Revista Brasileira de Psiquiatria. 2014;36:16–23
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doi:10.1590/1516-4446-2013-1180

ORIGINAL ARTICLE

Nonprescribed use of tranquilizers and use of other drugs among Brazilian students

Emérita S. Opaleye, Cleusa P. Ferri, Danilo P. Locatelli, Tatiana C. Amato, Ana R. Noto

Department of Psychobiology, Universidade Federal de São Paulo (UNIFESP), São Paulo, SP, Brazil.

Objectives: To describe patterns of nonprescribed use of tranquilizers by students aged 10 to 18 years and assess the sociodemographic characteristics of these adolescents and their use of other substances.
Methods: A randomized and stratified sample of 47,979 students from state and private schools of the 27 Brazilian state capitals completed a self-report questionnaire. Poisson regression was used to estimate the associations between tranquilizer use and sociodemographic factors, as well as the use of other psychotropic substances.
Results: The lifetime prevalence of nonprescribed use of tranquilizers was 3.9%. Use was most common among girls, wealthier adolescents, and those from private schools. An association was found between use of tranquilizers and lifetime use of alcohol (prevalence ratio [PR] = 3.15; 95% confidence intervals [95%CI] 2.58-3.85), tobacco (PR = 2.61; 95%CI 2.31-2.95), illicit drugs (PR = 3.70; 95%CI 3.19-4.29), and other prescription drugs (PR = 7.03; 95%CI 6.18-7.99). As the number of substances adolescents reported having used increased, so did the nonprescribed use of tranquilizers.
Conclusions: Nonprescribed use of tranquilizers by adolescents might indicate the use of other substances, including high-risk combinations such as tranquilizers and alcohol. The risks of this association should be addressed during the early stages of drug prevention programs.

Keywords: Adolescents; antianxiety agents; epidemiology; gender differences; psychoactive substance use disorder

Introduction

Nonprescribed use of prescription drugs – use without a physician's prescription, even when the intended use is self-medication – has been increasing among youths worldwide, promoted both by ease of access and by the false perception that medicines are completely safe.[1-4] The prevalence of this behavior varies among countries and age groups, and between genders. A recent systematic review reported the lifetime prevalence of such use by drug class among adolescents in the U.S. The most commonly used medicines were opioids (13-18%), followed by stimulants, including amphetamines (approximately 5%), and sedatives (approximately 4%). Most studies on the use of tranquilizers or anxiolytics have failed to examine lifetime use rates; however, past-year use rates range from 2 to 4.9% among individuals.[5]

The use of tranquilizers in Brazil gained attention during the late 1980s due to the suggestion that part of the population was abusing anxiolytics.[6] Most such drugs are of the benzodiazepine class, and analyses of medical prescription records in pharmacies have shown that these drugs are the psychotropic agents most often prescribed by medical professionals in Brazil.[7] Recent research has indicated that tranquilizers are used over much longer periods than recommended and might cause dependence.[8]

Previous studies of Brazilian school populations indicate that tranquilizers are the psychotropic agents most commonly implicated in nonprescribed use among adolescents, unlike in the U.S., where opioids are much more common. A nationwide survey of Brazilian state schools found that 4.1% of participants had ever used nonprescribed tranquilizers, whereas only 0.3% had used opioids.[9] A study using a similar methodology found an even higher prevalence (7.7%) in private and state schools in the municipality of Passo Fundo, state of Rio Grande do Sul.[10]

Despite growing use of these drugs without a prescription, there is a shortage of information from developing countries. In a large pharmaceutical market such as Brazil, knowledge of the access of vulnerable populations – including adolescents – to these substances is important, given the failures associated with controlling psychotropic medications and the high rate of self-medication.[11,12]

Within this context, this study sought to: 1) estimate the prevalence of nonprescribed use of tranquilizers among 10-to-18-year-old students attending the primary and secondary schools of the state and private educational systems in all 27 state capitals of Brazil; 2) identify the

Correspondence: Emérita Sátiro Opaleye, Rua Botucatu, 862, Ed. Ciências Médicas, 1° andar, CEP 04023-062, São Paulo, SP, Brazil.
E-mail: emeritasatiro@gmail.com
Submitted May 28 2013, accepted Aug 06 2013.

most vulnerable adolescents by estimating the associations between sociodemographic characteristics and nonprescribed use of these substances; and 3) assess whether nonprescribed use of tranquilizers by this population is associated with use of other psychotropic substances.

