Short Communication

Use of licit and illicit substances among adolescents in Brazil — A national survey

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ABSTRACT

Objective: We estimate the prevalence of alcohol, tobacco and illegal substance use in a national representative sample of adolescents. We also estimate how socio demographic characteristics, household environment and mental health are associated with substance misuse.
Method: This is a cross-sectional study using data from the first Brazilian National Alcohol Survey, which gathered information on the use of psychoactive substances in 761 participants aged 14 to 19 years old. Weighted logistic regression was used to calculate adjusted odds ratios.
Results: More than half of the adolescents interviewed were regular alcohol users and one out of ten were abusers and/or dependents. Older male adolescents living in urban areas were more likely to present alcohol related disorders and to smoke. Age had an inverse association with illegal substance use. Smokers and those using illegal substances were more likely to report domestic violence while those with alcohol abuse/dependence were more likely to have depression.
Conclusions: The high prevalence of alcohol, tobacco and illicit substance consumption among Brazilian adolescents is staggering. Young males with mood disorders from urban areas are more at risk of developing alcohol disorders while illegal drug use is highly associated to household dysfunction in early life. Brazilian growing economy will possibly lead to increased levels of substance use among adolescents if new prevention measures are not implemented. The intensification of law enforcement strategies to reduce psychotropic substances access is required.

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1. Introduction

Brazil is the fifth most populated country in the world with 20% of its population aged between 15 and 24 years old (IBGE, 2000). No special license is required to sell alcohol in the country, where it is extremely cheap and readily available. There are national laws to prevent the under aged from buying beverages, yet they are scarcely enforced. A slightly different scenario is seen regarding tobacco use. Changes in the law have broadly restricted advertising and innovative anti-smoke campaigns are taking place (Instituto Nacional de Cancer, 2009). However, the increasing gross domestic product (GDP) should negatively affect any possible improvement those campaigns could achieve (Menezes et al., 2009). The World Health Organization (WHO, 2002) reported that not only are increasing numbers of young people in developing countries resorting to licit and illicit substances for recreation and excitement but problems associated with the use of illegal drugs are also on the rise. The use of illegal psychotropic substances among adolescents has also become a major social and health problem in Brazil (Batistoni, Neri, & Cupertino, 2007). Harm reduction strategies are gradually becoming

more available in the country, yet the poorly enforced control of drug traffic and ready availability are making the use of illegal substances a major concern in most urban areas (Batistoni et al., 2007; United Nations Office on Drugs and Crime, 2008). The failure on law enforcement combined with the risk taking and impulsive tendencies that are intrinsic to adolescence make this large section of the population more vulnerable to addiction and in need of special attention.

The understanding of the underlying factors associated with use of substances among adolescents is essential as it can inform early interventions, crucial to prevent substance use disorders and its negative impact in adult life. In this study we estimate the prevalence of alcohol, tobacco and illegal substance use in a nationally representative sample of adolescents in Brazil; we describe patterns of alcohol and tobacco use and estimate the association between substance use and socio demographic characteristics, mental disorders (depression and attention deficit hyperactivity disorder) and household environment among adolescents.

2. Material and methods

2.1. Sampling and procedures

The Brazilian National Alcohol Survey (BNAS) followed a multistage cluster sampling procedure and selected 3007 individuals aged 14 years

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with an over-sample of adolescents of 761 participants aged 14 to 19 years old. The sample size was calculated considering the non-response rate to achieve a power of .80. The sampling involved 3 stages: 1) selection of 143 counties using probability proportional to size methods (PPS); 2) selection of 2 census sectors for each county; 3) within each census sector 8 households were selected by simple random sampling, followed by the selection of a household member to be interviewed using "the closest future birthday" technique. One-hour face-to-face interviews were conducted in the respondent's home by trained interviewers using a standardized questionnaire.

