

## Prevalence of psychoactive substance use by adolescents in public schools in a municipality in the São Paulo Metropolitan Area, Brazil

Prevalência do uso de substâncias psicoativas por adolescentes em escolas públicas de um município da Região Metropolitana de São Paulo, Brasil

Prevalencia de consumo de sustancias psicoactivas en adolescentes en escuelas públicas de un municipio de la Región Metropolitana de São Paulo, Brasil

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doi: 10.1590/0102-311XEN169722

### Abstract

*This study aimed to estimate the prevalence of psychoactive substance use by adolescents from public schools. This is a cross-sectional study that used a random sample of adolescents from five public schools located in a municipality in the central-west region of the São Paulo Metropolitan Area, Brazil. Information on demographic, socioeconomic, and drug use was collected using self-report questionnaires. The sample consisted of 1,460 students, 716 (49%) males, aged 10-19 years (13.19±2.04 years). The prevalence of psychoactive substance use in the last month was 51% for analgesics; 48.8% for alcohol; 37.3% for tobacco; 30.8% for tranquilizers; 23.1% for marijuana; 22.6% for anabolic steroids; 21.6% for ecstasy; 15.3% for amphetamines/stimulants; 13.4% for phencyclidine; 12.9% for cocaine/crack; 12.6% for inhalants/solvents; 11.5% for opiates; 11.4% for hallucinogens; and 16.2% for other unclassified drugs. Elementary and middle school students were more likely to consume tobacco (OR = 2.306; 95%CI: 1.733-3.068; p < 0.001), and male students were more likely to consume any type of substance. We identified a high use of psychoactive substances among this study participants, with a higher prevalence among male students.*

*Adolescent; Illicit Drugs; Drug Misuse; Alcohol Drinking; Consumption of Tobacco-Derived Products*

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## Introduction

The use of psychoactive substances is a global public health problem, significantly impacting physical and social well-being, constituting one of the main causes of disability and death in young people aged 10-24 years <sup>1</sup>.

Around 284 million people in the 15-64 age group used drugs in 2020, 26% more than in 2010. In many countries, young people are consuming more drugs compared to a generation ago. In Africa and Latin America, people aged under 35 years are the majority of those treated for disorders associated with drug use. Globally, an estimated 11.2 million people were injection drug users and about half were living with hepatitis C; 1.4 million with HIV; and 1.2 million with both <sup>2</sup>.

Regardless of the psychoactive substances used, early use contributes to abuse in adult life and is closely associated with physical and mental health problems <sup>3</sup>, including cognitive impairment, poor performance and truancy; social difficulties, behavioral changes, and depression and anxiety <sup>4,5</sup>.

Although there is extensive research on licit and illicit drug use among young people in developed countries, data on specific socioeconomic classes in developing countries are limited. Thus, this study aimed to verify the prevalence of psychoactive substance use by adolescents from public schools in a city in the central-west region of the São Paulo Metropolitan Area, Brazil.

## Methods

Cross-sectional descriptive study that analyzed a random sample of adolescent students in a city in the central-west region of the São Paulo Metropolitan Area. This study was approved by the Research Ethics Committee of the Federal University of São Paulo (protocol n. 2,089,526), in accordance with the Brazilian National Health Council and *Declaration of Helsinki*.

The municipality in this study has a territory of 179.9km<sup>2</sup> and estimate of 145,073 inhabitants <sup>6</sup>, its Human Development Index (HDI) in 2010 was 0.814, classified as very high <sup>7</sup>, and the number of students enrolled in the municipal school system was 17,605, with 14.4% in the fifth grade of elementary school, 53.5% in middle school, and 32.1% in high school. For the sample estimation, the following was considered: hypothesized % frequency of outcome factor in the population: 50%+5; confidence limits: +5%; design effect: 1. For the confidence level set at 99%, the required sample would be 640 students (OpenEpi, v.3.0, open-source calculator-SSPropor – <http://www.OpenEpi.com>).

Recruitment took place from November 2018 to June 2019. Students regularly enrolled in one of the five randomly selected schools were eligible. The sample was stratified by the proportion of students at each education level; thus, 2,760 adolescents were invited to participate in the study. All students who signed an assent form and whose parents or guardians signed an informed consent form were included in the study.