Methods

Sample

This cross-sectional study was conducted across all 27 Brazilian state capitals by the Brazilian Center for Information on Psychotropic Drugs (CEBRID), with funding from the National Secretariat for Drugs Policies (SENAD), between March and October 2010. A self-report questionnaire was administered to state and private-school students in classrooms. The sample was recruited from a national registry of all Brazilian state and private schools (Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira, INEP). Subsamples were drawn for each city, which generated 54 subsamples: 27 from state schools and 27 from private schools. Given the small number of private schools in Boa Vista, state of Roraima, and the refusal of a great number of private schools in the city of Rio de Janeiro to participate in the survey, data from both capitals were pooled into a single subsample for each city. Three strata were considered for each subsample: schools providing primary education only, schools providing both primary and secondary education, and schools providing secondary education only. A proportional sample was based on the number of students (estimated using the number of classrooms in each school) within each stratum and a randomized process used to select an average of three clusters (classrooms) in each school. Finally, all students in the selected classrooms were then invited to participate in the survey.

A total of 923 schools participated in this study: 545 state schools and 378 private schools. The average acceptance rate was 86% (94% among state schools and 73% among private schools). The student participation rate, which represents the number of students who participated in the survey divided by the number of students who officially enrolled in the classrooms drawn, was 83% (79% in state and 92% in private schools). Only 0.3% of students who were invited to participate in the survey refused to take part (0.2% from private and 0.4% from state schools). This process generated a sample of 51,154 questionnaires. A dummy question concerning drug use was included, and all questionnaires with positive responses to that question were removed (n=263). As all analyses were restricted to students between the ages of 10 and 18, the final sample consisted of 47,979 students: 17,370 from secondary schools and 30,609 from primary schools.

Procedure

An investigator with experience in survey research supervised each Brazilian state capital. This group of investigators completed a 3-day training session at Universidade Federal de São Paulo (UNIFESP), administered by CEBRID, and subsequently replicated this training for the team of field researchers (i.e., interviewers) in their states.

The questionnaires were administered in classroom to students who agreed to participate in the study. On average, the questionnaires were completed in 40 minutes, in the presence of a previously trained interviewer and in the absence of school officials. The procedures were standardized and performed on the same day for all classes selected from the same school to avoid confounders.

Written informed consent was obtained from the principal of each school clarifying that the adolescents' participation in the study was voluntary, and they would be free to discontinue their participation at any time. They were also notified that the information collected was anonymous, confidential, and intended for academic purposes only. The UNIFESP Research Ethics Committee approved this study with protocol no. 0348/08.

Instrument

The study questionnaire was based on a specific research instrument developed by the World Health Organization to examine student substance use.[13] This measure has been used in prior CEBRID surveys.[9] Additional questions were included on the basis of the European School Survey Project on Alcohol and Other Drugs (ESPAD).[14]

The questionnaire comprised the following sections:

Sociodemographic variables

Data concerning gender, age (open question), type of school (state or private), and country region were collected. The Brazilian Association of Research Companies (ABEP) scale of socioeconomic status was applied.[15] This assessment collects data including the level of education of the head of the household, ownership of household goods (including a TV, DVD player, cars, refrigerators, and so on), and the number of domestic workers in the household (maid, driver, gardener, and so on). The ABEP scale classifies participants into the following social statuses, in descending order: A1, A2, B1, B2, C1, C2, D, and E. Participants were subsequently categorized as lower (C, D, and E), middle (B), or upper (A) socioeconomic class for the purposes of the present analysis.

