

Marijuana use among adolescents: a cross-sectional study with Brazilian students from a remote area of the Amazon region

Uso de maconha entre adolescentes: um estudo transversal com estudantes brasileiros numa área remota da região amazônica

Uso de marihuana entre adolescentes: un estudio transversal de estudiantes brasileños en una zona remota de la región amazónica

Received: 10/27/2021 | Reviewed: 11/06/2021 | Accept: 11/08/2021 | Published: 11/11/2021

Samara Borges de Souza

ORCID: <https://orcid.org/0000-0002-7457-7836>

Universidade Federal do Pará, Brasil

E-mail: samaraysbren2327@gmail.com

Franciane Ferreira Costa

ORCID: <https://orcid.org/0000-0003-2313-2527>

Universidade Federal do Pará, Brasil

E-mail: francycostta8@gmail.com

Jocilena Pamela Quadros de Queiroz

ORCID: <https://orcid.org/0000-0003-0136-145X>

Universidade Federal do Pará, Brasil

E-mail: jocilenapqq@outlook.com

Gláucia Caroline Silva de Oliveira

ORCID: <https://orcid.org/0000-0001-5607-5835>

Universidade Federal do Pará, Brasil

E-mail: gcoliveira@ufpa.br

Luiz Marcelo de Lima Pinheiro

ORCID: <https://orcid.org/0000-0003-0406-2770>

Universidade Federal do Pará, Brasil

E-mail: lmlpinheiro@yahoo.com.br

Aldemir Branco de Oliveira Filho

ORCID: <https://orcid.org/0000-0002-4888-3530>

Universidade Federal do Pará, Brasil

E-mail: olivfilho@ufpa.br

Abstract

Marijuana is the most used illicit drug worldwide. The frequent use of marijuana in adolescence is very worrying, as it is associated with health problems. In Brazil, surveys on the use of psychotropic drugs with adolescent students were conducted in large cities. This study determined the prevalence and factors associated with marijuana use among adolescent students in the Brazilian city of Soure, Pará, in the Amazon region. In this cross-sectional study, 736 high school adolescent students provided information through a structured form at the three schools in Soure in November 2019. Marijuana use, in life and frequent (last 30 days), was calculated. Logistic regression models identified factors associated with different marijuana use. The rates of marijuana use in life and frequent were 17.7% and 7.1%, respectively. The behavioral pattern of the adolescents' coexistence nucleus (parents, relatives, and friends) was fundamental for marijuana use in life. Also, the lack of interference or reduced participation of the family in the adolescent's life, the inadequate family structure, and the continuous example of friends were associated with the frequent use of marijuana. Measures to control and prevent marijuana use are necessary and should be available to adolescents, their families, and friends in this remote area of the Amazon region.

Keywords: Epidemiology; Marijuana use; Adolescent; Prevalence; Risk Factors.

Resumo

A maconha é a droga ilícita mais usada no mundo. O uso frequente de maconha na adolescência é muito preocupante, pois está associado a problemas de saúde. No Brasil, pesquisas sobre o uso de drogas psicotrópicas entre adolescentes escolares foram realizadas em grandes cidades. Este estudo determinou a prevalência e os fatores associados ao uso de maconha entre adolescentes estudantes da cidade brasileira de Soure, Pará, na região amazônica. Neste estudo transversal, 736 adolescentes estudantes do ensino médio forneceram informações por meio de formulário estruturado nas três escolas de Soure em novembro de 2019. Calculou-se o uso de maconha na vida e frequente (últimos 30 dias). Modelos de regressão logística identificaram fatores associados ao uso distinto de maconha. As taxas de uso de maconha na vida e frequente foram de 17,7% e 7,1%, respectivamente. O padrão de comportamento do núcleo de

convivência dos adolescentes (pais, parentes e amigos) foi fundamental para o uso da maconha na vida. Além disso, a falta de interferência ou reduzida participação da família na vida do adolescente, a estrutura familiar inadequada e o exemplo contínuo de amigos estiveram associados ao uso frequente de maconha. Medidas de controle e prevenção do uso da maconha são necessárias e devem estar disponíveis para adolescentes, suas famílias e amigos nesta área remota da região amazônica.

Palavras-chave: Epidemiologia; Uso da maconha; Adolescente; Prevalência; Fatores de risco.

Resumen

La marihuana es la droga ilícita más consumida en el mundo. El uso frecuente de marihuana en la adolescencia es motivo de gran preocupación, ya que está asociado a problemas de salud. En Brasil, se llevaron a cabo encuestas sobre el uso de psicofármacos entre adolescentes escolares en las grandes ciudades. Este estudio determinó la prevalencia y los factores asociados al consumo de marihuana entre estudiantes adolescentes de la ciudad brasileña de Soure, Pará, en la región amazónica. En este estudio transversal, 736 estudiantes adolescentes de secundaria proporcionaron información a través de un formulario estructurado en las tres escuelas de Soure en noviembre de 2019. Se calculó el uso de marihuana de por vida y frecuente (últimos 30 días). Los modelos de regresión logística identificaron factores asociados con distintos usos de marihuana. Las tasas de uso frecuente y de por vida de marihuana fueron 17,7% y 7,1%, respectivamente. El patrón de comportamiento del núcleo de convivencia de los adolescentes (padres, familiares y amigos) fue fundamental para el uso de la marihuana en la vida. Además, la falta de injerencia o la reducida participación de la familia en la vida del adolescente, la estructura familiar inadecuada y el ejemplo continuo de amigos se asociaron con el uso frecuente de marihuana. Las medidas de control y prevención del consumo de marihuana son necesarias y deben estar al alcance de los adolescentes, sus familias y amigos en esta remota zona de la región amazónica.

Palabras clave: Epidemiología; Uso de marihuana; Adolescente; Predominio; Factores de riesgo.

1. Introduction

Adolescence is the stage of life between childhood and adulthood, from 10 to 19 years old, and is marked by significant changes in the physical, cognitive, and psychosocial fields. These changes affect how adolescents feel, think, make decisions, and interact with others (World Health Organization [WHO], 2020a). Around 1.2 billion people, or 1 in 6 of the world's population, are adolescents. Most of them are healthy, but there are many health problems such as depression, violence, infectious diseases, unplanned pregnancy, and the use of psychotropic drugs (United Nations Office on Drugs and Crime [UNODC], 2018; WHO, 2020b).

