

# Alcohol and drug use among university students: gender differences

## Uso de álcool e drogas entre estudantes universitários: diferença entre os gêneros

Gabriela Arantes Wagner,<sup>1</sup> Vladimir de Andrade Stempliuk,<sup>2</sup>  
Monica L Zilberman,<sup>3</sup> Lúcia Pereira Barroso,<sup>4</sup>  
Arthur Guerra de Andrade<sup>1,5</sup>

### Abstract

**Objective:** This study compared the pattern of alcohol, legal and illegal drugs use among students of the Universidade de São Paulo (Brazil) in 1996 and 2001. **Method:** Samples of 2.564 (1996) and 2.837 (2001) students answered a questionnaire proposed by the World Health Organization, which characterizes the consumption of alcohol, legal and illegal drugs in lifetime, in the last 12 months and in the last 30 days. **Results:** Men showed a significant increase in lifetime use of tobacco (44.8% to 50.9%), marijuana (33.7% to 39.5%) and hallucinogens (6.6% to 14.1%) between 1996 and 2001. No significant change was observed among women between 1996 and 2001 in tranquilizer use. Concerning the consumption reported in the last 12 months, both genders displayed significant increases in the consumption of marijuana (22.3% to 27.1% for men and 12.9% to 16.9% for women), amphetamines (1.9% to 5.0% for men and 3.4% to 5.6% for women), and inhalants (9.8% to 15.7% for men and 5.4% to 10.6% for women). The greatest gender difference was observed in consumption reported in the last 30 days with significant increases in male use of tobacco (19.6% to 23.5%), marijuana (15.8% to 20.5%), amphetamines (1.1% to 3.2%), and inhalants (4.0% to 7.9%). Substance use reported in the last 30 days remained stable among women between the 2 surveys. **Conclusion:** Rates of substance use among university students increased. These gender differences in substance consumption should be taken into account in the development of preventive and treatment strategies for undergraduate university students.

**Descriptors:** Alcohol drinking; Illegal drugs; Gender identity; Schools; Period analyses

### Resumo

**Objetivo:** Este estudo comparou o padrão de consumo de álcool e de drogas lícitas e ilícitas entre estudantes da Universidade de São Paulo nos anos de 1996 e 2001. **Método:** Amostras de 2.564 (1996) e 2.837 (2001) estudantes responderam ao questionário proposto pela Organização Mundial de Saúde que caracteriza o consumo de drogas durante a vida, nos últimos 12 meses e nos últimos 30 dias. **Resultados:** Entre os homens, observou-se aumento significativo no uso durante a vida de tabaco (de 44,8% para 50,9%), maconha (de 33,7% para 39,5%) e alucinógenos (de 6,6% para 14,1%) entre os anos de 1996 e 2001. Não foi observada diferença significativa entre as mulheres no uso de tranquilizantes ao longo da vida entre 1996 e 2001. Para o consumo relatado nos últimos 12 meses, para ambos os gêneros observou-se aumento significativo no uso de maconha (de 22,3% para 27,1% entre os homens e de 12,9% para 16,9% entre as mulheres), anfetaminas (de 1,9% para 5,0% entre os homens e de 3,4% para 5,6% entre as mulheres) e inalantes (de 9,8% para 15,7% entre os homens e de 5,4% para 10,6% entre as mulheres). A maior diferença entre os gêneros foi observada no consumo relatado nos últimos 30 dias, com aumento significativo no consumo de tabaco entre os homens (de 19,6% para 23,5%), maconha (de 15,8% para 20,5%), anfetaminas (de 1,1% para 3,2%) e inalantes (de 4,0% para 7,9%). O uso de substâncias relatado nos últimos 30 dias permaneceu estável para as mulheres entre os dois levantamentos. **Conclusão:** Observou-se aumento no uso de diversas substâncias entre os estudantes universitários. As diferenças observadas entre os gêneros quanto ao uso de substâncias devem ser levadas em conta quando do desenvolvimento de estratégias preventivas e de tratamento para essa população.