Nonprescribed use of tranquilizers

Questions concerning the nonprescribed use of tranquilizers were included. Questions regarding lifetime use, past-year use, and past-month use were answered with ''yes'' or ''no''. The medicines mentioned as examples were diazepam (and its trade names Dienpax® and Valium®), Lorax® (lorazepam), Rohypnol® (flunitrazepam), Psicosedin® (chlordiazepoxide), Rivotril® (clonazepam), alprazolam (and its trade names Apraz® and Frontal®),

Dalmadorm® (flurazepam), Dormonid® (midazolam), bromazepam (and its trade names Lexotan® and Somalium®), and Olcadil® (cloxazolam). The questionnaire noted that intake of teas and naturally occurring substances, including valerian, should not be considered part of this category. A question regarding frequency of use was designed for past-month users, with possible answers ranging from 1 to 5 days (sporadic use), 6 to 19 days (frequent use), and 20 days or more (heavy use). Age at first use was also examined in the form of an open-ended question, as was the name of the last used medicine. This variable considered generic and trade names, which were converted to the generic nomenclature after grouping.

Use of other substances

Several questions assessed the use of other psychoactive substances. In the present analysis, we collected data on lifetime use of alcohol, tobacco, illicit drugs (cannabis, cocaine/crack, or ecstasy), and nonprescribed use of other prescription drugs (benzydamine, anabolic steroids, amphetamines, or opiates). A variable, number of drugs, was constructed by adding the lifetime use of different drugs, except for alcohol and tobacco, by the respondent.

Data analyses

All analyses were performed using STATA version 11. The significance level was set at 5%. Prevalence was expressed with regard to the sample weight using confidence intervals. Student's *t*-test was used to examine the mean differences in participant age at the first use of tranquilizers by gender.

A Poisson regression model was constructed to estimate the unadjusted associations between tranquilizer use and age, gender, level of education, type of school (state vs. private), socioeconomic status, and country region. These associations were subsequently estimated using a fitted model. Level of education was excluded from this model because it was collinear with age, and socioeconomic status was excluded because it was collinear with type of school. Other Poisson regression models were constructed to estimate the associations between tranquilizer use and lifetime use of alcohol, tobacco, illicit drugs (cannabis, cocaine/crack, or ecstasy), other prescription drugs (benzydamine, anabolic steroids, amphetamines, or opiates), and the number of substances previously used. These models were fit using gender, age, and type of school. The results were expressed as prevalence ratios with 95% confidence intervals and p-values.

Results

Sample characteristics

Table 1 describes the sample profile (n=47,979). Overall, 62.1% of participants were from primary schools, and 78.2% were from state schools. The largest age group was 13-to-15-year-olds (45.2%), and females made up the majority of the sample (52.2%).

The distribution of the weighted proportion of students per region was based on representations per capital. Thus, although the absolute number of participants from the Southeast region of Brazil was not the largest, this region comprised the largest proportion of students (42.8%). The vast majority of students were from low-income and middle-class socioeconomic backgrounds (64.3%). Many respondents were grouped into a single "not reported" category (26.5%) because they failed to provide all the data required to assess their socioeconomic status.

Lifetime use of tranquilizers and associated sociodemographic factors

Of the total students interviewed, 2,124 (3.9%) reported a lifetime nonprescribed use of tranquilizers (95%CI 3.7-4.2). Students from the oldest age group were most likely to report this use (Table 1): the probability of a student reporting lifetime nonprescribed use of tranquilizers increased by 15% with each year of life. This use was also higher among secondary school students (PR = 1.55; 95%CI 1.35-1.78) as compared with primary school students. However, age and level of education were collinear in the fitted model. Girls showed a higher prevalence of tranquilizer use, and were two times more likely to use than boys (95%CI 1.76-2.26). An association was found between lifetime nonprescribed use of tranquilizers and highest socioeconomic status. This association was noted in the bivariate analysis with regard to both a higher prevalence of users among students from private schools as compared with those from state schools (PR = 1.92; 95%CI 1.69-2.18) and an increasing prevalence ratio found among the middle and upper socioeconomic statuses as compared with the lower status (PR = 1.63; 95%CI 1.40-1.89 and PR = 2.52; 95%CI 2.12-3.00, respectively). Private-school students were more than twice as likely to report using tranquilizers as public school students in the fitted model. Lastly, living in the South and Center-West regions was associated with use as compared with the Northeast region after adjusting for age, gender, and type of school (PR = 1.50; 95%CI 1.28-1.77 and PR = 1.18; 95%CI 1.01-1.37, respectively).

Figure 1 shows the prevalence of lifetime nonprescribed tranquilizer use by age group and gender. As shown above, the proportion of users increases by age, although this increase was most significant among female adolescents.

