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Prevalence of alcohol consumption and factors associated with binge drinking behavior among adolescents in the state of Pernambuco, Brazil, 2016

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ABSTRACT. To investigate the prevalence of alcohol consumption and the factors associated with binge drinking behavior among adolescents in the state of Pernambuco, Brazil. A cross-sectional study with a probabilistic sample of 6,002 adolescents composed of students from public high schools in Pernambuco, Brazil, aged 14 to 19 years. Binge drinking behavior was used as a dependent variable. The following were evaluated as possible risk factors: sociodemographic variables (gender, maternal education, marital status, work, religion); indicators of psychosocial stress (feelings of sadness; suicidal thoughts; feelings of loneliness; friends) and health risk behaviors (physical inactivity; number of sexual partners; drug use; and involvement in fights in the last year). Logistic regression was used to estimate odds ratios (OR). A total of 6,002 adolescents participated, with 75% reporting having consumed alcoholic beverages at least once in their lives. The prevalence of binge drinking in the last month was 17%. Adolescents without a religion had 81% (95%CI: 1.51; 2.16) more chance of consuming alcohol in excess. Adolescents who felt sad were 29% more likely to binge drink (95%CI: 1.08; 1.54), and adolescents who had already thought about suicide had 41% (95%CI: 1.13; 1.76) more chance to drink excessively. Adolescents who used illicit drugs had 4.6 times the chance (95%CI: 3.51; 6.17) of excessive drinking. Adolescents who engaged in four or more fights during the year were twice as likely to binge drink as those who did not fight (95%CI: 1.36; 2.88). The prevalence of alcohol consumption and binge drinking behavior was high. Sociodemographic factors, psychosocial stress and health risk behaviors were associated with binge drinking.

Keywords: adolescent behavior; drinking; ethanol; cross-sectional studies; teenager.

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Introduction

Alcohol is one of the earliest psychoactive substances consumed by adolescents (Alonso-Fernández, Jiménez-Trujillo, Hernández-Barrera, Palacios-Ceña, & Carrasco-Garrido, 2019), and its consumption is considered a public health problem (Malta et al., 2014). Adolescent alcohol use is associated with socio-cultural and environmental factors, fights with parents, negative feelings (sadness and loneliness) and the use of other psychoactive substances (Barbosa Filho, Campos, & Lopes, 2012). Frequent alcohol consumption by adolescents can cause a reduction in the hippocampus volume and affect skills such as memory and learning (Nagel, Schweinsburg, Phan, & Tapert, 2005).

The prevalence of alcohol consumption at some time in life among students of the ninth year (eighth grade) of Elementary School in the capitals of the Brazilian states and the Federal District was 71% in Brazil in 2009 (Malta et al., 2011). Data from the National School Health Survey (*PeNSE*) in 2015 showed that 55.5% (1.5 million) of students who were in the 9th year of elementary school in 2015 had consumed an alcoholic beverage dose some time in their life. Moreover, the prevalence of alcohol consumption in the last 30 days by high school teenagers in the state of Pernambuco in 2011 was 30.4% (Bezerra et al., 2015). The prevalence of alcohol consumption by adolescents is not only high in Brazil, but also elsewhere in the world, ranging from 17.9% in Kenya, to 17.4% in the Philippines, and 40.1% Trinidad and Tobago, as shown in a study carried out between 2003 and 2008 (Balogun, Koyanagi, Stickley, Gilmour, & Shibuya, 2014). Furthermore, the prevalence of alcohol consumption in the last 30 days by adolescents in the United States in 2016 was 12% (Clark Goings et al., 2019).

The behavior of excessive drinking on a single occasion, also called heavy episodic consumption or binge drinking (Gmel, Graham, Kuendig, & Kuntsche, 2006), is frequent in adolescents. The prevalence of binge drinking among students from public and private schools in the capitals in Brazil in 2010 was 38.6% among those who started drinking after 12 years of age and 55.2% among those who started drinking before 12 years of age (Sanchez et al., 2013). In addition, the prevalence of binge drinking in the last 2 weeks (at the time of the survey) among students aged 17 to 19 years in the United States in 2011 was 22% (Patrick & Schulenberg, 2013).