**Descritores:** Consumo bebidas alcoólicas; Drogas ilícitas; Identidade de gênero; Instituições acadêmicas; Análise transversal

<sup>1</sup> Group of Interdisciplinary Studies on Alcohol, Drugs and Street Drugs, Medical School, Universidade de São Paulo (USP), São Paulo (SP), Brazil

<sup>2</sup> National Observatory of Information of Drugs, National Antidrug Secretary

<sup>3</sup> Psychiatry Institute, Clinical Hospital, Medical School, Universidade de São Paulo (USP), São Paulo (SP), Brazil

<sup>4</sup> Department of Statistics, Institute of Mathematics and Statistics, Universidade de São Paulo (USP), São Paulo (SP), Brazil

<sup>5</sup> Faculdade de Medicina do ABC (FMABC), Santo André (SP), Brazil

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### Correspondence

Gabriela Arantes Wagner  
Rua Juscelino Barbosa, 1188 / 102  
Alfenas, MG, Brazil  
Phone/fax: (55 35) 3292-2476  
E-mail: gabriela.wagner@gmail.com

## Introduction

Academic students are an at-risk population for substance-related problems.<sup>1</sup> The consumption of alcohol, legal and illegal drugs in the university population is growing<sup>1-2</sup> and became a source of worry in many countries. The passage from high school to college is commonly marked by an increment in frequency of opportunities for peer interaction and in importance of the role of peer norms.<sup>2</sup> Direct (or active) peer influences explicitly focus on getting a person to drink. Also, peers, through their own actions, may provide information about which behaviors are accepted and admired, which is considered appropriate in a given social context, and therefore what behaviors are likely to lead to social acceptance and reinforcement. Each of these indirect influences set the stage for anticipated social reinforcement.<sup>3</sup> Lewis et al. demonstrated that men overestimated the drinking of their male peers and that women overestimated the drinking of their female peers. This finding was important for two reasons.<sup>4</sup> First, it demonstrated that normative perceptions are not confounded by gender differences in drinking. Second, it provides empirical evidence supporting the use of gender-specific normative references for prevention interventions based on social norms.<sup>4</sup> Reasons for the gender differences in the abuse of legal and illegal drugs are due to many factors. Women frequently report legal and illegal drug use as a coping mechanism to deal with problems,<sup>5</sup> whereas men display more positive attitudes towards illicit drug use.<sup>6</sup> For example, the nature of the relationship between the individual and his/her social environment may be particularly relevant to the phenomenon of college drinking, as the college years are typically a time of increased alcohol consumption as well as increased social interaction.<sup>7</sup>

A critical step in prevention and treatment programming is the detection of trends of use throughout time, allowing one to choose which future actions should be taken.

This subject is particularly important when the target population is students, given the possible quick change of habits and the adoption of new behaviors that this group usually displays.

The identification of gender differences may provide useful information for the development of educational interventions to reduce substance use.<sup>8</sup> In recent decades specialized literature emphasized the importance of studying gender differences regarding legal and illegal drugs consumption, in order to allow more efficacious preventive strategies and treatment for men and women.<sup>7,9</sup>

It is possible that these differences reflect the distinct sociocultural roles for each gender. In addition, the clinical literature suggests that women differ from men in their subjective and physiological responses during the consumption of certain drugs. Pre-clinical studies suggest a role of the sexual hormones in these gender differences in substance use.<sup>10</sup>

Epidemiological studies show that drug use among women and their vulnerability to the consumption of specific substances have been associated with severe individual and social consequences. Transversal epidemiological data are especially useful in order to establish prevalence and to identify risk factors for specific illnesses or behaviors. The pattern of drug use and its associated factors can be identified by means of this method, which, if repeated periodically, may provide data about how the variables investigated behave throughout time, and is able to identify trends.<sup>10</sup>

Several epidemiological studies about substance use have focused on gender differences.<sup>10-14</sup> The first household survey about substance use in Brazil showed that the age range in

which the largest percentages of alcohol dependence occur is 18-24 years, with approximately 3 men to each woman. However in the range of 12-17 years, the gender ratio is very similar. This study indicated that Brazilian women consume more benzodiazepines, stimulants, orexigens, codeine, and barbiturates than men.<sup>11</sup> Further, it was estimated that 6.6% of the population is alcohol dependent. Two years later, the same population was surveyed again and the prevalence of alcohol dependence significantly increased to 11.2% (17.1% for males and 5.7% for females). The percentage of people who had already received treatment for alcohol use reached 4.0% of the total (5.6% for males and 2.5% for females).<sup>12</sup>

