Co-occurrence of alcohol, tobacco and illicit drug use among university students in Brazil

Uso concomitante de álcool, tabaco e drogas ilícitas entre estudantes universitários no Brasil

Uso concurrente de alcohol, tabaco y drogas ilícitas entre estudiantes universitarios de Brasil

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ABSTRACT

Objective: To estimate the prevalence of co-occurrence of alcohol, tobacco, and illicit drug use among students at a public university in a municipality in Southern Brazil, and to evaluate the factors associated with this practice. **Methods:** Cross-sectional study conducted with undergraduate students between November 2017 and July 2018, to whom a digital self-administered questionnaire was applied. The relationship between the dependent variables co-occurrence of alcohol, tobacco, and illicit drug use and co-occurrence of alcohol and illicit drug use was analyzed using binary logistic regression with a 95% confidence interval. **Results:** Of the 1,824 university students, 92.0% consumed alcohol in their lifetime, 11.0% smoked, 43.9% used at least one illicit drug in their lifetime, and 23.3% used at least one illicit drug in the last 30 days. The rate of co-occurrence of alcohol, tobacco, and illicit drug use was 5.2%, and it was associated with belonging to the highest economic class (p=0.0003), experimenting with drugs before the age of 18 (p=0.0013), and attending an exact sciences or land/agricultural sciences program (p=0.0386). The prevalence of co-occurrence of alcohol and illicit drug use was 13.6%, and it was associated with belonging to the highest economic class (p=0.0000), male gender (p=0.0323), depression (p=0.0001), experimentation with alcohol before the age of 18 (p=0.0000), attending a linguistics or arts and literature program (p=0.0314) and living alone/with friends (p=0.0000). **Conclusion:** The co-occurrence of alcohol and drug use was higher than the co-occurrence of use of the three substances, and factors such as experimenting with drugs before the age of 18 and being of higher economic status were associated with these patterns.

Descriptors: Alcohol Drinking; Smoking; Illicit Drugs; Substance-Related Disorders.

RESUMO

Objetivo: Estimar a prevalência do uso concomitante de álcool, tabaco e drogas ilícitas entre estudantes de uma universidade pública de um município do Sul do Brasil, bem como avaliar os fatores associados a essa prática. Métodos: Estudo transversal realizado com estudantes de graduação entre novembro de 2017 e julho de 2018, aos quais se aplicou questionário digital autopreenchido. A relação entre as variáveis dependentes uso concomitante de álcool, tabaco e drogas ilícitas e uso concomitante de álcool e drogas ilícitas foi analisada por meio de regressão logística binária com intervalo de confiança de 95%. Resultados: Dos 1.824 universitários, 92,0% consumiram álcool na vida, 11,0% fumavam, 43,9% utilizaram pelo menos uma droga na vida e 23,3%, pelo menos uma nos últimos 30 dias. O consumo concomitante de álcool, tabaco e drogas foi de 5,2%, associado à classe econômica mais alta (p=0,0003), experimentação de drogas antes dos 18 anos (p=0,0013) e frequentar cursos das áreas de exatas e terra/agrárias (p=0,0386). A prevalência do uso concomitante de álcool e drogas foi 13,6%, associado à classe econômica mais alta (p=0,0000), sexo masculino (p=0,0323), depressão (p=0,0001), experimentação de álcool antes

dos 18 anos (p=0,0000), frequentar cursos de linguística, letras e artes (p=0,0314) e morar sozinho/com amigos (p=0,0000). **Conclusão:** *O consumo concomitante de álcool e drogas foi superior ao consumo concomitante das três substâncias; e fatores como experimentar drogas antes dos 18 anos de idade e ser de classe econômica mais alta estiveram associados.*

Descritores: *Consumo de Bebidas Alcoólicas; Fumar; Drogas Ilícitas; Transtornos Relacionados ao Uso de Substâncias.*