In the world, marijuana is the most widely used illicit drug (Peacock et al., 2018). Annually, about 2.5% of the world's population (approximately 147 million people) use marijuana and consumption has increased more rapidly than cocaine and opioids (WHO, 2016). The frequent use of marijuana during adolescence is a concern, as it has been associated with decreased school performance, lower level of education and school dropout, risk of dependence, early onset of psychosis, neuropsychological decline, and use with other illicit drugs (Degenhardt et al., 2016; Gobbi et al., 2019; Silins et al., 2014; Volkow et al., 2014). Parenting styles, substance use by parents and colleagues, risk perception have been described as relevant psychosocial risk factors (Chadi et al., 2018; Libuy et al., 2020).

In 2017, the world record for most marijuana seized was recorded in South America. In recent decades, Brazil has emerged as a major illicit drug market, such as marijuana, crack-cocaine, and cocaine (UNODC, 2019). It is estimated that 4.9 million Brazilians use some illicit drug per year. This rate is higher among men, youth, and adolescents, compared to women (Fundação Oswaldo Cruz [FIOCRUZ], 2017). Major epidemiological surveys on the use of licit and illicit drugs have been conducted in the past decades with students in major Brazilian cities, who point to alcohol and marijuana as the most consumed licit and illicit drugs, respectively (Centro Brasileiro de Informações sobre Drogas Psicotrópicas [CEBRID], 2004; CEBRID, 2010; FIOCRUZ, 2017; Soldera et al., 2004). The 6th national survey on the use of psychotropic drugs among elementary and high school students from the public and private education networks of the 27 Brazilian capitals showed that 25.5% of Brazilian students reported having already used illicit drugs (marijuana, cocaine paste, crack-cocaine, amphetamines, solvents, and others) in their lives, of which 10.6% used in the last year and 5.5% in the last month (CEBRID, 2010).

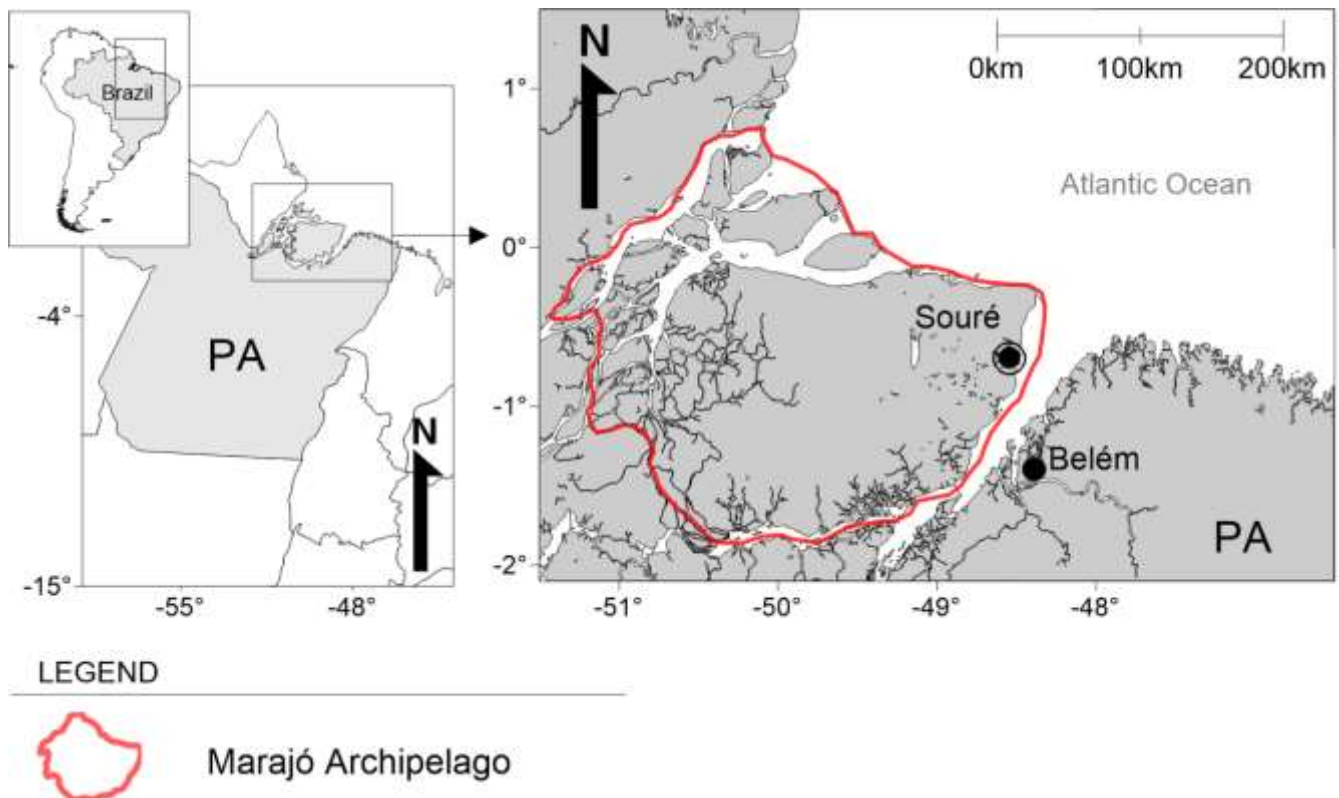
In the Brazilian Amazon (northern Brazil), there are few epidemiological studies on the use of illicit drugs among adolescents, and most of the information comes from surveys with students from public and private schools located in state capitals. In the cities of Belém (n = 2,067) and Manaus (n = 2,389), the two main cities in this Brazilian region, the prevalence of marijuana use in life among adolescent students was 4.2% and 5.3%, respectively. Being that the frequent use of marijuana (use more than six times in 30 days) among adolescent students in both cities was equal to 0.1%, mainly concentrated in the age group of 16 to 19 years old (CEBRID, 2010). To date, only two studies have been conducted with adolescent students in distant cities (Breves and Capanema) in metropolitan areas in the Brazilian Amazon, which indicated a very high prevalence of lifetime use (8.8% to 23.4%) and frequent use (4.0% to 12.5%) of marijuana, with records also of the use of cocaine paste and crack-cocaine by adolescents. In these studies, the factors associated with the use of marijuana were school failure, reduced participation of parents in the school life of adolescents, parents who do not talk to their children about the use of psychotropic drugs, use of licit drugs by adolescents, involvement in conflicts, and parents/friends who consume licit and/or illicit drugs (Alcantara et al., 2017; Furtado et al., 2017).