Another study involving high-school students (12-17 years) from 1987 to 1997 showed that although males used more drugs than females, the gender comparison showed a significant increase in the consumption of drugs among women.<sup>13</sup> Among university students of the Universidade de São Paulo (USP) significant differences are found in the consumption of legal and illegal substances between genders. Among students of the Universidade Estadual de São Paulo (UNESP), the prevalence of drug use is higher among men for all drugs, except for analgesics and amphetamines, which are more consumed by women.<sup>14</sup>

The objectives of this study were to compare the attitudes and the patterns of use of alcohol and other drugs between male and female undergraduate students of USP in the years 1996 and 2001.

## Method

The project was submitted to the Ethics Commission of the Psychiatry Department of the Universidade de São Paulo Medical School (protocol n. 371/00) and its accomplishment was approved. The participation of the students in the project was voluntary and was granted after clarifying the objectives. The students who agreed to participate in the project signed a term of post-information consent agreement. Students' names were not disclosed as to maintain the information anonymous and ensure the free expression of their opinions.

### 1. Sampling

The sampling plan followed that described by Andrade et al.<sup>15</sup> and Stempliuik et al.<sup>16</sup> The study population was composed of the students enrolled in 1996 and 2001 in any of the graduation courses of the Universidade de São Paulo, Campus of São Paulo. According to Cochran<sup>17</sup> and Duncan and Kalton,<sup>18</sup> we considered independent samples for the two moments, as a panel would not take into consideration changes in the population.<sup>17-19</sup> According to the yearly statistics of USP,<sup>20</sup> there were 29,305 students in 1996 and 32,894 students in 2001.<sup>21</sup> The objective was to estimate the proportions of students who used drugs at three moments: during lifetime, in the last 12 months and in the last 30 days.

The sample used was stratified by area (Human, Exact and Biological Sciences), equally shared, the sampling fraction consisting of:

$$f_h = n_h / N_h$$

Where:  $n_h$  is the number of students sampled in the area  $h$   
 $N_h$  is the number of students enrolled in the area  $h$

The students were selected by systematic raffling, performed by the data processing sector of the Pro-Rectorship of USP. By means of correspondence, the information was transmitted about how the raffling should be executed and the list of students raffled was issued.

## 2. Sample size

In order to determine the number of students to be interviewed in each area it was established that the absolute difference (sampling error) between a particular proportion obtained by the sample and its value in the population should not exceed 0.05 with 95% confidence interval. For the initial study executed in 1996,<sup>15</sup> the size of the sample was calculated using the hypothesis that the proportion of users was 50%, whereas for the study in 2001<sup>16</sup> it was estimated that this proportion was 40%, based on the percentage of lifetime use of illegal drugs obtained in the study of 1996.

This value (369) was then divided by 0.37 to allow for estimates according to gender, period (day or night) and area of study (Exact, Biological or Human Sciences). In order to compensate for possible losses, another 20% students were included. Taking into account the three areas, the total number of students who were included was 3,204 in the 1996 study<sup>15</sup> and 3,590 in the 2001 study.<sup>16</sup>

## 3. Data collection

The instrument used to ascertain the drug use in the last 12 months, last month and lifetime, was an anonymous self-report questionnaire, containing 74 multiple-choice questions about socio-economic issues: student profile, family environment, university course, academic life, group of friends, leisure activities, personal use of drugs and attitudes related to drugs.

The students answered an anonymous questionnaire asking about alcohol, tobacco, marijuana, hallucinogens, cocaine, crack, amphetamines, anticholinergics, tranquilizers, opiates, sedatives, anabolizants and inhalants during lifetime, in the last 12 months and in the last 30 days. To answer questions about drug use, students should indicate if they had any lifetime use or any use in the last 12 months. Only students who had used drugs in the last thirty days responded questions about frequency of use. Questionnaires used in both studies were the same,<sup>15-16</sup> except for the inclusion of ecstasy among the drugs investigated in the 2001 study.<sup>16</sup> Confidentiality was assured and complete anonymity was preferred to improve the validity of the responses.<sup>19</sup>

The questionnaires were applied on three occasions between April and October of 1996 for the first study and between December of 2000 and October of 2001 for the second study.<sup>15-16</sup>

Undergraduate students of USP were recruited and trained to apply the questionnaires. In order to standardize the approach type and the information given by the researchers to the subjects, 2 training sessions were performed, each one lasting for 2 hours. The training included answering the questionnaire and discussing queries related to the objectives of the study, the wording of the questions, the sampling method and suggestions. Thus an explanation was given about how to present and explain the study and about the post-information consent form. Finally common application situations were practically rehearsed, removing any remaining doubts.