Binge drinking behavior can cause alcoholism, and often accompanied by mental and physical health disorders, problems in relationships with others and in social and economic behavior, excessive alcohol consumption, psychiatric illnesses, school dropouts, accidents and drug use (Soares, Farias, & Monteiro, 2019; Viner & Taylor, 2007). National and international studies also show an association of alcohol abuse with physical and sexual violence, in addition to increasing the likelihood of risky sexual behaviors, traffic accidents, unintentional injuries and periods of amnesia (blackouts) (Bellis et al., 2008; Carvalho, Barros, Lima, Santos, & Mélo, 2011; Davies, Kuipers, Junger, & Kunst, 2017).

It is necessary to know the factors associated with binge drinking among adolescents in order to develop strategies aimed at reducing alcohol consumption. The peculiarities of economic, social and cultural conditions in Brazil lead to the theory that perhaps the prevalence and factors associated with binge drinking are different from those found in wealthier countries and even those found in different Brazilian states (Sanchez, Locatelli, Noto, & Martins, 2013). Thus, the objective of this study was to investigate the prevalence of alcohol consumption and the factors associated with binge drinking behavior among adolescents in the state of Pernambuco, Brazil.

Material and methods

This was a cross-sectional school-based study with statewide coverage, being part of a larger research project called 'Practice of Physical Activities and Health Risk Behaviors in High School Students in the State of Pernambuco – A Temporal Trend Study (2006-2011-2016) - Attitude Project'. Only the data from the third survey carried out in 2016 in public high schools in the state of Pernambuco were used in this study.

The research protocol was approved by the Human Research Ethics Committee of the University of Pernambuco (CAAE: 56341416.9.0000.5192/CEP-UPE). All parents/guardians were informed of the study through a Free and Informed Consent Form (ICF) and the adolescents through a separate Informed Consent Form. The interviews were only conducted after delivery of the two signed documents when under 18 years old, and only the ICF for those over 18 years old.

The target population consisted of 300,215 high school students enrolled in 734 state public schools, aged 14 to 19 years old. The sample size took into account the estimate of the target population, confidence interval (95%), sample error values defined at 2%, prevalence estimated at 50%, assuming 80% power to detect differences in magnitude of 1.5 OR and the sample design effect established at 2 times the minimum sample size. An additional 20% was added to the minimum sample size to compensate for losses (inadequate application and/or completion of the questionnaires and participation of students outside the age group of interest in the study) and refusals, reaching a sample size of 5,667 adolescents.

A stratified random sampling was carried out in two different stages. Schools were selected at random in the first stage considering a proportional distribution in 17 micro-regions of the state and the school size. Next, high school classes were defined as sample units in the second stage. The selection of these units was also randomly carried out in proportion to the number of classes in each school selected in the first stage per shift (day and night). All students from the selected classes who were present at the school when the data were collected were invited to participate in the study.

Data collection was carried out during the second half of 2016. The group of researchers was divided into two teams, one to carry out the research in the Sertão Médio do São Francisco, Sertão Central and Sertão do Araripe GREs, and the other for the Metropolitan Region and the other GREs. The questionnaire was applied in the classroom without the presence of teachers for all students present in the room, regardless of age, with their participation on a voluntary basis. The researcher informed the students about the research objectives, explaining to them that the information provided would be kept confidential, would not influence their school performance/grades, and that they would only be used for research purposes. The

questionnaires were applied as a collective interview in which the researcher provided previous instructions and read each of the questions, and the students later answered the questions.

Data were collected using the translated version of the 'Global School-based Student Health Survey' (GSHS) questionnaire proposed by (World Health Organization-WHO), with the objective of investigating health risk behaviors in adolescents. This questionnaire was translated into Portuguese and is widely used in studies conducted in Brazil (Legnani et al., 2012; Raizel et al., 2011; Ribeiro, Santos, & Menezes, 2019).