The Brazilian Amazon is an underdeveloped rural and socioeconomic region, with high levels of poverty, low level of education, limited transport infrastructure, and inadequate health services (Oliveira-Filho et al., 2019). In this context, poverty, malnutrition, domestic violence and neglect of children and adolescents, sex work and illicit drug use, and trafficking are common in this region. To increase vulnerability, this region is an important route for illicit drug trafficking and people due to unsafe borders with the largest cocaine producers (Peru, Colombia, and Bolivia) in the world (Oliveira-Filho et al., 2020). The assessment of epidemiological status and the quantification of possible risk factors and their trends over time can help considerably in the direction of strategies to prevent the use of marijuana and other psychotropic drugs, especially in a remote, unknown, and low human development area. Thus, this study determined the prevalence and factors associated with the use of marijuana among adolescent students in the city of Soure, Brazilian state of Pará, in the Amazon region.

2. Methodology

Soure is a city located in the Marajó Archipelago, one of the areas with the lowest human development index in Brazil, the Amazon region (Figure 1). This city has about 25 thousand inhabitants and is one of the main tourist areas of the Brazilian state of Pará. Livestock, agriculture, fishing, crab mining, and tourism are the main economic activities developed in Soure (Instituto Brasileiro de Geografia e Estatística [IBGE], 2017). According to a socioeconomic and environmental survey of the Marajó Archipelago (Fundação Amazônia de Amparo a Estudos e Pesquisas do Pará [FAPESPA], 2015), the city of Soure has worrying indicators in important areas of education, health, and safety, such as: high illiteracy rate among people aged 15 or over (23,1%), low rate of adolescents in high school (25.3%), very low frequency of people with complete higher education (3.7%), high rate of pregnancy in adolescence (38.2% of births notified), high rate of infant mortality (28 per thousand inhabitants), high maternal mortality rate (254 per 100 thousand inhabitants), high youth murder rate (39.24 per 100 thousand young people), low proportion of coverage of the family health strategy (24.7 per 100,000 inhabitants) and high population rate in extreme poverty (36.7%). According to the Marajó Analytical Report (Grupo de Estudo e Pesquisa Trabalho e Desenvolvimento na Amazônia [GEPTDA], 2012), these indicators found in Soure are similar the findings of the other 15 cities in the Marajó Archipelago, clearly showing the social vulnerability of the population living in this region of the Brazilian state of Pará. Socioeconomic problems, such as unemployment, informal work, prostitution, theft, and illegal drug trafficking through rivers are commonly reported in cities in this Brazilian archipelago (Andrade et al., 2017; Frade et al., 2019; Furtado et al., 2017).

Figure 1: The geographic location of the city of Soure, Marajó Archipelago, Brazilian state of Pará (PA), in the Amazon region.



Source: Authors.

This cross-sectional study consisted of quantitative and qualitative information provided by adolescents attending high school in the city of Soure, state of Pará (Campana, 1999; Medronho et al., 2011). In this city, there are only three high schools, and all were accessed. Initially, parents and guardians were consulted about the participation of adolescents in this study. During meetings, parents and guardians of the adolescents were informed of the objectives and conduct of the study, as well as received written invitations to be signed and delivered by their children on the scheduled visit date of the research team at the school. All data were collected during class time through intervention to explain the research objectives and invite all students present to participate in the study by filling out the form. The participation authorization provided by the parents or guardians was fixed to the form filled out by the adolescent and then deposited together in an urn. Each high school class was visited only once and all the students present, included in the age group for adolescents (10 to 19 years old) who filled out and delivered the forms, were included in this study. All students over the age of 19, who provided completed forms without parental or guardian authorization, or who were absent from the classroom at the time of the visit, were excluded from this study.

Data collection was conducted from 4 to 29 November 2019. The instrument used for data collection was a self-completed form, without personal identification, covering issues related to school routine, social, economic, and demographic characteristics and use of psychotropic drugs. This form was used in other epidemiological studies (Alcantara et al., 2017; Araujo et al., 2017; Furtado et al., 2017), and contained questions regarding age, sex, school performance, work activity in parallel with the studies, marital status of parents/guardians, participation of parents/guardians in school life, educational level of parents/guardians, family income of parents/guardians, family guidance on the use of psychotropic drugs (licit and/or illicit), involvement in conflicts with the family or coexistence core, use of marijuana in life, frequent use of marijuana in the last 30 days, age who used marijuana for the first time in life, parents used psychotropic drugs (licit and/or illicit), friends used

psychotropic drugs (licit and/or illicit), and how many friends used psychotropic drugs (licit and/or illicit). A question related to the use of a fictitious drug ("krypton tea") was used as a marker of information reliability. All information from adolescents who reported using this fictitious drug was excluded. In this study, the use of marijuana a few times in life and the permanent abandonment of such use was considered to use in life. On the other hand, the use of marijuana at least twice a week, over the last 30 days, was considered as frequent use.

All data were entered into an Excel database (Microsoft Corp., USA) and converted to SPSS. Confidence intervals (CI) were constructed to estimate the prevalence of psychotropic drug use. Marijuana use was considered the outcome. On the form, the question "Did you use marijuana during your life?" (Yes/No) was essential to identify the dependent variable and, consequently, the construction of the model of factors associated with the lifetime use of marijuana. Similarly, the question "Have you used marijuana frequently in the past 30 days?" (Yes/No) was essential to identify the dependent variable and, consequently, the construction of the model of factors associated with frequent use of marijuana. A descriptive analysis was conducted to investigate the bivariate relationships between outcome and epidemiological covariates drawn from the epidemiological form data, using Chi-square test. All the potential factors with probabilities of $p \leq 0.2$ were examined and included in the final models for distinct use of marijuana, using backward stepwise multiple logistic regression. Multiple logistic regressions were then run to determine the association of each factor with lifetime use, and frequent use of marijuana. Various possible types of interactions were evaluated to determine how they might improve the final models. The fit of the final model was assessed using the Hosmer-Lemeshow (HL) goodness-of-fit test. A *p-value* < 0.05 was considered significant in all analyzes. Finally, statistical analyzes for the construction of epidemiological models for adolescents who marijuana use was conducted using the SPSS 23.0 software (IBM, USA).