2.2. Measurements

The questionnaire used was the Brazilian adaptation of the "HABLAS" questionnaire (Caetano, Vaeth, Ramisetty-Mikler, & Rodriguez, 2009; Dawson & Room, 2000). Socio-demographic characteristics such as gender, age, school attendance and current residence (urban/non urban area) were assessed.

2.2.1. Substance use

We assessed alcohol consumption in the last 12 months. *Frequent binge drinking* was defined as the consumption of 4 units for females and 5 units for males (National Institute on Alcohol Abuse and Alcoholism, 2005; Saha, Stinson, & Grant, 2007) in one occasion once a week or more. *Alcohol abuse and dependence* diagnoses were established according to DSM-IV criteria using the Brazilian version of Composite International Diagnostic Interview (ICD version 2.1) (Quintana, Jorge, Gasta, & Miranda, 2004). *Current smokers* were questioned about their smoking habit (age of onset, average of cigarettes per day, etc.) and about their desire and possible reasons to quit smoking. *Illegal substance use* was defined as self-report of stimulants; ecstasy; crack or cocaine; solvents; opioids; cannabis or hashish and hallucinogen use in the last 12 months.

Domestic violence was assessed using the following questions: *"During your childhood or adolescence, did you see your parents physically harming each other or others?" "During your childhood or adolescence, did your parents or the people who raised you ever 1) Hurt you with an object? 2) Burned you or threw boiling water on you? 3) Threatened you with a knife or a gun? 4) Shot you with a gun or attacked you with a knife?".*

2.2.2. Mental health

Depression was assessed using the Brazilian validated version of the 20-item Center for Epidemiological Studies Depression Scale (CES-D), using the score 16 as the cutoff point (Batistoni, Neri, & Cupertino, 2007) The scale was previously validated for use among the adolescent population (Bradley, Bagnell, & Brannen, 2010; Maiano, Morin, & Begarie, 2011). *Attention Deficit and Hyperactivity Disorder* (ADHD) was assessed using the reduced version of the Adult Self Report Scale (ASRS) adapted to Portuguese language using the score 4 as the cutoff point (Kessler et al., 2005; Mattos et al., 2006).

2.3. Statistical analysis

Statistical analyses were conducted using STATA version 10 software. Given the multi-stage stratified sampling design, all analyses were weighted to take account of differing selection probabilities at each stage, and of non-response using post-stratification. All estimates of prevalence and association were made using the appropriate STATA survey commands to generate robust standard errors. Social-demographic characteristics, substance use, household environment and mental health were described by gender. Mutually adjusted odds ratios (OR) with 95% confidence intervals (CI) were calculated for the associations between socio-demographic characteristics; domestic violence, depression and ADHD with alcohol abuse/dependence, frequent binge drinking, tobacco and illegal drug use. All the logistic regression models were adjusted by socio-demographic characteristics and mental disorders. The alcohol use models were adjusted by illegal drug use and the illegal drug use models were adjusted by alcohol abuse/dependence.

2.4. Ethics

All respondents granted their informed consent. This study was approved by the Ethics Committee of the Federal University of Sao Paulo.

3. Results

3.1. Sample characteristics

The mean age of the participants was 16.5 years old (SE = 0.14) and the sample was equally distributed between genders (49.7% males and 50.2% females); most were still attending school (78.6%) at secondary level (76.7%) (Table 1).

3.2. Prevalence

Half of the participants reported alcohol consumption in the last 12 months; nearly 60% of the adolescents living in urban areas consumed alcohol in the last 12 months. The mean age of drinking onset was 15.8 years old (SE 0.13) and 11.3% of the adolescents were identified as current alcohol abusers and/or dependents (8.1% among those aged bellow 18 years old and 24.8% among those above 18). Frequent binge drinking prevalence was 5.4%, (8.1% males, 2.7% females).

The mean age of cigarette smoking onset was 14.7 years old (SE 0.5), 7.1% were current smokers, and nearly a third (28.3%) of them smoked 20 or more cigarettes a day. Over one third of the smokers (36%) reported no desire to quit. Over half of the smokers (52%) reported they would quit if cigarette prices were higher.