To apply the questionnaire, the sample list was reorganized by the 21 trained students from the University and it was obtained the schedule of classes on which the students were registered.

Research assistants went to the classes and invited the students selected to participate in the survey following a standard procedure. First, they explained the research goals, next they assured the confidentiality of the

information and ask the students to read and sign the Free Informed Consent Term. Finally, those who agreed to participate received a questionnaire to be put in a sealed box by themselves.

There were a total of 2,506 valid questionnaires (78.2% response rate) in the first study and 2,837 valid questionnaires (79.1% response rate) in the second study. Of the 3,204 (100%) collected in the 1996 study, 58 (1.8%) were excluded for replying affirmatively to a question involving false drugs. Of the 2,865 (100%) collected in the 2001 study, 28 (0.98%) were excluded for the same reason.

## 4. Data analysis

Results obtained in 1996 and 2001 were compared using Wald's test of equivalence<sup>22</sup> between the prevalence of each substance investigated.<sup>15</sup> The total of students per area and the total of students of USP were taken into account. Table 1 exhibits drugs which showed a statistically significant increase in the lifetime prevalence.

The estimator of prevalence in each area ( $h=1,2,3$ ) is  $\hat{p}_h = \frac{\sum_{i=1}^{n_h} Y_{hi}}{n_h}$

$y_{hi} = 1$  if the  $i$ -th student of the area has used the drug being studied, and zero if not.

$n_h$  = number of students of the area  $h$  who answered the questionnaire about the drug being studied.

Estimator of the variance

$$\text{Var}(\hat{p}_h) = \frac{(N_h - n_h)\hat{p}_h(1 - \hat{p}_h)}{N_h(n_h - 1)}$$

for  $h = 1,2,3$

"P-values" were determined for each one of the substances for each gender during lifetime, the last 12 months and the last 30 days.

The comparisons according to gender were made by building confidence intervals for the prevalence differences in the two categories (Male and Female).

For the gender comparison, the estimator of each area related to the period is:

$$\hat{p}_{hf} = \frac{\sum_{i=1}^{n_{hf}} y_i}{n_{hf}} \quad (\text{analog for the male student } \hat{p}_{hm})$$

**Table 1 - Drugs which showed a statistically significant increase in lifetime prevalence of use among students of the Universidade de São Paulo, Brazil, between 1996 and 2001**

	1996 (%)	2001 (%)	Difference (%)	P-value
Alcohol	88.6	92.0	3.4	0.006 ↑
Tobacco	42.9	50.6	7.7	< 0.001↑
Marijuana	31.1	35.4	4.2	0.001↑
Hallucinogens	6.2	11.5	5.3	< 0.001↑
Amphetamines	4.9	9.1	4.2	< 0.001↑
Anti-cholinergics	1.1	2.9	1.8	< 0.001↑
Sedatives	1.0	1.7	0.7	0.021 ↑
Inhalants	18.0	24.6	6.6	< 0.001↑
Illegal	39.4	45.1	5.7	< 0.001↑

↑ = significant (Wald's Test)

The estimator of each gender is:

$$\hat{p}_f = \frac{\sum_{h=1}^3 N_{hf} \hat{p}_{hf}}{N_f}$$

(analog for male student  $\hat{p}_m$ )

The variance of the estimator of the prevalence in each gender was approximated by:

$$\text{Var}(\hat{p}_f) = \sum_{h=1}^3 \left\{ \frac{N_{hf}}{N_f} \right\}^2 \text{Var}(\hat{p}_{hf}) \quad \text{for } h = 1, 2, 3$$

$$\text{Var}(\hat{p}_{hf}) = \frac{(N_{hf} - n_{hf}) \hat{p}_{hf} (1 - \hat{p}_{hf})}{N_{hf} (n_{hf} - 1)}$$

(analog for  $\text{Var}(\hat{p}_m)$ )

In order to make the comparison between the prevalence

$$\text{Var}(\hat{p}_h) = \frac{(N_h - n_h) \hat{p}_h (1 - \hat{p}_h)}{N_h (n_h - 1)}$$

for  $\alpha = 5\%$

If the prevalence in the Female and Male students is equal, the zero is expected to be contained in the interval.