All participants were included after the informed and written consent of the parents/guardians. This study was approved by the Human Research Ethics Committee of the Instituto de Ciências da Saúde of the Universidade Federal do Pará, Brazil (CAAE 0103.0.073.000-10).

3. Results

In 2019, 1082 students were enrolled in high schools in the city of Soure. In total, 838 filled out the data collection forms. However, the information provided by one hundred and two students was excluded from this study: ninety-four for being over 19 years of age and eight students for indicating the use of fictitious drugs. Also, another two hundred and forty-four students did not attend the school on the scheduled date for data collection or simply refused to participate in the study. Thus, this study consisted of data provided by 736 adolescent students (68.0% of total students).

Most adolescents were female (53.7%), aged 14 to 16 years (48.5%), studied in the morning shift (75.7%), belonged to the family with low monthly income (up to 1 Brazilian minimum wage = R\$ 998.00, approximately US\$ 190) (71.9%), and some of them reported the need to study and work in informal activities (25.5%). Some adolescents also reported the participation of their parents or guardians in school life (always = 31.1%), and they talked about the use of psychotropic drugs (always = 44.3%). Also, the use of psychotropic drugs (licit and/or illicit) by parents or guardians was registered, as well as the use of these substances by friends of adolescents (69.2%). More specifically, many adolescents rated the family structure as excellent (61.7%) and that they were not involved in conflicts (68.8%). None of the participants claimed to have participated in school activities to discuss and prevent the use of psychotropic drugs. All characteristics of the participants in this study can be seen in table 1.

In total, 130 (17.7%) adolescents have used marijuana at least once in their lives, and another 52 (7.1%) have used marijuana frequently in the last 30 days. In the first group, the average age of marijuana use was 16.3 years (± 2.5). On the

other hand, the average age of frequent use of marijuana was 15.6 years (± 2.1). Among adolescents who frequently used marijuana, the use of alcohol (34.6%), tobacco (17.3%), and crack-cocaine (7.7%) were also reported. These rates related to marijuana use by adolescents are also shown in Table 2.

The bivariate analysis identified four factors associated with marijuana use in life. Multivariate analysis identified the association of the same factors with marijuana use in life. The values of the association of marijuana use in life with "over 16 years", "parents use psychotropic drugs (licit and/or illicit)", "friends use psychotropic drugs (licit and/or illicit)", and "everyone + most friends use psychotropic drugs (licit and/or illicit)" are shown in table 3. The HL test indicated that the final model ($_{HL}\chi^2 = 1.9$; $p = 0.6$) had a good fit. Regarding the frequent use of marijuana, bivariate and multivariate analysis identified six factors. The values of the association of frequent use of marijuana with "more than 16 years", "parents who do not participate in school life (never + sometimes)", "parents who do not talk about psychotropic drug use (never + sometimes)", "friends use some psychotropic drugs (licit and/or illicit)", "everyone + most friends use psychotropic drugs (licit and/or illicit)", and "family structure (self-classified) bad" are shown in table 4. The HL test indicated that the final model ($_{HL}\chi^2 = 5.2$; $p = 0.4$) had a good fit.

4. Discussion

Despite the conduct of several surveys on the use of psychotropic drugs by students in large Brazilian cities, there are still gaps to be filled, especially in areas of difficult access and low human development index, such as the Amazon region. This study identified relevant information on marijuana use among adolescent students in the city of Soure, located in the Marajó Archipelago, one of the areas that have the lowest human development rates in Brazil. In this scenario, the use of marijuana among adolescents was higher than that registered in large Brazilian cities, with a clear influence of behavioral patterns of the coexistence nucleus, such as parents, relatives, and friends.

In Brazil, the average rates of marijuana use in life and the last 30 days among adolescent students were 5.7% and 0.3%, respectively. Approximate values also recorded in higher cities in northern Brazil: Belém (4.2% and 0.1%), Boa Vista (3.8% and 0.1%), Macapá (2.7% and 0.0%), Manaus (5.3% and 0.1%), Palmas (3.9% and 0.3%), Porto Velho (3.8% and 0.2%) and Rio Branco (3.6% and 0.1%) (CEBRID, 2010). Also, marijuana use is less than 5% among adolescent students in some countries in the South (Bolivia, Paraguay, Peru, Ecuador, Venezuela, Guyana, and Suriname) and Central America (El Salvador, Honduras, Panama, Haiti, and the Dominican Republic) (Organization of American States [OAS], 2015). The high rates of marijuana use among adolescents recorded in this study indicate a very worrying epidemiological scenario, in which there is still a record of combined use of marijuana with other psychotropic drugs as an aggravating factor. Brazilian authorities must carefully assess this scenario and intervene to attend to and take care of the health of adolescents, their families, and their friends.

Table 1: Use of marijuana and characteristics of adolescents in the Brazilian municipality of Soure, in the Amazon region.

Characteristics	<i>N</i>	Use in life (%)	<i>p-value</i> *	Frequent use (%)	<i>p-value</i> *
Total	736	130 (17.7)		52 (7.1)	
Sex					
Male	341	66 (19.4)	0.26	24 (7.0)	0.97
Female	395	64 (16.2)		28 (7.1)	
Age range (years)					
11 – 13	78	6 (7.7)	0.01	2 (2.6)	0.01
14 – 16	390	67 (17.2)		22 (5.6)	
17 – 19	268	59 (22.0)		28 (10.4)	
Study shift **					
Morning	557	100 (18.0)	0.22	39 (7.0)	0.39
Afternoon	106	22 (20.8)		10 (9.4)	
Night	73	8 (11.0)		3 (4.1)	
Study and work **					
Yes	188	29 (15.4)	0.35	10 (5.3)	0.28
No	548	101 (18.4)		42 (7.7)	
Parents participate in school life **					
Always	229	36 (15.7)	0.56	9 (3.9)	< 0.01
Sometimes	445	81 (18.2)		27 (6.1)	
Never	62	13 (21.0)		16 (25.8)	
Parents talk about psychotropic drug use **					
Always	326	56 (17.2)	0.75	6 (1.8)	< 0.01
Sometimes	304	55 (18.1)		28 (9.2)	
Never	106	9 (8.5)		18 (17.0)	
Monthly family income (Brazilian minimum wage) **					
Up to 1 (R\$ 998.00, approximately US \$ 190)	529	95 (18.0)	0.38	38 (7.2)	0.71
From 2 to 3	159	30 (18.9)		12 (7.6)	
More than 3	48	5 (10.4)		2 (4.2)	
Parents use some psychotropic drug (licit and/or illicit) **					
Yes	324	73 (22.5)	< 0.01	25 (7.8)	0.54
No	412	57 (13.8)		27 (6.6)	
Friends use some psychotropic drug (licit and/or illicit) **					
Yes	509	105 (20.6)	< 0.01	45 (8.8)	< 0.01
No	227	25 (11.0)		7 (3.1)	