Data was collected via a self-report questionnaire with information on the student's name, age, sex, and current grade. Ethnicity was defined by the participant's self-reported color/race according to the Brazilian Institute of Geography and Statistics (IBGE) <sup>8</sup>. Sexual maturation was assessed by self-assessment validated for the Brazilian population <sup>9</sup>. The Brazilian version of the DUSI-R (*Drug Use Screening Inventory-Revised*) <sup>10</sup> was used to evaluate the abuse of psychoactive substances. The Brazilian Economic Classification Criteria <sup>11</sup> was used for socioeconomic classification.

To facilitate reading and help organize the data, the different substances were categorized as depressants, stimulants, and deregulators of central nervous system activity <sup>12</sup>.

## Statistical analysis

IBM SPSS v.23.0 for Windows (<https://www.ibm.com/>) was used for all analyses. Prevalence was estimated as the relative frequency of nominal variables, followed by a 95% confidence interval (95%CI). Associations between grade, sex, ethnicity, and drug use were analyzed using the chi-squared test (Cramer's V) and odds ratio (OR). A 5% significance level was set.

## Results

Table 1 shows the descriptive characteristics of the sample. The sample consisted of 1,460 students, 51% female, with a mean age of  $13.19 \pm 2.04$  years (95%CI: 13.09-13.30), ranging from 10 to 19 years.

Table 2 shows data on the use of different psychoactive substances. Table 3 shows the results related to the type of use (experimental, abusive, and dependence).

## Discussion

This study aimed to describe the prevalence and trends of the behavior of psychoactive substance use among students. We found that at least 20% of adolescents admitted having used one or more substances in the last month. We found that the use of one drug was associated with the use of others, as observed in the *3rd National Survey on Drug Use by the Brazilian Population*<sup>13</sup>.

The level of drug use among young people, especially in the previous year and in the last month, is an indicator of recent and frequent drug use, being higher in the older population. However, the use of substances that have recently emerged or became popular in certain lifestyles is higher among younger people<sup>3</sup>.

**Table 1**

Demographic characteristics of students from a city in the central-west region of the São Paulo Metropolitan Area, Brazil (n = 1,460).

Characteristics	n	%
Sex		
Male	716	49.0
Female	744	51.0
Ethnicity		
White	455	31.2
Mixed race	89	6.1
Black	916	62.7
Schooling level		
5th elementary school	87	6.0
6th middle school	341	23.4
7th middle school	286	19.6
8th middle school	214	14.7
9th middle school	214	14.7
10th high school	71	4.9
11th high school	129	8.8
12th high school	118	8.1
Pubertal stage		
Prepubescent	260	17.8
Pubescent	1,096	75.1
Postpubescent	104	7.1
Economic classification		
A	74	5.1
B1	157	10.8
B2	362	24.8
C1	525	36.0
C2	253	17.3
D-E	89	6.1

**Table 2**

Prevalence of the students' responses to the *Drug Use Screening Inventory-Revised* (DUSI-R) questionnaire from a city in the central-west region of the São Paulo Metropolitan Area, Brazil.

Drug	Drug use (times)											
	0		1-2		3-9		10-20		> 20		Preferred	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI
Alcohol	51.2	48.6-53.8	42.2	39.7-44.8	5.3	4.2-6.5	0.4	0.1-0.8	0.5	0.1-1.0	0.3	0.0-0.6
Amphetamines/ Stimulants *	84.7	82.9-86.6	14.8	12.9-16.7	0.5	0.1-1.0	-	-	-	-	-	-
Ecstasy	78.4	76.3-80.5	20.9	18.8-23.1	0.5	0.1-1.0	-	-	0.1	0.0-0.3	-	-
Cocaine/Crack	87.1	85.4-88.9	12.6	10.9-14.4	0.2	0.0-0.5	-	-	-	-	0.1	0.0-0.3
Marijuana	76.9	74.7-79.1	22.2	20.1-24.4	0.7	0.3-1.2	0.1	0.0-0.3	0.1	0.0-0.3	-	-
Hallucinogens	88.6	87.0-90.3	10.9	9.3-12.5	0.4	0.1-0.8	0.1	0.0-0.3	-	-	-	-
Tranquilizers *	69.2	66.8-71.6	28.9	26.6-31.3	1.9	1.2-2.7	-	-	-	-	-	-
Analgesics *	49.0	46.4-51.6	40.2	37.7-42.8	9.9	8.4-11.5	0.5	0.1-1.0	0.3	0.0-0.6	0.1	0.0-0.3
Opiates	88.5	86.8-90.2	11.0	9.4-12.7	0.4	0.1-0.8	0.1	0.0-0.3	-	-	-	-
Phencyclidine	86.6	84.9-88.4	13.3	11.6-15.1	0.1	0.0-0.3	-	-	-	-	-	-
Anabolic steroids	77.4	75.3-79.6	21.7	19.6-23.9	0.8	0.3-1.3	-	-	-	-	0.1	0.0-0.3
Inhalants/Solvents	87.4	85.7-89.2	11.2	9.6-12.9	0.8	0.3-1.3	-	-	0.1	0.0-0.3	-	-
Tobacco	62.7	60.2-65.3	31.6	29.2-34.0	5.3	4.2-6.5	0.1	0.0-0.3	0.1	0.0-0.3	0.1	0.0-0.3
Others	83.8	81.9-85.8	15.4	13.6-17.3	0.8	0.3-1.3	-	-	-	-	-	-