A pilot study was conducted after carrying out an adaptation of the GSHS with the objective of verifying its applicability and the reproducibility of the measures, in which the Kappa value ranged from 0.70 to 0.98. The questionnaire presented 11 health risk behavior modules in its final version, of which the following were used for the present study: Personal Information; Physical activity; Alcohol Consumption and Use of Other Drugs; Feelings and Relationships; Behaviors at School and at Home; Sexual Behavior; Smoking; and Violence.

The independent variables were divided into 3 groups:

a) Sociodemographic characteristics: gender (male, female), age, marital status (single or married/living with a partner), work (yes, no), maternal education (up to 7 years, 8 years or more) and religion (yes, no).

b) Psychosocial stress indicators: The adolescents were asked about the presence of feelings of loneliness and sadness (yes, no), how many true friends they had, and whether they had already thought about suicide (yes, no).

c) Health risk behaviors: the questions were regarding whether they had already had any sexual intercourse (yes, no), whether they used a condom in the last sexual intercourse (yes, no), how many sexual partners the teenager had already had, how old they were when they smoked cigarettes for the first time, how old they were when they used some kind of drug for the first time, and how many times they had gotten involved in some kind of fight. Regarding the practice of physical activity, the students were asked about being physically active taking into account a criterion of 60 minutes at least 5 days a week (yes, no).

The dependent variable of alcohol consumption by adolescents was assessed by the questions: (a) How old were you when you consumed alcohol for the first time?; (b) How many days have you consumed at least one dose of alcohol-containing drink in the past 30 days?; (c) On the days that you consumed alcohol in the past 30 days, how many doses did you usually drink per day?; (d) During your life, how many times have you drunk so much that you got became drunk?; (e) During your life, how many times have you had a hangover, felt sick, had problems with your family or friends, missed school or got into fights due to drinking alcohol?

The outcome variable was binge drinking behavior, being defined by the intake of 4 doses or more of alcohol by women on the same occasion and 5 doses or more for men in the last month.

A descriptive analysis was performed by a frequency distribution. Differences between proportions were assessed using the Chi-squared test. Logistic regression was used to analyze the factors associated with binge drinking behavior. All variables with a 'p-value' lower than 0.05 in the Chi-squared test were inserted into the regression model as independent variables. Sociodemographic variables and psychosocial stress indicators were used in the adjusted model I, while sociodemographic variables and health risk behaviors were analyzed in model II. Statistical significance was defined at $\alpha = 0.05$ or through the confidence interval. Data analysis was performed using the SPSS for Windows program (version 20).

Results

A total of 6,700 adolescents were approached to participate in the study. However, a final amount of 6,002 adolescents were evaluated after losses and refusals (9.7%). The mean age was 16.46 years (± 1.18), 55% were female, and 46% had mothers who studied for less than 8 years (Table 1).

Of the adolescents interviewed, 75% had already consumed alcohol at some time in their lives. Of these adolescents, 36% consumed alcohol for the first time between 14 and 15 years old. In the 30 days prior to the survey, 54% of the adolescents consumed one or two doses of alcohol. In contrast, 46% of adolescents reported never having been drunk and 70% never had a hangover (Figure 1).

The prevalence of binge drinking in the last month was 17% (95%CI: 0.16; 0.18). The profile of the teenagers who binge drink was characterized as: 53% women; 59% children of mothers with more than eight years of schooling; 12% used drugs once or twice in their lives; and 20% reported having already thought about suicide (Table 1).

Table 1. Characteristics of adolescent (14-19 years of age) high school students and those who reported binge drinking, Pernambuco, Brazil, 2016.