Figure 2 shows the lifetime prevalence of nonprescribed tranquilizer use per Brazilian state capital by type of school (state or private). The highest prevalence was recorded at private schools in Belo Horizonte, state of Minas Gerais (9%), and the lowest rate was recorded at state schools in Belém, state of Pará (2%). The prevalence of use in private schools was higher than in state schools for most Brazilian state capitals, except Goiânia (state of Goiás) and Macapá (state of Amapá).

Table 1 Sociodemographic characteristics of the total sample and according to lifetime use of nonprescribed tranquilizers and the prevalence rate by Poisson regression

	Total (n=47,979)		Lifetime use of tranquilizers (n=2,124)					
	n	wgt% (95%CI)	n	wgt% (95%CI)	PR1 (95%CI)	p-value	PR2 (95%CI)	p-value
Age (years)*								
10-12	13,785	27.5 (25.8-29.2)	324	2.2 (1.8-2.6)	1.15 (1.12-1.19)	< 0.001	1.17 (1.14-1.21)	< 0.001
13-15	21,807	45.2 (43.7-46.7)	1,037	4.1 (3.7-4.5)				
16-18	12,387	27.4 (25.6-29.1)	763	5.3 (4.8-5.9)				
Missing			150					
Gender								
Male	22,813	47.8 (47.2-48.5)	686	2.6 (2.3-2.9)	1.00		1.00	
Female	25,001	52.2 (51.5-52.8)	1,432	5.1 (4.7-5.5)	1.97 (1.74-2.23)	< 0.001	2.00 (1.77-2.27)	< 0.001
Missing	165		22					
Level of education								
Primary	30,609	62.1 (59.8-64.3)	1,087	3.2 (2.9-3.6)	1.00		-	
Secondary	17,370	37.9 (35.7-40.2)	1,037	5.0 (4.6-5.5)	1.55 (1.35-1.78)	< 0.001		
Type of school								
State	28,759	78.2 (76.6-79.7)	990	3.3 (3.0-3.5)	1.00			
Private	19,220	21.8 (20.3-23.4)	1,134	6.2 (5.7-6.9)	1.92 (1.69-2.18)	< 0.001	2.09 (1.85-2.37)	< 0.001
Socioeconomic status								
Lower (C-E)	13,750	33.2 (32.2-34.2)	456	3.0 (2.7-3.4)	1.00		-	
Middle (B)	15,708	31.1 (30.0-32.2)	822	4.9 (4.5-5.4)	1.63 (1.40-1.89)	< 0.001		
Upper (A)	6,796	9.2 (8.2-10.3)	514	7.6 (6.7-8.7)	2.52 (2.12-3.00)	< 0.001		
Not informed	11,725	26.5 (25.6-27.4)	332	2.5 (2.1-2.9)	0.83 (0.68-1.00)	0.056		
Country region								
Northeast	16,503	26.2 (24.8-27.6)	725	4.0 (3.7-4.4)	1.00		1.00	
North	10,619	11.8 (10.8-12.9)	444	3.7 (3.2-4.2)	0.90 (0.77-1.06)	0.224	1.03 (0.88-1.21)	0.684
Midwest	7,486	11.7 (10.7-12.7)	353	4.5 (4.0-5.2)	1.12 (0.96-1.32)	0.156	1.18 (1.01-1.37)	0.028
South	5,055	7.6 (6.8-8.3)	274	5.5 (4.8-6.2)	1.35 (1.15-1.58)	< 0.001	1.50 (1.28-1.75)	< 0.001
Southeast	8,316	42.8 (40.9-44.7)	328	3.4 (3.0-4.0)	0.85 (0.71-1.00)	0.064	0.94 (0.80-1.11)	0.473

95%CI = 95% confidence interval; PR1 = prevalence ratio on bivariate analysis; PR2 = prevalence ratio adjusted by age, gender, and type of school (level of education was excluded from this model because it was collinear with age, and socioeconomic status was excluded because it was collinear with type of school); wgt% = weighted proportions.
* Age was used as a continuous variable in the regression model.

The overall lifetime prevalence of nonprescribed use of tranquilizers was 3.3% (95%CI 3.0-3.6) in state schools and 6.3% (95%CI 5.7-6.9) in private schools.