## Results

Concerning socio-economic profiles, in 1996, 42.3% of the sample did not receive any income, whereas in 2001, this was true for 58.7%. In 1996, 14.9% of subjects reported family income below 10 minimum wages and 25.3% above 40 minimum wages, whereas in 2001, 20.5% reported family income below 10 minimum wages and 18.0% above 40 minimum wages.<sup>16</sup>

The samples were divided into 4 segments related to the number of minimum wages (MW) i.e.: up to 1.0 MW (15% in 1996 and 20% in 2001), from 1.1 through 2.0 MW (24% in 1996 and 25% in 2001), from 2.1 through 3.0 MW (20% in 1996 and 24% in 2001) and more than 4.0 MW (25% in 1996 and 17% in 2001).<sup>15-16</sup> No significant differences were found between groups (1996 and 2001).

The socio-economic profiles of students surveyed in 1996 and 2001 shows that the two samples were similar regarding gender frequencies. In 1996, 43.0% of the sample were women and 57.0% were men. In 2001, 42.2% were women and 57.8% were men.<sup>16</sup>

In 1996, 60.1% of the students interviewed were in the 20-24 age group, whereas, in 2001, this rate was 67.8% ( $p < 0.05$ ).

Regarding marital status 7.8% were married in 1996 and 6.0% were married in 2001.

### 1. Men

From 1996 to 2001, there was a significant increase in the **lifetime use** of the following substances: tobacco, marijuana, hallucinogens, amphetamines, anticholinergics, tranquilizers, inhalants, and illegal drugs in general by undergraduate male students.

There was also a significant increase in the use in the **last 12 months** for tobacco, marijuana, hallucinogens, amphetamines, and inhalants. Use in the **last 30 days** increased significantly for tobacco, marijuana, amphetamines, inhalants, and illegal drugs in general.

### 2. Women

From 1996 to 2001, there was a significant increase in the **lifetime use** of the following substances: tobacco, marijuana, hallucinogens, amphetamines, anticholinergics, inhalants, and illegal drugs in general by undergraduate female students. There was also a significant increase in the use in the **last 12 months** for marijuana, amphetamines, anticholinergics, and inhalants. Use in the **last 30 days** was stable for all drugs investigated.

### 3. Gender differences (Table 2)

For both genders, there was an increase in the **lifetime use** of the following drugs: tobacco, marijuana, hallucinogens, amphetamines, anticholinergics, inhalants, and illegal drugs in general. In the case of lifetime use of tranquilizers, men showed a significant increase from 1996 to 2001, whereas it remained stable for women.

Focusing the use during the **last 12 months**, women differed from men in the consumption of tobacco, hallucinogens, and anticholinergics. Tobacco and hallucinogens use significantly increased among men, whereas for women the consumption of these drugs remained stable. Inversely, women showed an increase in anticholinergic use, whereas men remained stable from 1996 to 2001.

Use in the **last 30 days** showed the greatest differences between genders. Use of tobacco, marijuana, amphetamines, inhalants, and illegal drugs in general increased among men, while remaining stable among women.

## Discussion

Lifetime use of any substance indicates first episodes of use, infrequent or not persistent use. In this study, we found that while men experimented more alcohol, inhalants, anabolizers, crack, and cocaine than women did, both genders experimented equally tobacco, marijuana, hallucinogens, amphetamines, anticholinergics, and illegal drugs in general. Moreover, women consume amphetamines and tranquilizers, i.e. prescribed medications, more than men do. This gender difference in the use of licit drugs has been noted in epidemiological studies in different countries.<sup>11-14,23-27</sup> Culturally the use of amphetamines and tranquilizers is more attractive to women than to men. Data from our study corroborate those obtained by Galduroz et al., which indicate that Brazilian women consume more medications such as benzodiazepines, stimulants, anorexigens, codeine, opiates, and barbiturates than men do.<sup>12</sup> Likewise, among university students of UNESP, Kerr-Correa et al. found higher prevalences among women of analgesics and amphetamines use.<sup>14</sup> Kauffman et al. studied the different attitudes towards drug use and abuse of women and men. They emphasized that the social stigma related to women can be an important factor as to why they prefer to use more "socially accepted" substances such as psychoactive prescribed medications.<sup>5</sup> Amphetamine use is disproportionately more common in women as opposed to men as a way to control body weight, reflecting the social pressure towards women to maintain a thin body.<sup>28</sup>