Looking at all substances combined we found that nearly 3% of participants had used at least one illicit drug in the last twelve

Table 1
Description of socio-demographics characteristics, substance use and mental health in adolescents according to gender.

	Male 377 (49.7)	Female 384 (50.2)	Total 761
Demographics			
Age (mean (SE))	16.5 (0.14)	16.5 (0.12)	16.6 (0.09)
Current residence			
Urban area	116 (33.5)	139 (35.5)	255 (34.5)
Non-urban area	261 (66.5)	245 (64.5)	506 (65.5)
Attending school	310 (79.3)	318 (77.9)	628 (78.6)
Substance use (last 12 months)			
Alcohol use	179 (55.2)	173 (47.2)	352 (51.2)
Alcohol abuse/dependence	45 (16.7)	26 (6.0)	71 (11.3)
Binge at least once a week	16 (8.1)	11 (2.7)	27 (5.4)
Regular cigarette use	29 (7.7)	23 (6.5)	52 (7.1)
Cannabis	9 (2.1)	7 (1.1)	16 (1.6)
Solvents	7 (1.9)	2 (0.3)	9 (1.1)
Crack/cocaine	3 (0.5)	2 (0.4)	5 (0.5)
Any illegal drug	16 (4.2)	9 (1.4)	25 (2.8)
Household environment			
Domestic violence	89 (11.4)	99 (12.8)	188 (24.2)
Domestic violence related to alcohol	15 (2.5)	21 (3.3)	36 (5.8)
Mental health			
Depression	82 (21.7)	141 (36.7)	223 (29.3)
ADHD	33 (3.5)	50 (6.2)	83 (9.7)

Table 2
Associations between substance use, socio-demographics characteristics, domestic violence and mental health.

	Alcohol abuse/dependence[a]	Binge drinking[a]	Tobacco use [a,b]	Any illegal drug use[b]
Gender				
Female	1.00	1.00	1.00	1.00
Male	3.68 (1.63–8.26)	3.57 (1.33–9.55)	0.71 (0.29–1.74)	**3.64 (1.13–11.64)**
Age (years)	**1.52 (1.18–1.96)**	**1.57 (1.05–2.36)**	1.29 (0.95–1.77)	**0.71 (0.52–0.98)**
Current residence				
Non-urban	1.00	1.00	1.00	1.00
Urban	1.50 (0.65–3.49)	**8.46 (2.58–27.71)**	0.97 (0.28–3.30)	2.39 (0.90–6.35)
Attending school	1.11 (0.43–2.84)	0.44 (0.14–1.41)	0.76 (0.29–2.00)	**0.20 (0.08–0.49)**
Domestic violence	1.40 (0.65–3.00)	0.95 (0.28–3.20)	**2.49 (1.16–5.33)**	**2.93 (1.15–7.46)**
Domestic violence related to alcohol	0.82 (0.21–3.14)	0.30 (0.02–4.13)	**3.71 (1.03–13.45)**	**5.29 (1.52–18.38)**
Depression	**2.02 (1.02–3.97)**	0.94 (0.36–2.50)	1.18 (0.38–3.65)	1.78 (0.63–5.00)
ADHD	0.81 (0.25–2.56)	2.14 (0.50–9.17)	0.33 (0.05–2.26)	2.76 (0.63–12.09)

[a] Adjusted by all demographics and any illegal drug use.
[b] Adjusted by all demographics and alcohol abuse/dependence.

months. Less than 2% reported use of cannabis in the last year, 1.1% solvents and 0.5% crack/cocaine.