RESUMEN

Objetivo: *Estimar la prevalencia del uso concurrente de alcohol, tabaco y drogas ilícitas entre los estudiantes de una universidad pública de un municipio del Sur de Brasil así como evaluar los factores asociados con esa práctica.* **Métodos:** *Estudio transversal realizado con estudiantes de grado entre noviembre de 2017 y julio de 2018 a los cuales se les ha dado un cuestionario digital auto aplicado. La relación entre las variables dependientes uso concurrente de alcohol, tabaco y drogas ilícitas y uso concurrente de alcohol y drogas ilícitas ha sido analizada por la regresión logística binaria con intervalo de confianza del 95%.* **Resultados:** *De los 1.824 universitarios, el 92,0% ha consumido alcohol en la vida, el 11,0% fumaban, el 43,9% ha utilizado por lo menos una droga en la vida y el 23,3% por lo menos una en los últimos 30 días. El consumo concurrente de alcohol, tabaco y drogas ha sido del 5,2% y se ha asociado con la clase económica más alta (p=0,0003), la experiencia con la droga antes de los 18 años de edad (p=0,0013) y asistir a cursos de ciencias exactas y tierra/ciencias agrarias (p=0,0386). La prevalencia del uso concurrente de alcohol y drogas ha sido del 13,6% asociado con la clase económica más alta (p=0,0000), el género masculino (p=0,0323), la depresión (p=0,0001), la experiencia del alcohol antes de los 18 años de edad, asistir al curso de lingüística, letras y artes (p=0,0314) y vivir solo/con los amigos (p=0,0000).* **Conclusión:** *El consumo concurrente de alcohol y drogas ha sido más alto que el consumo concurrente de las tres sustancias; y factores como la experiencia con drogas antes de los 18 años de edad y ser de la clase económica más alta se han asociado.*

Descriptores: *Consumo de Bebidas Alcohólicas; Fumar; Drogas Ilícitas; Trastornos Relacionados con Sustancias.*

INTRODUCTION

Substance use – including consumption of alcohol, tobacco, and illicit drugs – is an important contributor to the global burden of disease[1]. Its impact on morbidity and mortality has extended beyond consequences for the user's health to affect society as a whole, thus generating a broad set of social costs, with implications ranging from health problems and premature death to social and economic decline[2].

The University environment is an important setting for personal and professional development[3], providing a great opportunity to belong to a large group of peers without family supervision[4]. However, this environment is related to risk factors that can lead to behaviors that jeopardize health, including drug use[5]. The assertion that adolescents and young adults, especially university students, are more vulnerable to the use of legal and illegal psychoactive substances is supported by evidence[6]. The growing concern with this group underlines the fact that this age range is considered a key transition period, during which identity is at its formative stage – with marked mood fluctuations, thereby causing heightened sensitivity to both experimental and recreational substance use[7].

Many studies in university populations have estimated the prevalence of substance use and associated factors[5,8,9]; however, the great heterogeneity in terms of methodology, populations and substances studied hinder comparability. According to 2009 data from the First Nationwide Survey on the Use of Alcohol, Tobacco, and Other Drugs among University Students in 27 Brazilian capitals, 86.2% of college students have consumed alcohol at least once in their lives, 72.0% did in the last 12 months, and 60.5% did in the last 30 days. As for tobacco, prevalence rates were 46.7%, 27.8%, and 21.6% for lifetime use, last 12 months, and last 30 days, respectively. With regard to illicit drugs, these rates were 48.7%, 35.8% and 25.9% for lifetime, 12-month, and 30-day use[10].

Although the isolated use of these substances has serious health consequences, simultaneous consumption of alcohol and one or more psychoactive substances increases the potential for additive or interactive psychopharmacological effects[11]. Concurrent use is associated with more damaging consequences, including adverse physical, social and behavioral outcomes, than isolated use of any substance[12,13]. It may also cause abnormal brain function, such as decreased cognitive and psychomotor performance, and significant changes in brain structures[13]. From a social, psychological and health standpoint, the combined use can increase the occurrence of relationship problems, aggressiveness and risky sexual behavior[14].