According to Simoni-Wastila, women have a different way of dealing with and expressing anxiety and stress, of seeking medical treatment and of perceiving their illnesses.<sup>29</sup> Women more frequently report mental and physical disturbances and tend to use more medications in general than men do. At the same time doctors tend to treat women differently than they



Table 2 - Prevalence of alcohol and drug use among male and female students of University of Sao Paulo in 1996 and 2001

Drug	Time	1996		2001		p-values	
		Men	Women	Men	Women	Men	Women
Alcohol	Lifetime	93.7 (92.0; 95.3)	87.9 (85.1; 90.6)	93.5 (92.3; 94.8)	89.6 (87.6; 91.7)	n.s	n.s
	12 months	83.9 (81.4; 86.4)	75.5 (72.0; 79.0)	82.7 (80.8; 84.6)	75.4 (72.5; 78.2)	n.s	n.s
	30 days	76.2 (73.3; 79.1)	66.8 (63.0; 70.6)	74.5 (72.3; 76.7)	62.8 (59.6; 65.9)	n.s	n.s
Tobacco	Lifetime	44.8 (41.4; 48.2)	41.6 (37.6; 45.6)	50.9 (48.4; 53.5)	50.1 (46.9; 53.3)	0.005 ↑	0.001 ↑
	12 months	23.6 (20.7; 26.5)	23.1 (19.8; 26.5)	27.7 (25.3; 30.0)	24.2 (21.5; 27.0)	0.034 ↑	n.s
	30 days	19.6 (16.9; 22.4)	19.3 (16.2; 22.4)	23.5 (21.2; 25.7)	21.3 (18.5; 24.0)	0.035 ↑	n.s
Marijuana	Lifetime	33.7(30.4;37.0)	22.3 (19.0; 25.6)	39.5 (37.0; 42.0)	29.5 (26.6; 32.5)	0.005 ↑	0.001 ↑
	12 months	22.3 (19.4; 25.2)	12.9 (10.3; 15.6)	27.1 (24.8; 29.4)	16.9 (14.5; 19.3)	0.011 ↑	0.030 ↑
	30 days	15.8 (13.3; 18.3)	10.1 (7.7; 12.5)	20.5 (18.4; 22.7)	11.9 (9.7; 14.0)	0.006 ↑	n.s
Hallucinogens	Lifetime	6.6 (4.8; 8.3)	4.9 (3.1; 6.7)	14.1 (12.3; 16.0)	7.7 (6.0; 9.5)	< 0.001 ↑	0.027 ↑
	12 months	4.0 (2.5; 5.5)	2.5 (1.2; 3.7)	6.5 (5.2; 7.8)	2.9 (1.9; 4.0)	0.015 ↑	n.s
	30 days	2.1 (1.1; 3.2)	0.8 (0.1; 1.4)	3.5 (2.5; 4.5)	1.2 (0.5; 1.9)	n.s	n.s
Cocaine	Lifetime	7.4 (5.5; 9.2)	4.7 (3.0; 6.5)	8.0 (6.6; 9.5)	4.3 (3.0; 5.6)	n.s	n.s
	12 months	3.8 (2.5; 5.1)	2.1 (0.9; 3.2)	3.5 (2.5; 4.5)	1.8 (0.9; 2.7)	n.s	n.s
	30 days	2.4 (1.4; 3.5)	1.3 (0.4; 2.2)	1.9 (1.1; 2.6)	0.9 (0.2; 1.5)	n.s	n.s
Crack	Lifetime	0.8 (0.2; 1.4)	0.4 (0.0; 0.9)	1.4 (0.8; 2.1)	0.3 (0.0; 0.7)	n.s	n.s
	12 months	0.4 (0.0; 0.9)	0.8 (0.0; 1.6)	0.2 (0.0; 0.5)	0.0 (0.0; 0.0)	n.s	n.s
	30 days	0.3 (0.0; 0.7)	0.3 (0.0; 0.7)	0.1 (0.0; 0.2)	0.0 (0.0; 0.0)	n.s	n.s