Variables	Categories	Total adolescents n	%	Adolescents who binge drink n	%
Sociodemographic factors					
Gender	Male	2672	44.8	475	46.7
	Female	3298	55.2	543	53.3
Study shift	Morning	1362	22.7	186	18.3
	Afternoon	995	16.6	169	16.6
	Night	873	14.5	181	17.8
	Semi-integral or integral	2772	46.2	482	47.3
Maternal education level	Up to 7 years	2323	46.1	352	40.6
	8 years or more	2720	53.9	514	59.4
Civil status	Single	5463	96.4	906	96.3
	Married/partner	205	3.6	35	3.7
Religion	No	1046	17.5	261	25.7
	Yes	4934	82.5	755	74.3
Psychosocial stress indicators					
Feeling of sadness	No	4116	70.2	642	63.8
	Yes	1766	29.8	364	36.2
Suicidal thoughts	No	5156	13.6	815	80.5
	Yes	809	86.4	197	19.5
Feeling of loneliness	No	4815	80.6	789	77.7
	Yes	1160	19.4	227	22.3
Number of friends	None	357	6.0	58	5.7
	1 friend	640	10.7	96	9.4
	2 friends or more	4989	83.3	863	84.9
Health risk behavior					
Have had sexual intercourse	No	2795	47.5	279	27.8
	Yes	3086	52.5	725	72.2
Condom use	No	1022	37.1	295	41
	Yes	1735	62.9	425	59
Number of sexual partners	1	961	34.7	151	20.9
	2	482	17.4	119	16.5
	3 to 5	747	27.0	222	30.8
	More than 6	580	20.9	229	31.8
Age when smoked cigarettes for the first time	11 years or less	284	22.3	80	16.4
	12 to 15 years	734	57.8	294	60.2
	16 years or older	253	19.9	114	23.4
How many times have you used drugs?	Never	5306	88.9	682	67.3
	1 or 2 times	299	5.0	121	11.9
	3 times or more	367	6.1	211	20.8
Missed class without permission in the last month	No	3398	56.9	391	38.6
	1 or 2 days	1583	26.5	293	28.9
	3 days or more	990	16.6	329	32.5
Frequency of fights in the last year	Never	4659	78.1	630	62.3
	1 time	675	11.3	160	15.8
	2 or 3 times	394	6.6	122	12.1
	4 times or more	241	4.0	99	9.8
Physical activity	No	3453	57.8	571	56.3
	Yes	2522	42.2	444	43.7

The following factors associated with binge drinking were identified in the bivariate analyzes: (i) sociodemographic - maternal education ≥ 8 years, working, not having religion and not practicing physical activity; (ii) psychosocial stress indicators - feelings of sadness, suicidal thoughts and feelings of loneliness; (iii) health risk behaviors - having more than one sexual partner, having used drugs and having been involved in fights in the last year (Table 2). Next, two models were proposed in the adjusted analysis. Sociodemographic factors and psychosocial stress indicators were analyzed in the first model. Adolescents in which the mother had more than eight years of study were 34% more likely to present binge drinking behavior. Adolescents without a religion were 81% more likely to consume alcohol in excess. Similarly, working teenagers were also more likely to binge drink. The chance for teenagers who feel sad to binge drink is 29% higher and teenagers who have already thought about suicide are 41% more likely to drink to excess (Table 3).