How many friends use psychotropic drugs (licit and/or illicit) **

All + Most	208	57 (27.4)	< 0.01	28 (13.5)	< 0.01
Few + None	528	73 (13.8)		24 (4.5)	
Family structure (self-classification)					
Regular + Poor	94	20 (21.3)	0.47	14 (14.9)	< 0.01
Good	188	29 (15.4)		15 (8.0)	
Excellent	454	81 (17.8)		23 (5.1)	
Involvement in conflicts **					
Yes	230	46 (20.0)	0.26	18 (7.8)	0.59
No	506	84 (16.6)		34 (6.7)	

**p-value* calculated by the Chi-square test; **Variable performed/occurred in the last 12 months. Source: Authors.

Table 2: Prevalence of marijuana use and combined with other psychotropic drugs by adolescents in this study.

Psychotropic drugs	Yes/Total	%	95% CI
Marijuana			
Use in life	130/736	17.7	13.9 – 22.0
Frequent use	52/736	7.1	2.9 – 11.6
*Marijuana combined with:			
Alcohol	18/52	34.6	30.1 – 38.2
Tobacco	9/52	17.3	13.3 – 20.8
Crack-cocaine	4/52	7.7	2.7 – 13.8

*Frequent use of marijuana. Source: Authors.

Table 3: Bivariate and multivariate analysis of factors associated with use in life of marijuana among adolescents in an area of low human development in the Brazilian Amazon.

Factors	<i>N</i>	Use in life (%)	Bivariate OR (95% CI)	Multivariate aOR (95% CI)
More than 16 years <i>vs.</i> Up to 16 years	268	59 (22.0)	1.6 (1.1 – 2.4)	2.4 (1.2 – 4.7)
Parents use some psychotropic drug (licit and/or illicit) <i>vs.</i> Parents do not use *	324	73 (22.5)	1.8 (1.2 – 2.7)	3.2 (1.4 – 5.3)
Friends use some psychotropic drug (licit and/or illicit) <i>vs.</i> Parents do not use *	509	105 (20.6)	2.1 (1.3 – 3.4)	4.1 (1.7 – 6.5)
Everyone + most friends use psychotropic drugs (licit and/or illicit) <i>vs.</i> Few + None of friends use *	208	57 (27.4)	2.4 (1.6 – 3.5)	4.8 (1.9 – 7.4)

*Factor performed/occurred in the last 12 months; ** One Brazilian minimum wage equal to R\$ 998.00 (approximately US \$ 190). OR: Odds Ratio; aOR: Adjusted Odds Ratio; 95% CI: 95% Confidence Interval. Other factors were assessed and were not associated with marijuana use in life; this data can be requested from the author for correspondence.
 Source: Authors.

Table 4: Bivariate and multivariate analysis of factors associated with frequent use of marijuana among adolescents in an area of low human development in the Brazilian Amazon.

Factors	<i>N</i>	Frequent use (%)	Bivariate OR (95% CI)	Multivariate aOR (95% CI)
More than 16 years <i>vs.</i> Up to 16 years	268	28 (10.4)	2.2 (1.2 – 4.0)	3.4 (2.0 – 5.8)
Parents do not participate in school life (never + sometimes) <i>vs.</i> Parents participate (always) *	507	43 (8.5)	2.4 (1.1 – 4.9)	3.0 (1.4 – 6.1)
Parents do not talk about psychotropic drug use (never + sometimes) <i>vs.</i> Parents talk (always)*	410	46 (11.2)	6.7 (2.8 – 15.8)	8.1 (3.3 – 20.5)
Friends use some psychotropic drug (licit and/or illicit) <i>vs.</i> Parents do not use *	509	45 (8.8)	3.0 (1.4 – 6.9)	6.5 (1.9 – 11.7)
Everyone + most friends use psychotropic drugs (licit and/or illicit) <i>vs.</i> Few + None of friends use *	208	28 (13.5)	3.3 (1.8 – 5.8)	7.2 (2.4 – 13.6)
Family structure (self-classified) Regular + Poor <i>vs.</i> Good + Excellent	94	14 (14.9)	2.8 (1.4 – 5.4)	4.2 (1.7 – 8.6)

*Factor performed/occurred in the last 12 months; ** One Brazilian minimum wage equal to R\$ 998.00 (approximately US \$ 190). OR: Odds Ratio; aOR: Adjusted Odds Ratio; 95% CI: 95% Confidence Interval. Other factors were assessed and were not associated with frequent use of marijuana; this data can be requested from the author for correspondence.
 Source: Authors.

In this sense, the social environment must be considered because it is a potential epidemiological factor related to the use of psychotropic drugs, i.e., it can prevent or encourage the continued use (Chadi et al., 2018; Libuy et al., 2020; Schenker, & Minayo, 2003). Families structured, which transmit safety and behavioral examples for a healthy life, have been associated with a lower prevalence of psychotropic drug use among adolescents (Soldera et al., 2004; Tavares et al., 2004; Terzic et al., 2013; Wang et al., 2009). On the other hand, the rates of use of psychotropic drugs are higher in a coexistence environment (with parents, relatives, and friends) in which health risk behaviors are commonly performed, such as the frequent use of alcohol, tobacco, marijuana and/or cocaine by friends and family of adolescents (Alcantara et al., 2017; Bernardy, & de Oliveira, 2010; Costa et al., 2020; Elicker et al., 2015; Ferreira, & Sousa Filho, 2007; Furtado et al., 2017; Silva, 2016). Adolescents of parents who use marijuana are 2.5 to 4.4 times more likely to use marijuana, and 1.8 to 2.75 times more likely to use alcohol, compared to adolescents of parents who do not use marijuana. In addition, adolescents of parents who use marijuana are more likely to use tobacco, report more favorable opinions about marijuana, and have reduced school performance (lower grades) (Epstein et al., 2020).