There is still a dearth of published research on the interrelationship or concurrence of substance consumption. Studies report a prevalence of approximately 10% for concomitant use of alcohol, tobacco and illicit drugs[5,15,16],

with rates ranging from 12.5%[15,16] to 14,6%[5] for combined alcohol and tobacco use. Several factors have been associated with this practice. Students who had higher monthly income were more likely to be substance users[17], while having no religion is associated with higher rates of concurrent alcohol, tobacco, and illicit drug use[9]. Other factors include having family members and friends who use these substances[9], male gender, not living with family[5], being White[16], and having symptoms of depression[9,16,17].

Multiple substance use represents a potential indicator of addictive behavior and places the user at greater health and social risks[5], which makes them the main target group for health actions. The present study is important for planning health and education actions with a focus on preventing the use of psychoactive substances in the university population. Thus, knowledge of the risk and protective factors that lead young persons to use these substances can assist in the implementation of health promotion actions focused on these factors to prevent the use and health problems caused by legal and illegal drugs[18]. In addition, health promotion and education would reduce expenditure on treatment related to substance use by reducing disease burden on the public health system.

Given that knowledge about drug use can facilitate the diagnosis and identification of factors associated with the consumption of these substances, this study intends to estimate the prevalence of co-occurrence of alcohol, tobacco, and illicit drug use among students of a public university in the city of Pelotas, Brazil, and to evaluate the factors associated with this practice.

METHODS

Pelotas is a medium-sized city located in Southern Brazil, with several higher education institutions, thus being considered a university town. A cross-sectional, university-based, census-like survey was administered to the incoming undergraduate student body at a public university in the city of Pelotas to ascertain the health profile of this population. The study was a census of college students who joined the institution in the first semester of 2017 carried out as part of a research consortium[19].

A digital questionnaire was built using REDCap (Research Electronic Data Capture) platform[20]. Data were collected between November 2017 and July 2018. Teams of Masters' students instructed the participants on completion of the questionnaires and elucidated any questions.

Students were eligible if they had been admitted to any of the on-campus programs during the first half of 2017, were enrolled in and attending the second or third semester of the program, and were aged 18 years or older at the time of the interview. Every student admitted to any programs during the first semester of 2017 and who was still attending the program during data collection was invited. Those with visual, hearing, mental, or cognitive impairment precluding completion of the questionnaire were not eligible.

Dependent variables were co-occurrence of alcohol, tobacco, and illicit drug use and co-occurrence of alcohol and illicit drug use. The Alcohol Use Disorders Identification Test (AUDIT) was used to evaluate alcohol consumption[21]. The test consists of 10 items that generate a score of 0 to 40 points. The World Health Organization[22] proposes a subdivision of scores into categories or patterns of alcohol consumption: 0 to 7 (low-risk use), 8 to 15 (hazardous use), 16 to 19 (harmful use), and 20 or more (probable dependence). For purposes of analysis, we dichotomized this variable. Scores from 0 to 7 points were categorized as "low-risk use", while scores 8 to 40 points were categorized as "harmful alcohol use".

Two items were used to collect data on tobacco use: 1) "Do you smoke or have you ever smoked?"; and 2) "Currently, how many cigarettes a day do you smoke?". Respondents who reported smoking one or more cigarettes per day for more than one month were classified as current smokers, while those who reported having quit smoking were considered former smokers. To measure illicit drug use, items inquired use of the following substances at least once (lifetime use) and in the 30 days prior to data collection: cocaine, solvents and inhalants (chloroform/ether, glue, paint thinner, benzene, nail polish, gasoline, ethyl chloride, etc.); MDMA (ecstasy, "molly"), hallucinogens (LSD or "acid", mushrooms, *Datura*) and cannabis[23]. Illicit drug use was considered when individuals reported having consumed at least one of the aforementioned drugs within 30 days prior to the interview.

The outcome co-occurrence of consumption of alcohol, tobacco, and illicit drugs was defined as harmful use of alcohol (≥8 points), current smoking, and having consumed at least one of the illicit drugs of interest in the 30 days before data collection. The outcome co-occurrence of consumption of alcohol and illicit drugs was defined as harmful use of alcohol (≥8 points) and having consumed at least one of the illicit drugs of interest in the 30 days prior to data collection.