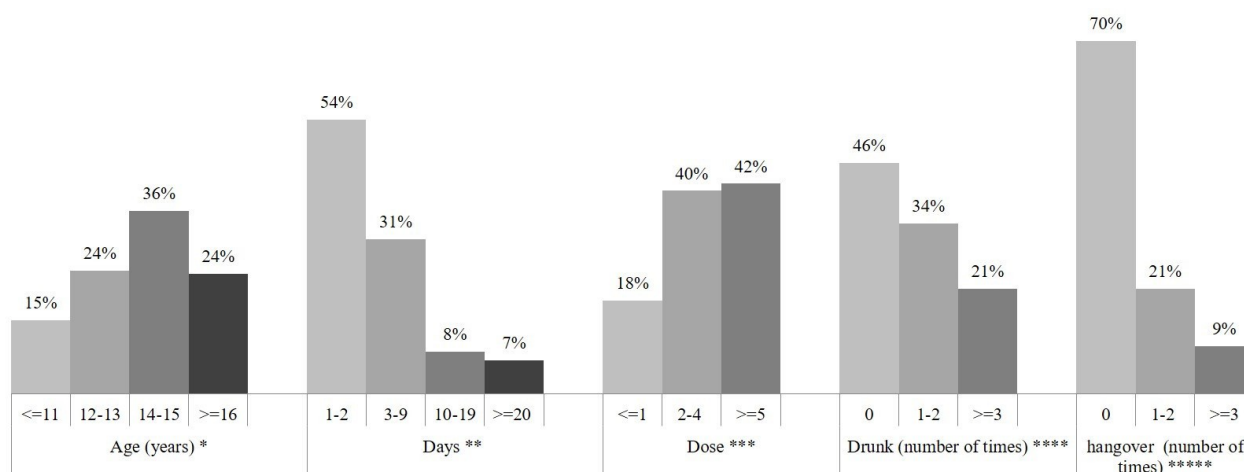


Figure 1. Prevalence of alcohol consumption among adolescent students (14-19 years of age) from public and private schools, Pernambuco, Brazil, 2016. *How old were you when you drank alcohol for the first time? **In the past 30 days, on how many days have you consumed at least one dose of alcohol-containing drink? ***In the past 30 days, how many doses did you usually drink per day on the days that you consumed alcohol? ****During your life, how many times did you drink so much that you became drunk? *****During your life, how many times have you had a hangover, felt sick, had problems with your family or friends, missed school or got into fights due to drinking alcohol?

Table 2. Association between sociodemographic variables, psychosocial stress indicators and health risk behaviors with binge drinking behavior among adolescent high school students (14-19 years of age), Pernambuco, Brazil, 2016.

Variables	Categories	Binge drinking behavior				p-value*
		No		Yes		
		n	%	n	%	
Sociodemographic factors						
Gender	Male	2186	82.1	475	17.9	0.175
	Female	2744	83.5	543	16.5	
Maternal education level	Up to 7 years	1949	84.7	352	15.3	<0.001
	8 years or more	2185	81.0	514	19.0	
Civil status	Not married	4508	83.3	906	16.7	0.849
	Married/partner	168	82.8	35	17.2	
Work	No	4301	83.4	857	16.6	0.002
	Yes	600	78.9	160	21.1	
Religion	No	779	74.9	261	25.1	<0.001
	Yes	4137	84.6	755	15.4	
Psychosocial stress indicators						
Feeling of sadness	No	3482	84.4	642	15.6	<0.001
	Yes	1393	79.3	364	20.7	
Suicidal thoughts	No	4302	84.1	815	15.9	<0.001
	Yes	605	75.4	197	24.6	
Feeling of loneliness	No	3991	83.5	789	16.5	0.009
	Yes	923	80.3	227	19.7	
Number of friends	None	299	83.8	58	16.2	0.298
	1	540	84.9	96	15.1	
	2 or more	4081	82.5	863	17.5	
Health risk behaviors						
How many sexual partners	1	801	84.1	151	15.9	<0.001
	2	358	75.1	119	24.9	
	3 to 5	518	70.0	222	30.0	
	More than 6	341	59.8	229	40.2	
How many times have you used drugs?	Never	4587	87.1	682	12.9	<0.001
	1 or 2 times	171	58.6	121	41.4	
	3 times or more	152	41.9	211	58.1	
Number of fights in the last year	None	3996	86.4	630	13.6	<0.001
	1	512	76.2	160	23.8	
	2 or 3	262	68.2	122	31.8	
	4 or more	139	58.4	99	41.6	
Physical activity	No	1866	84.8	334	15.2	0.002
	Yes	3042	81.8	679	18.2	

*p-value from the Chi-squared test..