In this study, the behavioral pattern of the adolescents' coexistence nucleus (parents, family, and friends) was critical for the use of marijuana in life. Also, the lack of interference or reduced participation of the family in the adolescent's life, the inadequate family structure, and the continuous example of friends were associated with the frequent use of marijuana. The family and the school are essential institutions for strengthening self-esteem and promoting the health of adolescents, specifically related to the perception of limits and health risks, such as frequent use of marijuana and other psychotropic drugs. With the support of these two institutions, adolescents can assess and address the common challenges of their age, relieve tension and curiosity, and make safe choices for your health autonomously (Costa et al., 2020; Schenker, & Minayo, 2003; Silva, 2016).

These findings point to the urgent need for key actions to prevent and control the use of marijuana and other psychotropic drugs by adolescents. A school is an initial and favorable place for the development of regular actions to promote the health of a range of people, with different characteristics. Thus, prevention of the use of psychotropic drugs can be encouraged through actions within the classroom that allow reflection and adoption of healthier choices. This will allow establishing clear parameters for the health promotion of adolescents and their families, as well as reducing the field of uncertainties related to the use of psychotropic drugs. Another very important factor related to this approach is to allow space for adolescents to express themselves, get involved in new proposals, share problems, and look for solutions. A school that includes, brings together, contributes to the development of self-esteem, autonomy, and the perception of limits and risks.

These characteristics are important and must be considered for preventing the use of psychotropic drugs. An example of this intervention was done with adolescents in a public school in the Brazilian municipality of Muriaé (Souza et al., 2015). Through regular workshops based on the integral promotion of health and the creation of unique modes of care, the prevention of the use of alcohol and other drugs was discussed by adolescent students and specialized professionals (teacher, psychologist, nurse, and social worker). The harm reduction strategy was adopted aiming to reduce losses resulting from the use of alcohol and other psychotropic drugs, without having abstinence as the only way out. In this sense, the adolescents' autonomy was valued through activities that considered their experiences, taking active, conscious, and political positions during the discussions (Souza et al., 2015).

Another key intervention to be considered is the need to care for the families of adolescents who regularly use marijuana and other psychotropic drugs. It is very important to strengthen families, through the establishment of social policies and health promotion, with consistent actions and programs that meet their integral needs, in a perspective of totality, regardless of the way they are configured, to face the inherent issues frequent and abusive use of psychotropic drugs. Public

policies and strategies related to mental health, especially aimed at assisting people who use psychotropic drugs, have been implemented in Brazil in the last decades (Machado, & Boarini, 2013). This has enabled the articulation and integration of interventions for treatment, recovery, harm reduction, social, and occupational reintegration with the national health system (Sistema Único de Saúde (SUS)) and the national social assistance system (Sistema Único de Assistência Social (SUAS)) for users and their families in large Brazilian cities. The absence of structures and services for people who use psychotropic drugs and their families in the Amazon region, especially in remote areas such as the cities of the Marajó Archipelago, have hampered access, treatment, and recovery for people who use psychotropic drugs, and all those impacted by chemical dependence in this Brazilian region (Andrade et al., 2017; Oliveira-Filho et al., 2020; Piauiense et al., 2020).

The provision of social justice and equity is very important and necessary in the Marajó Archipelago and in other regions with low or very low human development indices. Despite its complexity, this intervention is essential for the quality of life of people living in the Marajó Archipelago and can minimize several socioeconomic and health problems, including the use of psychotropic drugs. The state must assume its social role and guarantee a minimum standard of benefits to all residents of this Brazilian area, as a measure to reduce social inequalities and promote social well-being. The illicit drug trade involves labor exploitation, corruption of public agents, use of armed violence to demarcate interests and other conflicts. The victims and perpetrators of this war are mostly from the poorest and most stigmatized strata (Fiore, 2012). In recent decades, people's involvement with the trade and use of psychotropic drugs has increased considerably in the Marajó Archipelago (GEPTDA, 2012). An improvement considered in the socioeconomic, educational, safety and health services conditions offered to the population could have a positive impact on the quality and perspective of life of residents in the city of Soure. For many decades, the incompetence and corrupt acts of managers have strengthened the absence of social justice and inequity in the Marajó Archipelago (GEPTDA, 2012; Superintendência do Desenvolvimento da Amazônia [SUDAM], 2007). It is imperative that the state develops coordinated social policies for social and economic development, especially for the protection of families in adverse socioeconomic contexts. In summary, interventions to reduce marijuana use among adolescents in this Brazilian location are complex, and should involve the family, school, and state.

This study has limitations and should be considered. The number of adolescents who frequently use marijuana and other psychotropic drugs may be underestimated. About 20% of adolescents did not participate in this study ($n = 244$) either because they missed classes on data collection days or simply because they did not feel comfortable providing information about the use of marijuana and other drugs. Despite the authors' efforts to ensure safe information, the data obtained on marijuana use were self-reported and may contain response bias.

5. Final Considerations

This study identified high rates of marijuana use among adolescent students in the municipality of Soure, located in a remote area of the Amazon region, and with a very low human development index. The use of marijuana was associated with several factors related to the adolescents' coexistence nucleus (parents and friends), the lack of interference or reduced participation of the family in the adolescent's life, and the inadequate family structure. Measures to control and prevent the use of marijuana and other psychotropic drugs are necessary and should be available to adolescents, their friends, and family in this Brazilian municipality. In the future, epidemiological studies using other psychotropic drugs as outcomes should be conducted and disseminated, as well as small actions to promote health and prevent the use of psychotropic drugs in schools. The neglect for the epidemiological scenario presented in this study can contribute to the reduction of school performance and neuropsychological decline of adolescents, and the increased risk of chemical dependence on marijuana and other psychotropic drugs. The provision of social justice and equity is extremely necessary. These high rates of marijuana use can be reduced

through human, integral and solidary development, respecting local identity and culture, offering knowledge, dignity, autonomy, and social well-being.

Acknowledgments

The authors are grateful for the support provided by teachers and principals of public schools in the municipality of Soure for the development of this study.