Patterns of tranquilizer use

Of the 2,124 adolescents who reported lifetime use of tranquilizers, 1,403 (65.7%) reported past-year use (95%CI 63.0-68.0). However, only 658 adolescents (32.7%) indicated past-month use (95%CI 29.8-35.7), and the frequency of this use suggested that most of these adolescents were not heavy users. Of the 658 students who reported past-month use, 534 (81.0%) reported sporadic use (95%CI 76.0-85.0), whereas 51 adolescents (9.0%) reported frequent use (95%CI 6.4-12.0), and 73 participants (10.1%) were heavy users (95%CI 7.3-13.7). The mean age at first use was 13.2 years (standard error [SE] = 0.06). Although boys were less likely to use tranquilizers than girls, their first use tended to be at a younger age (12.8 vs. 13.5 years; $p < 0.001$). The tranquilizer most frequently used by adolescents was diazepam, which accounted for approximately 60% of the reports. The other medicines cited and their respective proportions are shown in Figure 3.

Association between lifetime use of tranquilizers and use of other substances

Lifetime tranquilizer use was associated with lifetime use of other substances, both legal and illicit (Table 2). The

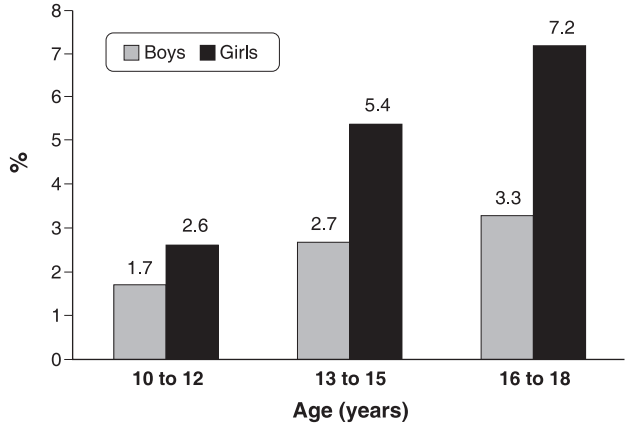


Figure 1 Lifetime nonprescribed use of tranquilizers by age range, according to gender (n=47,979)

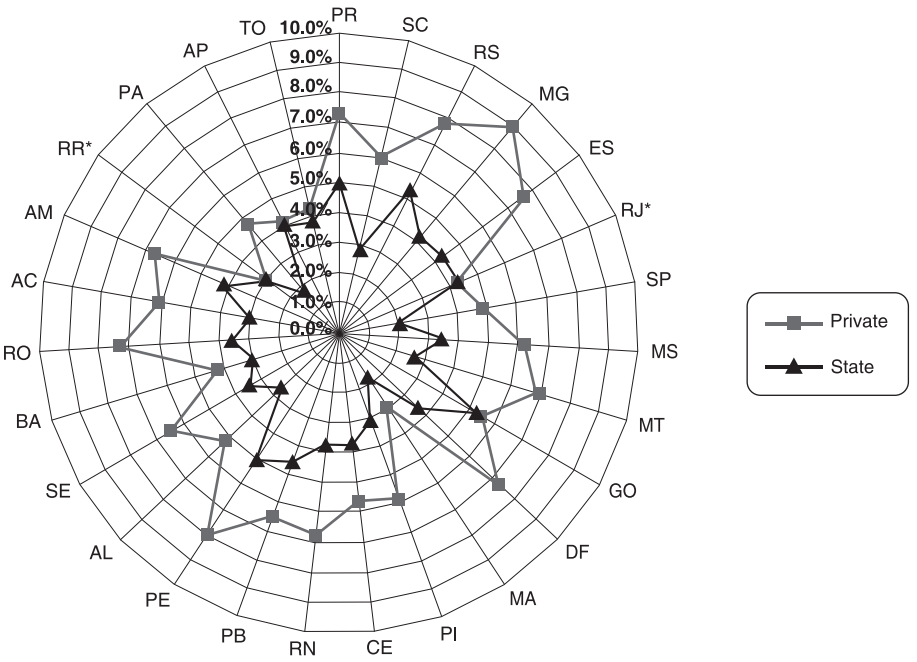


Figure 2 Lifetime nonprescribed use of tranquilizers by state capital according to type of school (n=47,979). * RJ and RR had data from private and state schools analyzed together.