Table 3. Crude and adjusted analysis for binge drinking behavior according to sociodemographic factors, psychosocial stress indicators and health risk behaviors among adolescent students (14–19 years of age), Pernambuco, Brazil, 2016.

Variables	Crude model OR (95%CI)	Adjusted model I* OR (95%CI)	Adjusted model II** OR (95%CI)
Sociodemographic factors			
Maternal education level			
Up to 7 years	1.00	1.00	1.00
8 years or more	1.30 (1.12;1.51)	1.34 (1.15;1.56)	1.17 (0.95;1.43)
Religion			
No	1.84 (1.56;2.15)	1.81 (1.51;2.16)	1.25 (0.99;1.58)
Yes	1.00	1.00	1.00
Work			
No	1.00	1.00	1.00
Yes	1.34 (1.11;1.62)	1.38 (1.12;1.70)	1.02 (0.79;1.31)
Psychosocial stress indicators			
Feeling of sadness			
No	1.00	1.00	-
Yes	1.42 (1.23;1.63)	1.29 (1.08;1.54)	-
Suicidal thoughts			
No	1.00	1.00	-
Yes	1.72 (1.44;2.05)	1.41 (1.13;1.76)	-
Feeling of loneliness			
No	1.00	1.00	-
Yes	1.24 (1.06;1.47)	0.99 (0.81;1.22)	-
Health risk behaviors			
How many sexual partners			
1	1.00	-	1.00
2	1.76 (1.34;2.31)	-	1.64 (1.21;2.22)
3 to 5	2.27 (1.80;2.87)	-	1.88 (1.43;2.47)
6 or more	3.56 (2.80;4.53)	-	2.13(1.59;2.85)
How many times used drugs			
Never	1.00	-	1.00
1 to 2 times	4.76 (3.72;6.09)	-	2.55 (1.87;3.48)
3 times or more	9.34 (7.47;11.67)	-	4.65 (3.51;6.17)
Frequency of fights in the last year			
None	1.00	-	1.00
1	1.98 (1.63;2.41)	-	1.30 (0.99;1.70)
2 or 3	2.95 (2.34;3.72)	-	1.75 (1.27;2.42)
4 or more	4.52 (3.44-5.92)	-	1.98 (1.36;2.88)
Physical activity practice			
Yes	1.00	-	1.00
No	1.25 (1.08;1.44)	-	1.21 (0.97;1.52)

* Adjusted model I – sociodemographic variables + psychosocial stress indicators. ** Adjusted model II sociodemographic variables + health risk behaviors.

Sociodemographic factors and health risk behaviors were analyzed in the second model. The greater the number of sexual partners, the greater the chance of presenting binge drinking behavior. Adolescents who had two sexual partners were 64% more likely to binge drink than adolescents who had only one partner. The chance increases to 2.1 times in adolescents who have had more than six partners. Adolescents who used illicit drugs three times or more presented 4.6 times the chance of excessive drinking compared to those who never used drugs. Adolescents who engaged in four or more fights during the year were twice as likely to binge drink as those who did not fight. Lastly, those who did not practice physical activity were also more likely to binge drink (Table 3).

Discussion

The findings of this study revealed that approximately three quarters of school adolescents in Pernambuco have already consumed alcoholic beverages and about half of them drank regularly in the past 30 days. Despite prohibition on the sale of alcoholic beverages to minors under 18 in Brazil (Lei n. 9.294, 1996), excessive alcohol consumption among adolescents is still a common practice.

Higher maternal education, adolescents without religion, adolescents who work, feeling sad, suicidal thoughts, greater number of sexual partners, use of illicit drugs, involvement in fights and not practicing physical activity were reported as associated factors for binge drinking.

Regarding the associated factors, higher family income has a positive association with binge drinking behavior in adolescents (Fraga, Sousa, Ramos, Dias, & Barros, 2011). Adolescents who are children of parents with a higher education level or higher income have an easier time acquiring alcoholic beverages (Reis & Oliveira, 2015), more frequent parties (Imai, Coelho, & Bastos, 2014) and often have a more active social life, constituting factors which encourage consumption of alcoholic beverages (Cibeira, Muller, Lazzaretti, Nader, & Caleffi, 2013).