References

- Alcantara, R. M., Silva-Oliveira, G. C., Oliveira-Filho, A. B. (2017). Epidemiological aspects of illicit drug use by teenage students in the municipality of Capanema, Pará. *Revista Adolescência & Saúde*, 14(2), 47-57.
- Andrade, A. P., Pacheco, S., Silva, F. Q., Pinheiro, L., Castro, J., Amaral, C., Hermes, R. B., Fischer, B., Pinho, J., Lemos, J., & Oliveira-Filho, A. B. (2017). Characterization of hepatitis B virus infection in illicit drug users in the Marajó Archipelago, northern Brazil. *Archives of Virology*, 162(1), 227-233.
- Araujo, C. P., Castor, L. A., Guimarães-Nunes, V. G., Oliveira-Miranda, A. M., Silva-Oliveira, G. C., Oliveira-Filho, A. B. (2017). Experimentation and regular use of illicit drugs by students in the city of Bragança, northeastern Pará. *Revista Eletrônica Gestão & Saúde*, 1(1), 1694-1705.
- Bernardy, C. C., & de Oliveira, M. L. (2010). The role of family relationships in the initiation of street drug abuse by institutionalized youths. *Revista da Escola de Enfermagem da USP*, 44(1), 11-17.
- Campana, A. O. (1999). Metodologia da investigação científica aplicada à área biomédica: 2. Investigações na área médica. *Jornal de Pneumologia*, 25(2), 84-93.
- Centro Brasileiro de Informações sobre Drogas Psicotrópicas, Universidade Federal de São Paulo, Brazil. (2004). *V Levantamento nacional sobre o consumo de drogas psicotrópicas entre estudantes do ensino fundamental e médio da rede pública de ensino nas 27 capitais brasileiras, 2004*. <https://www.cebrid.com.br/wp-content/uploads/2004/04/V-Levantamento-Nacional-sobre-o-Consumo-de-Drogas-Psicotropicas-entre-Estudantes-do-Ensino-Fundamental-e-Medio-da-Rede-Publica-de-Ensino-nas-27-Capitais-Brasileiras-2004.pdf>
- Centro Brasileiro de Informações sobre Drogas Psicotrópicas, Universidade Federal de São Paulo, Brazil. (2010). *VI Levantamento Nacional Sobre o Consumo de Drogas Psicotrópicas Entre Estudantes do Ensino Fundamental e Médio da Rede Pública de Ensino nas 27 Capitais Brasileiras, 2010*. <https://www.cebrid.com.br/wp-content/uploads/2012/10/VI-Levantamento-Nacional-sobre-o-Consumo-de-Drogas-Psicotropicas-entre-Estudantes-do-Ensino-Fundamental-e-Medio-das-Redes-Publica-e-Privada-de-Ensino-nas-27-Capitais-Brasileiras.pdf>
- Chadi, N., Bagley, S. M., & Hadland, S. E. (2018). Addressing Adolescents' and Young Adults' Substance Use Disorders. *Medical Clinics of North America*, 102(4), 603-620.
- Costa, F. F., de Queiroz, J. P. Q., Souza, S. B., Silva-Oliveira, G. C., & Oliveira-Filho, A. B. (2020). Alcohol use among adolescents: prevalence, risk factors and prevention strategy in a rural area in the Brazilian state of Pará. *Research, Society and Development*, 9(11), e58291110351.
- Degenhardt, L., Charlson, F., Stanaway, J., Larney, S., Alexander, L. T., Hickman, M., Cowie, B., Hall, W. D., Strang, J., Whiteford, H., & Vos, T. (2016). Estimating the burden of disease attributable to injecting drug use as a risk factor for HIV, hepatitis C, and hepatitis B: findings from the Global Burden of Disease Study 2013. *Lancet Infectious Diseases*, 16(12), 1385-1398.
- Elicker, E., Palazzo, L. S., Aerts, D. R. G. C., Alves, G. G., & Câmara, S. (2015). Use of alcohol, tobacco and other drugs by adolescents students from Porto Velho-RO, Brazil. *Epidemiologia e Serviços de Saúde*, 24(3), 399-410.
- Epstein, M., Bailey, J. A., Furlong, M., Steeger, C. M., & Hill, K. G. (2020). An intergenerational investigation of the associations between parental marijuana use trajectories and child functioning. *Psychology of Addictive Behaviors*, 34(8), 830-838.
- Fundação Amazônia de Amparo a Estudos e Pesquisas do Pará, Governo do Estado do Pará, Brazil. (2015). *Diagnóstico socioeconômico e ambiental da região de integração do Marajó*. <http://www.fapespa.pa.gov.br/upload/Arquivo/anexo/434.pdf?id=1621510424>
- Ferreira, V. M., & Sousa Filho EA. (2007). Marijuana and family context: a psychosocial study among university students of Rio de Janeiro. *Psicologia e Sociedade*, 19(1), 52-60.
- Instituto de Comunicação e Informação Científica e Tecnológica em Saúde, Fundação Oswaldo Cruz, Brazil. (2017). *3rd National survey on drug use by the Brazilian population*. <https://www.arca.fiocruz.br/handle/icict/34614>
- Fiore, M. (2012). O lugar do Estado na questão das drogas: o paradigma proibicionista e as alternativas. *Novos Estudos CEBRAP*, 92, 9-21.
- Frade, P. C., Raiol, N. C., da Costa, L. M., Pinheiro, L. M., Silva-Oliveira, G. C., Pinho, J. R., Lemos, J. A., Martins, L. C., & Oliveira-Filho, A. B. (2019). Prevalence and genotyping of hepatitis B virus: a cross-sectional study conducted with female sex workers in the Marajó Archipelago, Brazil. *International Journal of STD & AIDS*, 30(9), 902-910.
- Furtado, I. M., Araujo, L. G., Almeida, J. M., Miranda, A. M. O., Ferreira, D. T., Oliveira, G. C. S., & Oliveira-Filho, A. B. (2017). Use of marijuana and cocaine among students in the municipality of Breves, Marajó Archipelago, Brazilian Amazon. *Journal of Drug Abuse*, 3(1), 1.