The following characteristics were used as independent variables: sex (male; female); age (18-19; 20-22; ≥23 years); skin color (White; Black/*Pardo* (mixed-race Brazilians)/other); marital status (married/consensual union; single/separated/divorced/widowed); religious practice (yes; no); living arrangement (with family/spouse; alone; with friends); economic class (according to an instrument proposed by the Brazilian Association of Research Companies (*Associação Brasileira de Empresas de Pesquisa – ABEP*)[24] and categorized as classes A, B, C, D/E); symptoms of major depression (according to the Patient Health Questionnaire-9 [PHQ-9], with a cutoff point of ≥9)[25]; age at first experimentation with alcohol, tobacco, and illicit drugs (<18; ≥18 years); academic major (health and life sciences; exact sciences and land/agricultural sciences; applied social sciences and humanities; linguistics or arts and letters), according to the attended course; day vs. night classes; and exposure to a stressor (including issues such as giving up or postponing important moments of leisure, having financial problems, or feeling worried, anxious, discouraged, or tense because of an overload of academic activities; feeling alone or lacking support; suffering discrimination from peers or professors; pressure to perform well; verbal or physical aggression by peers; conflict with professor(s); changes in living habits; disappointment with teaching quality), scored on the following scale: happened, but did not affect me; happened, but I was little affected; happened, and I was more or less affected; happened and affected me deeply; did not happen to me. The variable was dichotomized, with stressors coded as "yes" only in cases in which the participants reported having been deeply affected by at least one event. The stressor instrument was built for this study and the different questions were previously tested for their understanding.

Statistical analyses were conducted in Stata 12.1 (Stata Corp., College Station, TX, USA). Descriptive analyses of the sample; of co-occurrence of use of alcohol, tobacco, and drugs; and of co-occurrence of use of alcohol and drugs alone were carried out. A Venn diagram was constructed to assess the relationship between use of the three substance categories. For associations between the outcomes and independent variables, binary logistic regression analysis was used to provide crude and adjusted Odds Ratios and their respective 95% confidence intervals (95%CI). Variables with p≤0.20 in the crude analysis were carried forward into multivariate analysis. Possible confounders were analyzed through a hierarchical model; each level in the model retained only those variables with p<0.20 in the multivariate analysis or those considered highly relevant for the underlying theoretical model of the study.

The study was approved by the UFPel Ethics Committee (Approval No. 79250317.0.0000.5317) and the respondents gave their informed consent for participation.

RESULTS

In all, 2,706 university students were considered eligible for the study. A total of 49 refused to participate and 792 were treated as losses (31.1% of the sample). Of these, 52.8% were male, 46.7% were aged 23 or older, and 38.3% attended exact sciences or land/agricultural sciences programs. Many of the losses were because almost 16% (432) of the original sample did not return to the university during the data collection period. From the sample of 1,865 university students, 41 individuals did not provide complete answers to the alcohol, tobacco, and illicit drug items and were hence excluded from this analysis. The final sample comprised 1,824 students, 54.9% of whom were female and 71.8% were White (Table I). The mean age of participants was 22.2 (± 6.6) years and the majority (74.2%) were aged 18-22 years. 91.6% of the respondents were single, separated/divorced, or widowed, and 59.4% belonged to socioeconomic classes A and B. Approximately 68.0% reported having no religion, 61.3% lived with family or a spouse/partner, 55.7% had symptoms of depression, and 14.8% had experienced a stressful event. Regarding academic programs, 34.5% were taking applied social sciences and humanities majors, and 53.6% took day-shift classes.

Alcohol was the most widely consumed substance, as 92.0% of the participants had consumed alcoholic beverages at least once in their lifetime. Of the total sample, 61.4% reported low-risk use; 25.6% hazardous use; 3.8% harmful use; and 1.2% likely dependence. Regarding drug use, 43.9% of the respondents had used at least one illicit drug in their lifetime, and 23.3% had done so within the 30 days preceding the interview. The smoking prevalence rate was 11.0%. The majority of students had begun consuming alcohol, tobacco, and illicit drugs before age 18 (81.9%, 64.1%, and 51.9%, respectively) (Table I). The prevalence rate of co-occurrence of consumption of the three substances was 5.2%, while that of alcohol and drug consumption was 13.6% (Figure 1). Other prevalence rates and their co-occurrences can be observed in Figure 1.