Amphetamines	Lifetime	2.8 (1.6; 4.0)	5.7 (3.8; 7.6)	8.4 (6.9; 9.8)	10.0 (8.1; 11.9)	< 0.001 ↑	0.002 ↑
	12 months	1.9 (0.9; 3.0)	3.4 (2.0; 4.8)	5.0 (3.8; 6.2)	5.6 (4.2; 7.1)	< 0.001 ↑	0.031 ↑
	30 days	1.1 (0.3; 1.9)	2.8 (1.5; 4.2)	3.2 (2.3; 4.2)	3.6 (2.5; 4.8)	< 0.001 ↑	n.s
Anticholinergics	Lifetime	0.9 (0.2; 1.6)	0.9 (0.1; 1.6)	3.3 (2.3; 4.3)	2.4 (1.4; 3.4)	< 0.001 ↑	0.015 ↑
	12 months	0.3 (0.0; 0.7)	0.2 (0.0; 0.4)	0.8 (0.3; 1.3)	0.8 (0.2; 1.5)	n.s	0.050 ↑
	30 days	0.4 (0.0; 1.0)	0.4 (0.0; 0.9)	0.4 (0.0; 0.8)	0.3 (0.0; 0.7)	n.s	n.s
Tranquilizers	Lifetime	3.1 (2.0; 4.3)	6.9 (4.8; 9.1)	6.5 (5.2; 7.9)	8.0 (6.2; 9.8)	< 0.001 ↑	n.s
	12 months	2.0 (1.0; 2.9)	3.3 (1.8; 4.8)	2.8 (1.9; 3.8)	5.1 (3.6; 6.5)	n.s	n.s
	30 days	1.3 (0.5; 2.1)	3.2 (1.7; 4.7)	1.7 (1.0; 2.4)	3.4 (2.2; 4.6)	n.s	n.s
Opiates	Lifetime	1.1 (0.3; 1.9)	0.4 (0.0; 0.9)	1.5 (0.9; 2.2)	0.9 (0.3; 1.4)	n.s	n.s
	12 months	0.6 (0.0; 1.1)	0.6 (0.0; 1.2)	0.6 (0.2; 1.0)	0.4 (0.0; 0.9)	n.s	n.s
	30 days	0.3 (0.0; 0.7)	0.6 (0.0; 1.2)	0.4 (0.0; 0.7)	0.3 (0.0; 0.6)	n.s	n.s
Sedatives	Lifetime	1.0 (0.3; 1.7)	0.7 (0.0; 1.4)	1.6 (1.0; 2.3)	1.8 (0.9; 2.8)	n.s	n.s
	12 months	0.4 (0.0; 0.8)	0.6 (0.0; 1.2)	0.6 (0.2; 1.1)	0.9 (0.2; 1.6)	n.s	n.s
	30 days	0.4 (0.0; 0.9)	0.5 (0.0; 1.2)	0.4 (0.0; 0.8)	0.7 (0.1; 1.4)	n.s	n.s
Anabolizants	Lifetime	0.5 (0.1; 1.0)	0.1 (0.0; 0.3)	0.6 (0.2; 1.0)	0.0 (0.0; 0.1)	n.s	n.s
	12 months	0.2 (0.0; 0.3)	0.3 (0.0; 0.7)	0.5 (0.1; 0.9)	0.1 (0.0; 0.2)	n.s	n.s
	30 days	0.3 (0.0; 0.7)	0.3 (0.0; 0.7)	0.2 (0.0; 0.4)	0.0 (0.0; 0.0)	n.s	n.s
Inhalants	Lifetime	19.7 (16.9; 22.4)	12.8 (10.1; 15.5)	28.8 (26.5; 31.2)	18.8 (16.3; 21.2)	< 0.001 ↑	0.001 ↑
	12 months	9.8 (7.8; 11.9)	5.4 (3.7; 7.1)	15.7 (13.8; 17.6)	10.6 (8.6; 12.5)	< 0.001 ↑	< 0.001 ↑
	30 days	4.0 (2.8; 5.3)	2.9 (1.7; 4.2)	7.9 (6.5; 9.3)	4.7 (3.4; 6.0)	< 0.001 ↑	n.s
Any illegal drug	Lifetime	42.9 (40.1; 45.8)	34.5 (31.2; 37.9)	47.9 (45.3; 50.5)	41.3 (38.1; 44.5)	0.012 ↑	0.004 ↑
	12 months	31.1 (28.4; 33.9)	23.7 (20.6; 26.7)	34.2 (31.7; 36.7)	27.1 (24.2; 30.0)	n.s	n.s
	30 days	19.1 (16.5; 21.7)	14.8 (12.1; 17.6)	24.9 (22.5; 27.2)	17.5 (15.0; 20.0)	0.001 ↑	n.s