- Grupo de Estudo e Pesquisa Trabalho e Desenvolvimento na Amazônia, Universidade Federal do Pará, Brazil. (2012). *Relatório Analítico do Território do Marajó*. <http://sit.mda.gov.br/download/ra/ra129.pdf>
- Gobbi, G., Atkin, T., Zytynski, T., Wang, S., Askari, S., Boruff, J., Ware, M., Marmorstein, N., Cipriani, A., Dendukuri, N., & Mayo, N. (2019). Association of Cannabis Use in Adolescence and Risk of Depression, Anxiety, and Suicidality in Young Adulthood: A Systematic Review and Meta-analysis. *JAMA Psychiatry*, 76(4), 426-434.
- Instituto Brasileiro de Geografia e Estatística, Brazil. (2017). *Panorama: Soure*. <https://cidades.ibge.gov.br/brasil/pa/soure/panorama>
- Libuy, N., Ibáñez, C., & Mundt, A. P. (2020). Factors related to an increase of cannabis use among adolescents in Chile: National school based surveys between 2003 and 2017. *Addictive Behaviors Reports*, 11, 100260.
- Machado, L. V., Boarini, M. L. (2013). Drug policies in Brazil: the harm reduction strategy. *Psicologia: Ciência e Profissão*, 33(3), 580-595.
- Medronho, A. R., Carvalho, D. M., Bloch, K. V., Luiz, R. R., & Werneck, G. L. (2011). *Epidemiologia*. Atheneu.
- Organization of American States, Inter-American Drug Abuse Control Commission. (2015). *Report on drug use in the Americas, 2015*. https://www.oas.org/en/media_center/press_release.aspx?sCodigo=E-154/15
- Oliveira-Filho, A. B., Santos, F., Silva, F. Q., Raiol, N. C., Costa, C., Piauiense, J., Martins, L. C., Cardoso, Y., Di Miceli, J., Resque, R. L., Silva-Oliveira, G. C., Pinheiro, L., Machado, L., Pinho, J., Lemos, J., Kupek, E., & Fischer, B. (2019). Hepatitis C virus infection status and associated factors among a multi-site sample of people who used illicit drugs in the Amazon region. *BMC Infectious Diseases*, 19(1), 634.
- Oliveira-Filho, A. B., Silva, F. Q., Santos, F., Cardoso, Y., Di Miceli, J., Resque, R. L., Silva-Oliveira, G. C., Martins, L. C., Pinheiro, L., Machado, L., Pinto, A. R., Lemos, J., Fischer, B., & Kupek, E. (2020). Prevalence and risk factors for HIV-1 infection in people who use illicit drugs in northern Brazil. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 114(3), 213-221.
- Peacock, A., Leung, J., Larney, S., Colledge, S., Hickman, M., Rehm, J., Giovino, G. A., West, R., Hall, W., Griffiths, P., Ali, R., Gowing, L., Marsden, J., Ferrari, A. J., Grebely, J., Farrell, M., & Degenhardt, L. (2018). Global statistics on alcohol, tobacco, and illicit drug use: 2017 status report. *Addiction (Abingdon, England)*, 113(10), 1905-1926.
- Piauiense, J., Costa, C., Silva, R., Cardoso, Y., Di Miceli, J., Resque, R. L., Lemos, J., Fischer, B., Pinho, J., Kupek, E., Martins, L. C., & Oliveira-Filho, A. B. (2020). Hepatitis B virus infection among people who use illicit drugs: prevalence, genotypes, and risk factors in the State of Amapá, northern Brazil. *Substance Use & Misuse*, 55(10), 1633-1639.
- Schenker, M., Minayo, M. C. S. (2003). The family implication on the drug abusive use: a critical review. *Ciência & Saúde Coletiva*, 8(1), 299-306.
- Silins, E., Horwood, L. J., Patton, G. C., Fergusson, D. M., Olsson, C. A., Hutchinson, D. M., Spry, E., Toumbourou, J. W., Degenhardt, L., Swift, W., Coffey, C., Tait, R. J., Letcher, P., Copeland, J., Mattick, R. P., & Cannabis Cohorts Research Consortium (2014). Young adult sequelae of adolescent cannabis use: an integrative analysis. *Lancet Psychiatry*, 1(4), 286-293.
- Silva, M. C. P. (2016). The role of the school in preventive actions related to the use of alcohol and other drugs by Elementary School students. *SMAD Revista Eletrônica Saúde Mental Álcool e Drogas*, 12(1), 30-39.
- Soldera, M., Dalgalarondo, P., Corrêa Filho, H. R., & Silva, C. A. (2004). Use of psychotropic drugs among students: prevalence and associated social factors. *Revista de Saúde Pública*, 38(2), 277-283.
- Souza, M. R., Souza, C. R., Daher, C. M. S., Calais, L. B. (2015). Youth and drugs: an intervention from the perspective of Social Psychology. *Pesquisas e Práticas Psicossociais*, 10(1), 66-78.
- Superintendência do Desenvolvimento da Amazônia (SUDAM), Ministério do Desenvolvimento Regional, Brazil. (2007). *Plano de desenvolvimento territorial sustentável do arquipélago do Marajó*. http://bvsm.saude.gov.br/bvs/publicacoes/plano_desenv_arquipelago_marajo.pdf
- Tavares, B. F., Béria, J. U., & Lima, M. S. (2004). Factors associated with drug use among adolescent students in southern Brazil. *Revista de Saúde Pública*, 38(6), 787-796.
- Terzic Supic, Z., Santric Milicevic, M., Sbutega, I., & Vasic, V. (2013). The importance of family relations for cannabis users: the case of serbian adolescents. *Iranian Journal of Public Health*, 42(3), 249-260.
- Volkow, N. D., Compton, W. M., & Weiss, S. R. (2014). Adverse health effects of marijuana use. *New England Journal of Medicine*, 371(9), 879.
- Wang, J., Simons-Morton, B. G., Farhat, T., & Luk, J. W. (2009). Socio-demographic variability in adolescent substance use: mediation by parents and peers. *Prevention Science*, 10(4), 387-396.
- World Health Organization. (2020a). *Adolescent health and development*. <https://www.who.int/westernpacific/news/q-a-detail/adolescent-health-and-development>
- World Health Organization. (2020b). *Alcohol, Drugs and Addictive Behaviours Unit: Drugs (psychoactive)*. <https://www.who.int/teams/mental-health-and-substance-use/alcohol-drugs-and-addictive-behaviours/drugs-psychoactive/cannabis>
- United Nations Office on Drugs and Crime. (2018). *World Drug Report 2018*. https://www.unodc.org/wdr2018/prelaunch/WDR18_Booklet_4_YOUTH.pdf
- United Nations Office on Drugs and Crime. (2019). *World Drug Report 2019*. https://wdr.unodc.org/wdr2019/prelaunch/WDR19_Booklet_5_CANNABIS_HALLUCINOGENS.pdf