95%CI: 95% confidence interval.

\* OTC: over-the-counter.

**Table 3**

Use prevalence of different psychoactive substances among 1,460 elementary, middle and high school students from public schools according to the types of use.

Psychoactive substance	Type of use							
	Total		Experimental		Abusive		Dependence	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI
CNS depressants								
Alcohol	48.8	46.2-51.4	42.2	39.7-44.8	5.8	4.6-7.1	0.9	0.4-1.4
Tranquilizers	30.8	28.4-33.2	28.9	26.6-31.3	1.9	1.2-2.7	-	-
Analgesics	51.0	48.4-53.6	40.2	37.7-42.8	9.9	8.4-11.5	1.0	0.5-1.6
Opiates	11.5	9.9-13.2	11.0	9.4-12.7	0.4	0.1-1.0	0.1	0.0-0.3
Inhalants	12.6	10.9-14.4	11.8	10.1-13.5	0.8	0.3-1.3	0.1	0.0-0.3
CNS stimulants								
Amphetamines/Stimulants	15.3	13.4-17.2	14.8	12.9-16.7	0.5	0.1-1.0	-	-
Cocaine/Crack	12.9	11.2-14.7	12.6	10.9-14.4	0.2	0.0-0.5	0.1	0.0-0.3
Anabolic steroids	22.6	20.5-24.8	21.7	19.6-23.9	0.8	0.3-1.3	0.1	0.0-0.3
Tobacco	37.3	34.8-39.9	31.6	29.2-34.0	5.4	4.2-6.6	0.3	0.0-0.6
CNS disruptors								
Ecstasy	21.6	19.5-23.8	20.9	18.8-23.1	0.5	0.1-1.0	0.1	0.0-0.3
Marijuana	23.1	21.0-25.3	22.2	20.1-24.4	0.7	0.3-1.2	0.2	0.0-0.5
Hallucinogens	11.4	9.8-13.1	10.9	9.3-12.5	0.4	0.1-1.0	0.1	0.0-0.3
Phencyclidine	13.4	11.6-15.2	13.3	11.6-15.1	0.1	0.0-0.3	-	-
Others	16.2	14.3-18.2	15.4	13.6-17.3	0.8	0.3-1.3	-	-

95%CI: 95% confidence interval; CNS: central nervous system.

Degenhart et al.<sup>14</sup> compared the age of onset of alcohol, tobacco, marijuana, and cocaine use among 17 countries ( $n = 85,052$ ), and found a similar median age of onset of substance use: 16-19 years for alcohol and tobacco, 18-19 years for cannabis, and 21-24 years for cocaine. Thus, children and adolescents must be made aware of consequences of using these substances before reaching the age of onset, via prevention techniques, interventions, and evidence-based policies.

In 2010, the elementary-secondary education survey reported the general use of psychotropic drugs in Brazil<sup>15</sup>, and the values found at the national or local level (São Paulo) were lower than those in our study. Thus, we can assume that drug use has greatly increased in recent years, or that we conducted our study in a region endemic for drug use.