lifetime prevalence of alcohol use was three times higher among adolescents who reported having used tranquilizers compared with non-users, and the lifetime prevalence of tobacco use was 2.6 times higher, even after accounting for the major sociodemographic variables associated with tranquilizer use (i.e., age, gender, and type of school). Tranquilizer use was four times greater (PR = 3.70; 95%CI 3.19-4.29) among adolescents who reported using at least one illicit drug (cannabis, cocaine/crack, or ecstasy). Similarly, students who reported nonprescribed use of other prescription drugs were most likely to use tranquilizers with regard to the variables examined (PR = 7.03; 95%CI 6.18-7.99). The number of substances used by adolescents was also associated with tranquilizer use: as the number of substances reportedly used increased, so did the prevalence of nonprescribed tranquilizer use.

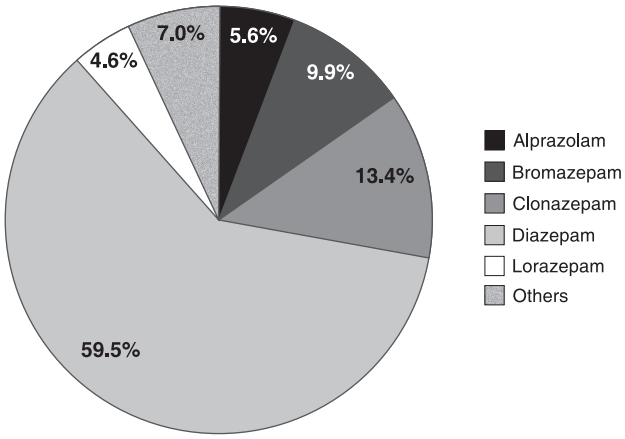


Figure 3 Benzodiazepines most commonly used by adolescents without a medical prescription as self-reported (n=2,124)

Discussion

Overall, lifetime nonprescribed use of tranquilizers was reported by 3.9% of adolescents in this sample (3.3% of students from state schools and 6.3% of those from private schools). This estimated prevalence is very similar to that found in a survey conducted 6 years earlier in state schools only[9] (3.8% among students aged 10 to 18 years).

However, the prevalence in private schools (6.3%) was found to be twice as high as that found in state schools. This estimate was similar to the overall prevalence found in 31 European countries (5.6%), ranging from 1.5% in the Ukraine to 13.6% in Lithuania.[16] Likewise, the last edition of Monitoring the Future, a survey conducted in U.S. schools, reported a 6.3% prevalence, similar to that found among Brazilian private-school students.[17]

The findings of this study also suggest that the lifetime prevalence of nonprescribed tranquilizer use among students from private schools in Brazil is similar to the prevalence found among Brazilian adults. Nonprescribed use of tranquilizers was examined in a representative nationwide sample of the 107 largest Brazilian cities via household surveys of 12-to-65-year-olds in 2005. Nearly one in six respondents (5.6%) reported nonprescribed use of tranquilizers at some time during their lives.[18] However, such comparisons should be interpreted with caution, as the methods employed to ascertain nonprescribed use differed between the two surveys.

Table 2 Lifetime use of other substances, overall and according to lifetime nonprescribed use of tranquilizers, and prevalence ratios by Poisson regression