Table I - Demographic, socioeconomic, behavioral, and academic profile of the sample. Pelotas, Brazil, 2018 (n=1,824).

Variable	Sample		Alcohol and drugs		Alcohol, tobacco, and drugs	
	n	%	n	%	n	%
Sex						
Female	1004	55.0	123	12.2	44	4.4
Male	820	45.0	126	15.3	51	6.2
Age (years)						
18-19	749	41.3	116	15.4	38	5.1
20-22	595	32.9	85	14.3	34	5.7
23 or older	468	25.8	48	10.2	23	4.9
Self-reported skin color						
White	1309	71.8	176	13.4	69	5.3
Black/*Pardo*(Mixed-race Brazilians)/Other	513	28.2	73	14.2	26	5.1
Marital status						
Married or in consensual union	153	8.4	9	5.9	5	3.3
Single/Separated/Divorced/Widowed	1671	91.6	240	14.3	90	5.4
Economic class (ABEP criterion)						
A	263	15.1	54	20.5	24	9.1
B	771	44.3	106	13.7	42	5.4
C	632	36.3	71	11.2	25	3.9
D/E	76	4.3	5	6.6	1	1.3
Religion						
No	1239	68.0	192	15.4	71	5.7
Yes	584	32.0	57	9.8	24	4.1
Living arrangement						
With family or spouse/companion	1116	61.3	99	8.9	38	3.4
Alone	229	12.6	38	16.6	16	7.0
With friends	475	26.1	112	23.6	41	8.6
Depressive symptoms (PHQ9 ≥ 9)						
No	808	44.3	77	9.5	27	3.3
Yes	1016	55.7	172	16.9	68	6.7
Exposure to stressful event						
No	1555	85.2	212	13.6	80	5.1
Yes	269	14.8	37	13.7	15	5.6
Academic major						
Exact sciences and land/agricultural sciences	532	29.2	71	13.4	32	6.0
Health and life sciences	325	17.8	35	10.8	11	3.4
Applied social sciences and humanities	629	34.5	83	13.1	30	4.8
Linguistics/arts and letters	338	18.5	60	17.7	22	6.5
Class shift						
Day	978	53.6	134	13.7	53	5.4
Night	846	46.4	115	13.6	42	5.0
Lifetime use of alcohol						
Never	146	8.0	0	0.0	0	0.0
At least once	1678	92.0	249	14.8	95	5.7
Alcohol consumption pattern						
Never	146	8.0	0	0.0	0	0.0
Low-risk use	1119	61.4	0	0.0	0	0.0
High-risk use	468	25.6	186	39.7	64	13.7
Harmful use	69	3.8	46	66.7	22	31.9
Likely dependence	22	1.2	17	77.3	9	40.9
Harmful use of alcohol (AUDIT≥8)						
No	1271	69.4	0	0.0	0	0.0
Yes	559	30.6	249	44.5	95	17.0

Table I - Demographic, socioeconomic, behavioral, and academic profile of the sample. Pelotas, Brazil, 2018 (n=1,824).

Variable	Sample		Alcohol and drugs		Alcohol, tobacco, and drugs	
	n	%	n	%	n	%
Age at first alcohol intake						
<18	1494	81.9	238	15.9	92	6.2
≥18	330	18.1	11	3.3	3	0.9
Smoking						
Never smoked	1336	73.3	77	5.8	0	0.0
Former smoker	287	15.7	77	26.8	0	0.0
Current smoker	201	11.0	95	47.3	95	47.3
Age at first tobacco use						
<18	311	64.1	118	37.9	69	22.2
≥18	174	35.9	53	30.5	26	14.9
Lifetime use of at least one illicit drug						
No	1023	56.1	0	0.0	0	0.0
Yes	801	43.9	249	31.1	95	11.9
30-day use of at least one illicit drug						
No	1399	76.7	0	0.0	0	0.0
Yes	425	23.3	249	58.6	95	22.4
Age at first illicit drug use						
<18	405	51.9	151	37.3	64	15.8
≥18	376	48.1	96	25.5	29	7.7