Comparing age groups, we found that younger students (up to 14 years) were 2,306 times more likely to consume tobacco when compared with older students (15-17 years-old). According to the *Brazilian National Survey of School Health* (PeNSE 2015), among ninth grade adolescents, 21% reported having knowledge about the use of cigarettes by schoolmates<sup>16</sup>. A study of tobacco use among elementary, middle and high school students in the United States found that one in each 13 elementary or middle school students and one in each four high school students reported using some tobacco product in the last 30 days<sup>17</sup>.

From 2017 to 2019, more than one million adolescents aged 14-17 years started to consume some type of tobacco daily in the United States. This value can be translated into 2,284 new adolescent smokers, every day; most of them using electronic cigarettes/hookah. Moreover, these adolescents showed the same degree of dependence as those who smoke cigarettes daily<sup>18</sup>.

Contrary to expectations, we found no significant difference between elementary and middle school students and high school ones (OR = 0.973; 95%CI: 0.759-1.248;  $p = 0.849$ ) for alcohol use in our study. Other studies report that it is more frequent among older adolescents (16-18 years)<sup>14,15,19</sup>.

Comparing sexes, we found a moderate association ( $\phi_c = 0.327$ ;  $p < 0.001$ ) between alcohol use and males, with men being 3.891 times more likely to consume alcohol in the last 30 days ( $p < 0.001$ ). According to the World Health Organization (WHO), more than 25% of all people aged 15-19 years consume alcoholic beverages, reaching 155 million adolescents. The worldwide prevalence of alcohol use among adolescents aged 15-19 years was 13.6% in 2016, being higher in Europe (43.8%), followed by the Americas (38.2%). This study reported little difference in prevalence between the sexes; only cases of binge drinking were more prevalent among boys<sup>20</sup>. In Brazil, the prevalence of use among ninth graders in the last 30 days was higher among girls, 25.1% vs. 22.5%, respectively<sup>16</sup>. Regarding lifetime use, the use prevalence among girls was also higher at the national and local levels, 62.1% vs. 58.9% and 63% vs. 58.3%, respectively<sup>15</sup>.

The results of the *3rd National Survey on Drug Use by the Brazilian Population*<sup>13</sup> showed that more than half of the population aged 12-65 years reported having consumed alcohol at some point in their lives. About 46 million (30.1%) reported having consumed at least one dose in the last 30 days, and about 2.3 million people met the criteria for alcohol dependence in the last 12 months.

In our sample, tobacco, ecstasy, and marijuana use was more common among boys, with OR of 1.767, 2,618, and 2,224, respectively. In PeNSE<sup>16</sup>, among ninth grade students, 5.8% of boys admitted to having smoked in the last 30 days, against 5.4% of girls; in the stratification by age, tobacco use was higher among older boys (16-17 years, 10.1% vs. 13-15 years, 5.3%), whereas the difference was smaller for girls (6.7% vs. 5.6%). In this study, current marijuana use was 4.1% among boys and 3.5% among girls. This use also increased older individuals, 4.2% (13-15 years) and 7.4% (16-17 years), being higher among boys (4.2% and 8.6%) than girls (4.2% and 5.8%).

Considering ethnicity, skin color was not associated with the use of different psychoactive substances. This topic is little explored in the literature, although a national survey conducted in the United States showed few differences among ethnicities. However, young White people are more likely to receive drug abuse treatment, an alarming difference, because they have more access to private health care insurance and undergo substance abuse screening and treatment<sup>19</sup>.

Some limitations should be considered when interpreting our results. This is a cross-sectional study, not allowing for the detection of developments or changes in the characteristics of the target population, whether at group or individual level. We only conducted this study in public schools, in a single municipality, thus, the results show the context of a specific population. Data on the use of

psychoactive substances were collected in the last 30 days, thus, we could not establish an overview of a longer period. However, the robust random sample increases the reliability of our results.

The earlier the use of psychoactive substances, the greater the risk of developing disorders associated with them since the brains of adolescents are still developing and are particularly vulnerable<sup>4</sup>. Knowledge sharing can help to better understand substance use patterns, related problems, and support needs in adolescents, thus increasing the likelihood of creating public policies for this population, in line with the *UNODC Strategy 2021-2025*<sup>21</sup>.

School has been an important scenario in our work, and it is worth remembering that any attempt to reduce the use of psychoactive substances will bring benefits, as well as reducing harmful effects, helping to promote prevention, as it is always more efficient.