Feeling of sadness and suicidal thoughts were associated with binge drinking behavior. Sadness can be an emotional factor which explains alcohol consumption in students. Loneliness and sadness refer to emotional suffering resulting from perceived deficits in the quantity and/or quality of their social relationships, also being identified as a unique risk factor for physical and psychological health (Tenório et al., 2010). This result is corroborated in studies with Korean adolescents (Park & Kim, 2016) and Mexicans (Ocampo, Bojorquez, & Cortés, 2009), and is a factor which must be taken into account, because in addition to being associated with alcohol abuse, this emotional distress can lead to depression, suicidal behavior (Park & Kim, 2016), as well as deliberate self-harm (Ocampo et al., 2009).

Religion showed an inverse association with excessive alcohol consumption. Alcohol abuse among adolescents who reported not having a religion was also found in other studies (Bezerra et al., 2009; Chen & Feeley, 2016). The possible explanation is due to the rules of conduct adopted by most religions which prohibit alcohol abuse and greater contact with friends who share the same values in the religion.

The health risk behaviors of a greater number of sexual partners, drug use and involvement in fights were associated with excessive alcohol consumption. Adolescents who use drugs usually have characteristics such as conflicting family ties and little proximity between their family members, thereby increasing the chance of alcohol consumption (Mendonça et al., 2018). The causal relationship between health risk behavior and alcohol is still uncertain. There is likely to be a reciprocal relationship between them (Turner, Daneback, & Skårner, 2018). Recreational drug use and excessive alcohol consumption alter the sexual decisions adolescents make and increase the chances of unsafe sex. However, substance use for many authors (Bellis et al., 2008) is now an integral part of their strategic approach to sex, and as such an additional factor which keeps them in continuous use. Combating substances with physiological and psychological links to sex requires addressing substance use and sexual behavior in the same way that young people experience them; as part of the same social process (Bellis et al., 2008).

Some behavioral factors related to the adolescent's life linked to individual, family and social characteristics combine in order to increase the probability of alcohol abuse. Studies indicate that the absence of limits and/or authority, non-compliance with rules, lack of affection, understanding and family support can weaken adolescents, favoring the harmful influence of friends and adopting risky health behaviors (Carvalho et al., 2011; Pratta & Santos, 2007).

The statewide scope of the survey in this study and the representative sample of school adolescents should be highlighted, strengthening the external validity of this investigation. Another relevant factor is the use of a questionnaire adopted worldwide for the study of this population, which helps in comparing the results (Tenório et al., 2010).

The cross-sectional design of this study is cited as a main limitation, which makes it impossible to establish a temporal relationship between most of the independent variables and binge drinking behavior. Due to the literature showing a reciprocal relationship between these behaviors, further studies with a longitudinal design are suggested for better understanding. Another limitation is the possibility of information bias, which can cause the prevalence of substance use to be underestimated when investigating behaviors which are not socially accepted through self-reporting, even though this is anonymous. It should also be noted that not all the possible factors associated with binge drinking were analyzed, such as low school performance, sexual violence, among others. However important factors involving different domains were tested in this study, including: sociodemographic factors, psychosocial stress indicators and health risk behaviors.

Conclusion

The prevalence of alcohol consumption and binge drinking behavior was high. Sociodemographic factors, psychosocial stress indicators and health risk behaviors were associated with binge drinking. Monitoring trends in health risk behaviors in the adolescent population can help identify potential preventive strategies

and reassess existing ones. Thus, the results of this study may contribute to implementing and evaluating specific public policies which fully assist adolescents, as well as guiding health and education professionals who work in health promotion and disease prevention programs which can be carried out by health agencies in developing actions to reduce factors associated with alcohol consumption among adolescent.

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