	Total (n=47,979)		Lifetime use of tranquilizers (n=2,124)			
	n	wgt% (95%CI)	n	wgt% (95%CI)	PR (95%CI)	p-value
Alcohol						
No	19,557	40.4 (39.1-41.7)	332	1.5 (1.2-1.7)	1.00	
Yes	28,308	59.6 (58.3-60.9)	1,788	5.6 (5.2-5.9)	3.15 (2.58-3.85)	< 0.001
Missing	114		4			
Tobacco						
No	40,746	84.1 (83.3-84.8)	1,412	3.0 (2.7-3.2)	1.00	
Yes	7,206	15.9 (15.2-16.7)	711	8.7 (7.9-9.6)	2.61 (2.31-2.95)	< 0.001
Missing	27		1			
Illicit drugs*						
No	45,018	94.8 (94.4-95.2)	1,733	3.3 (3.1-3.5)	1.00	
Yes	2,743	5.2 (4.8-5.6)	388	13.1 (11.6-14.8)	3.70 (3.19-4.29)	< 0.001
Missing	218		3			
Prescription drugs†						
No	45,576	96.2 (95.9-96.5)	1,583	3.1 (2.9-3.3)	1.00	
Yes	2,083	3.8 (3.5-4.1)	525	24.6 (22.1-27.2)	7.03 (6.18-7.99)	< 0.001
Missing	320		3			
Number of substances‡						
None	43,342	91.3 (90.8-91.7)	1,378	2.8 (2.6-3.0)	1.00	
One	2,910	5.9 (5.5-6.2)	431	12.2 (10.8-13.8)	4.03 (3.46-4.71)	< 0.001
Two	868	1.9 (1.8-2.2)	160	16.8 (13.6-20.7)	6.10 (4.84-7.68)	< 0.001
Three or more	408	0.9 (0.8-1.0)	130	31.7 (25.1-39.2)	10.92 (8.67-13.76)	< 0.001
Missing	451		25			

95%CI = 95% confidence interval; PR = prevalence ratio adjusted by sociodemographic factors (age, gender, and type of school); wgt% = weighted proportions.
* Illicit drugs: cannabis, cocaine/crack, or ecstasy.
† Prescription drugs: benzydamine, anabolic steroids, amphetamines, or opioids.
‡ Only illicit drugs and nonprescribed use of prescription drugs.

This use was higher among older respondents, which corroborates other studies of school-age adolescents.[19-21] However, the cumulative effect of the question concerning lifetime use might explain this finding.

The scientific literature has established that women are more likely to use psychotropic medications recreationally as compared with men, most likely because they visit medical services more often and have a higher prevalence of anxiety symptoms.[22,23] In the present study, the prevalence of use among adolescent girls was almost twice that observed in boys across all age groups. Another factor associated with higher use among girls is their more frequent sharing of prescriptions and medications.[24]

In contrast to the international literature, in which low income is generally a risk factor for drug use,[25,26] Brazilian studies have found a higher use of certain drugs – especially alcohol – among socioeconomic statuses with greater purchasing power.[27,28] A survey of psychotropic medication use conducted in Passo Fundo, state of Rio Grande do Sul, found that the prevalence of tranquilizer use was 1.3 times higher among private schools.[10] A possible hypothesis to explain this finding is that parents' higher purchasing power increases access to healthcare services and, consequently, increases adolescents' access to medications, which are often within reach in their own homes. A culture of tranquilizer use might also exist among adolescents who interact in the same social circles (e.g., private schools). The greater use observed in private schools as compared with state schools was evident in approximately all Brazilian state capitals, despite the discrepancy between the overall prevalence of use among state capitals. The regression model indicated a higher rate of tranquilizer use in the South and Center-West regions compared with the Northeast region. Possible sample differences in purchasing power might explain this finding; however, additional research is required to better understand this phenomenon.

The present study also found an association between nonprescribed use of tranquilizers and use of other substances, both legal and illicit. American adolescents who reported using sedatives or tranquilizers recreationally were approximately eight times more likely to report a past-year use of illicit drugs than non-users.[19] In a study of 18-to-24-year-olds, past-year tranquilizer use was strongly associated with patterns of alcohol abuse.[29] Another study indicated that lifetime nonprescribed use of prescription medications was associated with a greater likelihood of using illicit drugs and binge drinking (five or more drinks on a single occasion) over the past year among university students. These findings were more significant when analyzing the use of tranquilizers for recreational purposes (illicit drugs odds ratio [OR] = 15.7, $p < 0.001$; binge drinking OR = 12.2, $p < 0.01$).[30]

Adolescents who reported using prescription benzodiazepines recreationally might have more anxiety or other mental disorder symptoms, including those associated with social phobia. The self-medication hypothesis of addictive disorders[31] suggests that adolescent interest in self-medication might explain their use of other substances. Importantly, substance abuse is a multifactorial phenomenon that encompasses a range of biological, psychological, and social factors. Thus, the factors that promote an adolescent's first use of a substance might be the same factors that induce nonprescribed use of prescription anxiolytics.