ABEP: Associação Brasileira de Empresas de Pesquisa (Brazilian Association of Research Companies); PHQ9: Patient Health Questionnaire-9; AUDIT: The Alcohol Use Disorders Identification Test
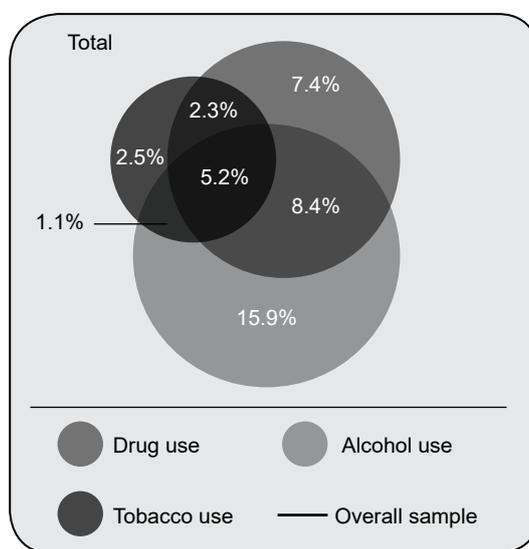

Figure 1 - Venn diagram of alcohol, drug, and tobacco use and the intersections thereof (n=1,824).

In the adjusted analysis, co-occurrence of consumption of the three substances was associated with economic class, age at onset of drug experimentation, and academic major. Poorer respondents (D/E) were 89.0% less likely to use all three substances concurrently when compared to wealthiest respondents (A) (OR=0.1; 95%CI 0.01-0.88). The lower the socioeconomic class, the lower the odds of consuming all three substances (p=0.0003). Respondents who had experimented with any illicit drugs before the age of 18 were 2.2 times more likely (95%CI 1.4-3.6) to consume all three substances compared to those who had only experimented after age 18 (p=0.0013). Respondents enrolled in exact sciences or land/agricultural sciences programs used psychoactive substances more often than those enrolled in health and life sciences programs (OR=3.1; 95%CI 1.4-6.8) (p=0.0386) (Table II).

Table II - Factors associated with co-occurrence of use of alcohol (score ≥8), tobacco, and illicit drugs in the last 30 days by university students. Pelotas, Brazil, 2018 (n=1,824).

Level	Variable	Crude analysis			Adjusted analysis		
		OR	95%CI	P-value	OR	95%CI	P-value
1	**Sex**			0.0804			0.080
	Female	1			1		
	Male	1.4	0.9; 2.1		1.5	1.0; 2.2	
1	**Age (years)**			0.8073			-
	18 - 19	1.0	0.6; 1.8		-	-	
	20 – 22	1.2	0.7; 2.0		-	-	
	23 or older	1			-	-	
1	**Self-reported skin color**			0.8644			-
	Black/*Pardo*(Mixed-race Brazilians)/Other	1			-		
	White	1.0	0.7; 1.7		-	-	
2	**Marital status**			0.2327			0.3123
	Married or in consensual union	1			1		
	Single/Separated/Divorced/Widowed	1.7	0.7; 4.2		1.6	0.6; 4.0	
2	**Economic class (ABEP criterion)**			0.0063			0.0003*
	A	1			1		
	B	0.6	0.3; 0.9		0.5	0.3; 0.9	
	C	0.4	0.2; 0.7		0.4	0.2; 0.7	
	D/E	0.1	0.0; 1.0		0.1	0.0; 0.9	
3	**Religion**			0.1432			0.3887
	No	1.4	0.9; 2.3		1.3	0.7; 2.2	
	Yes	1			1		
3	**Exposure to stressful event**			0.7738			-
	No	1			-	-	
	Yes	1.1	0.6; 1.9		-	-	
3	**Depressive symptoms**			0.0011			0.0539
	No	1			1		
	Yes	2.1	1.3; 3.3		1.7	1.0; 2.8	
3	**Age at first alcohol intake**			0.0000			0.2220
	<18	7.2	2.3; 22.8		2.1	0.6; 7.2	
	≥18	1			1		
3	**Age at first tobacco use**			0.0501			0.7423
	<18	1.6	1.0; 2.7		0.9	0.5; 1.8	
	≥18	1			1		
3	**Age at first illicit drug use**			0.0004			0.0013
	<18	2.3	1.4; 3.6		2.2	1.4; 3.6	
	≥18	1			1		
3	**Academic major**			0.2162			0.0386
	Health and life sciences	1			1		
	Exact sciences and land/agricultural sciences	1.8	0.9; 3.7		3.1	1.4; 6.8	
	Applied social sciences and humanities	1.4	0.7; 2.9		1.8	0.8; 4.1	
	Linguistics/arts and letters	2.0	0.9; 4.1		2.3	1.0; 5.3	
4	**Class shift**			0.673			-
	Day	1.1	0.7; 1.7		-	-	
	Night	1			-	-	
4	**Living arrangement**			0.0001			0.0611
	With family or spouse/companion	1			1		
	Alone	2.1	1.2; 3.9		2.1	1.1; 4.1	
	With friends	2.7	1.7; 4.2		1.5	0.9; 2.5	