3.3. Associations between socio-demographic characteristics, household environment and mental health with substance use

Gender was significantly associated with alcohol disorders and illegal substance use. The odds of alcohol abuse/dependence and binge drinking were much higher in males compared to females (OR: 3.68, 95%CI: 1.63 to 8.26 for alcohol abuse/dependence, OR: 3.57 95%CI: 1.33 to 9.55 for frequent binge drinking and OR: 3.64, 95%CI: 1.13–11.64 for illegal drug use) (Table 2).

Age was associated with increased odds for alcohol abuse/dependence (OR = 1.52; 95%CI: 1.18 to 1.96) and binge drinking (OR = 1.57; 95%CI: 1.05 to 2.36). The opposite was found regarding the use of illegal substances (OR = 0.71 95%CI: 0.52 to 0.98).

Domestic violence and domestic violence related to alcohol were associated with tobacco use (OR: 2.49, 95% CI: 1.16 to 5.33 and OR: 3.71, 95% CI: 1.03 to 13.45 respectively) and to illegal substance use (OR: 2.93, 95% CI: 1.15 to 7.46 and OR: 5.29, 95%CI: 1.52–18.38 respectively). Depression was associated with alcohol abuse/dependence only (OR: 2.02 95%CI: 1.02 to 3.97) and ADHD was not associated with any of the substances studied.

4. Discussion

This study examined the prevalence and correlates of alcohol, tobacco and illegal substances in a nationally representative sample of Brazilian adolescents. Our results showed that alcohol use is highly prevalent among adolescents; we found that more than half of the sample were regular alcohol users and one out of ten were abusers and/or dependents. Older males living in urban areas were more likely to have alcohol use disorders and to smoke. Age seemed to influence alcohol and illegal substance use in different ways: getting older increases the likelihood of having alcohol use disorders and decreases the likelihood of using illegal substances. Having been exposed to domestic violence was positively associated with the use of tobacco and illegal substances, while depression was significantly associated with alcohol abuse/dependence only.

Alcoholic beverages are sold like any other manufactured product in Brazil, with no time or business restrictions (Laranjeira, 2007). Only very recently the retail of alcohol was limited in major motorways and blood alcohol limit for drivers was decreased to 0.02 g/l (Andreuccetti et al., 2011). However, it hardly had any effect on the easy access to alcoholic beverages seen in bars, clubs and even in bakeries. The wide availability of alcohol in urban areas might explain why our results showed that adolescents living in urban areas are more at risk to regular binge drinking. A previous population based

study (Strauch, Pinheiro, Silva, & Horta, 2009) performed in a small city of southern Brazil showed lower rates of alcohol use, despite methodological differences between the studies, this supports the hypothesis that adolescents residing in bigger urban areas tend to be more at risk.

The positive association between age and alcohol related disorders is in agreement with extensive literature showing that alcohol abuse usually starts during adolescence and tends to escalate towards adult life (Merline, Jager, & Schulenberg, 2008; Pitkanen, Kokko, Lyyra, & Pulkkinen, 2008). Regarding the use of illicit substances age appears to have a protective effect. Nevertheless, nearly 3% of the adolescents in our sample reported use of at least one illegal drug in the last 12 months. This result is similar to previous findings of not nationally representative samples in the country (Strauch et al., 2009).

The same biological changes that lead to enhanced vulnerability to substance use in adolescents are responsible for the vulnerability to other mental disorders during this stage of development (Adriani & Laviola, 2004; Andersen & Teicher, 2008). Alcohol disorders in particular tend to start and escalate during adolescence (Merline et al., 2008) following the same pattern of other mental disorders. In fact, the use of alcohol and other psychotropic substances during adolescence can cause permanent alterations leading to the development of mental disorders (Turner, Muck, Muck, Stephens, & Sukumar, 2004) but it is still unclear whether a causal relationship can be established. In our study almost one third of the participants suffered from depression and they were twice more likely to have alcohol disorders. Nearly one out of ten adolescents suffered from attention deficit and hyperactivity disorder (ADHD), however, we did not find an association between ADHD and alcohol and/or other substances as it had been shown in previous studies (Carroll & Rounsaville, 1993; Wilens, 2004). One possible explanation might be the hypothesis that ADHD precedes the development of substance use disorders (Wilens & Biederman, 2006) and our young participants with ADHD would not have developed substance use disorders yet.