Although the cross-sectional nature of our study does not allow us to establish causality, another possible hypothesis for this behavior is based on the social learning theory. This theory postulates that behaviors are learned and reproduced by observing others (i.e., social models).[32] Peralta & Steele[33] concluded that social learning theory at least partially explained the nonprescribed use of psychotropics in a sample of university students.

Nonprescribed use of prescription medicines by adolescents might be affected by their observation of adults who use these medications, including their reasons for use (e.g., before a job interview or after an argument with their partner). Observing adults who use tranquilizers for reasons related to daily life might induce adolescents to seek relief from their own discomfort via prescription drugs. This behavior is potentially harmful to the development of adolescents, who are still learning their limits and potentials.

In Brazil, several factors appear to create a context conducive to the inappropriate use of medications. One such strong effect is the influence of the pharmaceutical industry[34] on the prescriber/user/seller triad, which incorporates a culture of medication reinforced by the symbolic power of medicine.[35] This concept might be assimilated as a fanciful belief that medicines are unlikely to cause harm because they are produced with stringent quality controls by a pharmaceutical company and used by patients under the scrutiny of licensed physicians. This reasoning might explain why our findings revealed a stronger association between the use of tranquilizers and that of other medicines with potential for abuse.

Certain limitations should be considered. Cross-sectional surveys are designed to collect data about outcome and exposure at the same time; therefore, the association of factors found in this study does not imply causality. The sample is representative of students from Brazilian state capitals; therefore, extrapolation of these findings to adolescents who do not attend school or who live in cities with different characteristics should be done with caution. Seventeen per cent of students were absent on the day of data collection. Previous studies have shown that absent students are more likely to use drugs[36,37]; if this is true for tranquilizers, we might have underestimated the nonprescribed use among Brazilian students. Despite being the most cost-effective epidemiological study method for large samples, the self-report method is subject to under- and over-reporting.[38] The use of a dummy question regarding drug use minimized over-reporting, and questionnaires were excluded from the analysis for this reason. However, the strength of this survey was that it reported unpublished nationwide data concerning nonprescribed use of tranquilizers by adolescents. This survey had a good response rate and voluntary participation.

The assessment of nonprescribed use of tranquilizers by Brazilian adolescents provides key information from a public health standpoint. Moreover, these data help prevent trivialization of this behavior by highlighting the risks that result from the chronic and acute use of anxiolytics in combination with other substances (e.g., alcohol). The analyses presented in this paper raised specific concerns that should be studied to prevent this behavior. First, although access to tranquilizers by adolescents was not assessed in this specific analysis, evidence suggests that nonprescribed use of tranquilizers is associated with family influence and previous medical prescription of tranquilizers.[39] Therefore, physicians should advise their patients about personal medical use and the risks associated with using substances without therapeutic monitoring so as to reduce the availability of prescription drugs to adolescents. Pharmacists are responsible for exerting greater control over the sale of these medications; furthermore, guidance regarding the storage and proper disposal of psychotropic agents should be followed.

Another key point is the need to include specific information about medicines in drug prevention programs. These programs should expand their discourse, which currently focuses on drugs such as cannabis and cocaine/crack, to substances with less visibility but great relevance throughout life (i.e., tranquilizers). Prescription drugs immediately follow alcohol, tobacco, and solvents with regard to age at first use; therefore, addressing this content in the classroom is appropriate. Prevention programs should work with adolescents to search for strategies that might alleviate issues related to anxiety and insomnia without resorting to the use of medicines. In addition, they should provide information on the potential for dependence and the risks associated with nonprescribed use of tranquilizers.

Finally, periodic epidemiological surveys are essential to assess changes in user profiles over time and promote immediate health measures to reach this population.

Acknowledgements

We thank the National Secretariat for Drugs Policies (SENAD) and the Research Incentive Fund Association (AFIP) for funding this project, the Brazilian Center for Information on Psychotropic Drugs (CEBRID) for providing the database, and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for granting a sandwich PhD scholarship to the first author (ESO). CPF is an AFIP research fellow. ARN is a Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) research fellow.

Disclosure

The authors report no conflicts of interest.

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