## Contributors

E. P. Vellozo contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. M. S. S. Vitale contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. M. A. Z. Passos contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. S. R. Niskier contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. T. H. Schoen contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. P. R. Hall contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. F. P. N. Arcanjo contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. R. F. Costa contributed to the data analysis and interpretation and review; and approved the final version to be published. B. I. Kopelman contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published. T. Konstantyner contributed to the study conception and design, data acquisition, analysis and interpretation, writing, and review; and approved the final version to be published.

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## Acknowledgments

The authors thank the São Paulo State Education Department, directors, coordinators, and teachers who assisted in the collection of data, and the adolescents and parents/guardians for their valuable assistance.

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## Resumo

O objetivo foi estimar a prevalência de uso de substâncias psicoativas por adolescentes de escolas públicas. Trata-se de um estudo transversal com uma amostra aleatória de adolescentes de cinco escolas públicas localizadas em um município da zona centro-oeste da Região Metropolitana de São Paulo, Brasil. Informações sobre as características demográficas, socioeconômicas e de uso de drogas foram coletadas por meio de questionários autorreferidos. A amostra foi composta por 1.460 estudantes, sendo 716 (49%) meninos, com idade entre 10 e 19 anos ( $13,19 \pm 2,04$  anos). A prevalência de uso de substâncias psicoativas no último mês foi de 51,0% para analgésicos; álcool 48,8%; tabaco 37,3%; tranquilizantes 30,8%; maconha 23,1%; esteroides anabolizantes 22,6%; ecstasy 21,6%; anfetaminas/estimulantes 15,3%; fenciclidina 13,4%; cocaína/crack 12,9%; inalantes/solventes 12,6%; opiáceos 11,5%; alucinógenos 11,4%; e outras drogas não classificadas 16,2%. Alunos do Ensino Fundamental foram mais propensos a consumir tabaco (OR = 2,306; IC95%: 1,733-3,068;  $p < 0,001$ ), e os estudantes do sexo masculino foram mais propensos a consumir qualquer tipo de substância. Identificou-se um alto uso de substâncias psicoativas entre os participantes deste estudo, com maior prevalência entre os estudantes do sexo masculino.

Adolescente; Drogas Ilícitas; Uso Indevido de Medicamentos; Consumo de Bebidas Alcoólicas; Consumo de Produtos Derivados do Tabaco

## Resumen

El objetivo de este estudio fue estimar la prevalencia de consumo de sustancias psicoactivas por adolescentes de escuelas públicas brasileñas. Se trata de un estudio transversal, realizado con una muestra aleatoria de adolescentes de cinco escuelas públicas, ubicadas en una ciudad de la región centro-oeste de la Región Metropolitana de São Paulo, Brasil. La información sobre las características demográficas, socioeconómicas y de consumo de drogas se recabó de cuestionarios autoinformados. La muestra estuvo compuesta por 1.460 estudiantes; 716 (49%) de los cuales eran varones, con edades entre 10 y 19 años ( $13,19 \pm 2,04$  años). La prevalencia de consumo de sustancias psicoactivas en el último mes fue: para analgésicos 51%; alcohol 48,8%; tabaco 37,3%; tranquilizantes 30,8%; marihuana 23,1%; esteroides anabólicos 22,6%; éxtasis 21,6%; anfetaminas/estimulantes 15,3%; fenciclidina 13,4%; cocaína/crack 12,9%; inhalantes/disolventes 12,6%; opiáceos 11,5%; alucinógenos 11,4%; y otras drogas no clasificadas 16,2%. Los estudiantes de primaria fueron los más propensos a consumir tabaco (OR = 2,306; IC95%: 1,733-3,068;  $p < 0,001$ ), y los varones los más propensos a consumir cualquier tipo de sustancia. Se identificó un alto consumo de sustancias psicoactivas entre los participantes, con mayor prevalencia entre los estudiantes del sexo masculino.

Adolescente; Drogas Ilícitas; Abuso de Medicamentos; Consumo de Bebidas Alcohólicas; Consumo de Productos Derivados del Tabaco

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Submitted on 10/Sep/2022

Final version resubmitted on 12/Dec/2022

Approved on 05/Jan/2023