There is an increasing body of evidence showing that adverse events in early life such as domestic violence can predict mental disorders (Schilling, Aseltine, & Gore, 2007; Wise, Zierler, Krieger, & Harlow, 2001) and addiction specifically (Dubow, Boxer, & Huesmann, 2008; Maggs, Patrick, & Feinstein, 2008; Wiles et al., 2007). Negative childhood experiences can exert profound and long-lasting effects on a variety of biochemical, hormonal and behavioral responses that might lead to the use of psychoactive substances. Individuals who suffered such experiences are more likely to smoke (Anda et al., 1999; McFarlane et al., 2005), to use alcohol and illicit substances in adulthood (Dube et al., 2001, 2003). We found a high association between domestic violence, illegal substance use and tobacco use. In fact, participants who were exposed to domestic violence early in life were over five times more likely to use illegal substances. In spite of this, we could not detect any

association of domestic violence and alcohol disorders. This finding confronts several studies — including our own among the adult population (Madruga et al., 2011). However, we found previously that the association of adverse early life events with alcohol disorders is highly mediated by depression, while its association with illegal drug use is not. Alike the adults, our young participants who suffered violence during childhood were significantly more likely to present depression, they are perhaps on the path to develop alcohol disorders in the future. Therefore we can suggest that in such cases alcohol disorder tends to emerge later in life and it would still be undetected among adolescents.

The prevalence of cigarette smoking among adolescents was 7.1% agreeing with findings from another population based study performed in southern Brazil (Strauch et al., 2009) but is lower than another study investigating the prevalence of smoking among high school students in Sao Paulo (Opaleye et al., 2012). Brazil has been actively restricting tobacco advertisement on the media since 2001 and tobacco product manufacturers have been required by law to include pictorial health warnings on cigarette packages (Instituto Nacional de Cancer, 2009). Those reforms are gradually showing results and a significant decrease on the use of tobacco among adolescents has already been detected (Galduróz, Fonseca, Noto, & Carlini, 2007). Despite these efforts, we found that a relatively small proportion of adolescents are willing to quit cigarettes. Yet, a much higher proportion reported they would quit if cigarette prices were higher. A review of the taxation policy should be considered to achieve concrete improvements in smoking prevention and cessation.

There are few limitations in this study that must be highlighted. First of all, this study is based on a cross sectional design, which precludes establishing temporality between exposure and outcome. The relatively low response rate of 66.4% is another factor to be considered, however, it must be pointed out that this is a common constraint in surveys involving alcohol and drug use assessment (Dunn & Ferri, 1999). Moreover, the household survey design might have lead to substance use under-reporting. Another point to be raised is concerning our measure of ADHD. Our prevalence rates are disagreeing with studies (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007) showing higher rates among males, and this might indicate that our instrument might not be capable to detect the disorder adequately in this age group.

5. Conclusion

As in other countries, mental health services in Brazil use rigid cut-offs to delineate service boundaries, creating discontinuities in provision of care (Ptakowski, 2010; Singh, 2009), as a consequence there is a gap on the health sector when it comes to provide service to adolescents. The knowledge of substance use correlates among adolescents should be used as a baseline for the implementation of more resolute prevention strategies and instigate the development of treatments target to adolescents specifically. The data provided should instigate changes in policies to implement higher rates of taxation on alcohol and tobacco as well as encourage the intensification of law enforcement strategies in Brazil.

Contributors

RL and RC designed the survey; RL, MZ and IP managed the data collection and data entry. CSM performed the statistical analyses and wrote the first draft of the manuscript under Cleusa P Ferri's supervision. All authors participated in the study concept and design, revised and approved the final version of the manuscript.

Conflict of interest

None.

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