence. As problems that require treatment do not generally become evident until much later in life, primary prevention is crucial for adolescents [53]. According to Kraus et al. [55], the frequency of binge drinking seems to be a better predictor of alcohol-related social problems than volume. Such problems, especially among

drinkers with moderate intake per day, may be reduced by prevention strategies aimed at episodic heavy drinkers. Moreover, reducing the frequency of episodic heavy drinking may reduce overall alcohol consumption.

Conclusions

Determining the frequency of binge drinking is important to collective health, as this practice is associated with harm to health and well-being as well as the use of other psychotropic substances. Moreover, binge drinking can lead to dependence, with serious biological, psychological, behavioral and social consequences. The present findings demonstrate the influence of family and socioeconomic status on the occurrence of binge drinking and can assist in the establishment of public health policies directed at health promotion and prevention strategies on the family and community levels. Considering the cross-sectional nature of most scientific investigations, the present longitudinal study offers a greater understanding of the role of religious activities in the prevention of binge drinking, which is a relevant issue to public health in Brazil.

Contributors

K. O. Jorge conceived the study, collected data and wrote the first version, revised the manuscript for important intellectual content and read and approved the final version of the manuscript. R. C. Ferreira conducted the statistical analysis, contributed substantially to the interpretation of the results, revised the manuscript for important intellectual content and read and approved the final version of the manuscript. E. F. Ferreira and I. Kawachi contributed substantially to the interpretation of the results, revised the manuscript for important intellectual content and read and approved the final version of the manuscript. M. P. Vale revised the manuscript for important intellectual content and read and approved the final version of the manuscript. P. M. Zarzar conceived the study, contributed substantially to the interpretation of the results, revised the manuscript for important intellectual content and read and approved the final version of the manuscript.

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Resumo

Objetivou-se investigar mudanças na frequência de consumo excessivo de álcool (binge drinking) e fatores associados na cidade de Belo Horizonte, Minas Gerais, Brasil. A amostra incluiu 436 adolescentes. Os dados foram coletados com o Alcohol Use Disorders Identification Test *e o* Alcohol, Smoking and Substance Involvement Screening Test. *A regressão logística multivariada foi usada na análise dos dados. Observamos um aumento na frequência de consumo excessivo de álcool entre adolescentes que viviam em áreas de maior vulnerabilidade social (OR = 1,64; IC95%: 1,01-2,68), com mães que consumiam bebidas alcoólicas (OR = 1,75; IC95%: 1,05-2,92), com pais que consumiam bebidas alcoólicas (OR = 2,02; IC95%: 1,11-3,68), expostos a risco aumentado de tabagismo (OR = 2,82; IC95%: 1,07-7,42) e que participavam de atividades religiosas (OR = 2,10; IC95%: 1,30-3,38). O conhecimento dos fatores associados a mudanças na frequência de consumo excessivo de álcool entre adolescentes pode auxiliar na elaboração de políticas públicas dirigidas à promoção da saúde e à prevenção de desfechos adversos.*

Bebedeira; Bebidas Alcoólicas; Adolescente

Resumen

El objetivo fue investigar cambios en la frecuencia de consumo excesivo de alcohol (binge drinking) y sus factores asociados en la ciudad de Belo Horizonte, Minas Gerais, Brasil. La muestra incluyó a 436 adolescentes. Los datos fueron recogidos con el Alcohol Use Disorders Identification Test *y el* Alcohol, Smoking and Substance Involvement Screening Test. *Se usó la regresión logística multivariada en el análisis de datos. Observamos un aumento en la frecuencia de consumo excesivo de alcohol entre adolescentes que vivían en áreas de mayor vulnerabilidad social (OR = 1,64; IC95%: 1,01-2,68), con madres que consumían bebidas alcohólicas (OR = 1,75; IC95%: 1,05-2,92), con padres que consumían bebidas alcohólicas (OR = 2,02; IC95%: 1,11-3,68), expuestos a riesgo aumentado de tabaquismo (OR = 2,82; IC95%: 1,07-7,42) y que practicaban una religión (OR = 2,10; IC95%: 1,30-3,38). El conocimiento de los factores asociados a cambios en la frecuencia de consumo excesivo de alcohol entre adolescentes puede ayudar en la elaboración de políticas públicas, dirigidas a la promoción de la salud y a la prevención de desenlaces adversos.*

Borrachera; Bebidas Alcohólicas; Adolescente