n.s. = not significant; ↑ = significant increase (Wald's Test)

treat men. These factors seem to contribute to facilitate the prescription of some medications for women and are partly responsible for the higher exposition of women to the initiation and maintenance of substance use (particularly benzodiazepines and amphetamines).

In our sample we did not observe significant changes in the pattern of alcohol consumption across genders from 1996 to 2001. The male-to-female ratios of lifetime prevalence of alcohol consumption among subjects were alarmingly close to 1:1. The same is observed regarding alcohol use in the last 12 months and in the last 30 days. These results further confirm the closing of the previously observed gender gap in drinking

patterns reported in the international literature. This is cause for concern as, even with smaller quantities of alcohol consumed, the drinking-related morbidity and mortality are more severe for women as compared to their male counterparts, a phenomenon called "telescoping effect"<sup>5,26-27,29-32</sup>

Murphy et al. observed that drinking among male college students was particularly related to alcohol's facilitating role in social interaction. No such relation was found among women. Furthermore, for female college students, drinking was associated with diminished life satisfaction.<sup>33</sup>

Feminine traits (nurturance and warmth) are associated with lower use and fewer alcohol problems. Undesirable masculine

traits (aggressiveness and overcontrol) are associated with heavy and problematic alcohol use. Socially desirable masculine traits (instrumentality) are associated with fewer drinking problems. Patterns are generally the same for males and females.<sup>34</sup>

Marlatt et al. underscore the need for prevention programs that address the proximal adverse consequences of high-risk drinking rather than absolute rates of drinking as they are both more appealing and more effective for college students.<sup>35</sup> This is particularly relevant for women because alcohol-related consequences tend to appear sooner among them in comparison to men.

Use during the last 12 months is related to the recreational use. In our study, a significant increase in tobacco and hallucinogens use in the last 12 months was observed from 1996 to 2001 among men, whereas for women, the consumption of these drugs remained stable in the same period. Regarding anticholinergics use, women showed a small increase, whereas men remained stable in the same period. These data are in line with studies among Brazilian students<sup>11,13,23-24</sup> and the data presented by Kerr-Correa et al. in their study about the use of drugs among medical students at UNESP.<sup>14</sup>

Substance use during the last 30 days represents more frequent use and most gender differences appeared in analyses of this period. These differences were particularly due to increase in substance consumption among men.

It is worth pointing out that for both genders the consumption of opiates remained stable during the ten years evaluated.

In sum, we observed in this study that female undergraduates continue to consume licit substances, such as amphetamines and tranquilizers more than men. Frequent use (last 30 days) increased among men for both legal and illegal substances. These results should be taken into account in the development of preventive and treatment strategies for undergraduate university students.

#### Limitations of the study

It was not possible to search for the students absent from the lecture rooms on the days that the questionnaires were applied. As a result, nothing can be stated about the absent students. One possible hypothesis concerning this lack of information is that if these students had answered the questionnaire, the prevalences could be greater than the ones found, as the absence in the lectures could be related to a more frequent use of drugs. Another limitation is the absence of neurobiological variables which may influence a different drug use pattern between men and women as we focused on epidemiological variables in this study.

Besides this, the data were collected at different times of the year in the two studies, (1996-2001); for example, in 2001 the collection was executed during the period of festive celebrations such as Christmas, the New Year and Carnival, which did not occur in the group of 1996.

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