Level 1: adjusted for sex, age; Level 2: previous adjustment + marital status, economic class; Level 3: previous adjustment + religion, depressive symptoms, age at first alcohol intake, age at first tobacco use e age at first illicit drug use and academic major; Level 4: previous adjustment + living arrangement. *P-value for linear trend

Table III describes factors associated with co-occurrence of consumption of alcohol and illicit drugs. Sex, economic class, symptoms of depression, age at first alcohol intake, academic major, and living arrangement were associated with the outcome. Men were 1.4 times more likely to consume alcohol and drugs than women (OR=1.4; 95%CI 1.0-1.9; p=0.0323). Poorest individuals (D/E) were 80% less likely to consume alcohol and drugs than wealthiest ones (A) (OR=0.2; 95%CI 0.1-0.6). Individuals with symptoms of depression and those who had experimented with alcohol

before age 18 were more likely to consume the two substances than their peers in the corresponding reference categories (OR=1.9; 95%CI 1.4-2.6; p=0.0001; OR=5.3; 95%CI 2.8-10.2; p=0.0000, respectively). Individuals enrolled in linguistics or arts and letters programs were 2.1 times more likely to consume alcohol and illicit drugs together than those enrolled in health and life sciences programs (95%CI 1.3-3.4; p=0.0314). Living alone and with friends were also risk factors for co-occurrence of use (OR=2.1; 95%CI 1.3-3.2; OR=2.8; 95%CI 2.0-3.9, respectively, p=0.0000) compared to living with family members or a spouse/partner.

Table III - Factors associated with co-occurrence of use of alcohol (score ≥8) and illicit drugs in the last 30 days by university students. Pelotas, Brazil, 2018 (n=1,824).

Level	Variable	Crude analysis			Adjusted analysis		
		OR	95%CI	P-value	OR	95%CI	P-value
1	**Sex**			0.0550			0.0323
	Female	1			1		
	Male	1.3	1.0; 1.7		1.4	1.0; 1.9	
1	**Age (years)**			0.0285			0.9059
	18 - 19	1.6	1.1; 2.3		1.1	0.7; 1.7	
	20 – 22	1.5	1.0; 2.1		1.1	0.7; 1.6	
	23 or older	1			1		
1	**Self-reported skin color**			0.6560			-
	Black/*Pardo*(Mixed-race Brazilians)/Other	1			-	-	
	White	0.9	0.7; 1.3		-	-	
2	**Marital status**			0.0013			0.1977
	Married or in consensual union	1			1		
	Single/Separated/Divorced/Widowed	2.7	1.4; 5.3		1.6	0.8; 3.5	
2	**Economic class (ABEP criterion)**			0.0008			0.0000*
	A	1			1		
	B	0.6	0.4; 0.9		0.6	0.4; 0.9	
	C	0.5	0.3; 0.7		0.4	0.3; 0.7	
	D/E	0.3	0.1; 0.7		0.2	0.1; 0.6	
3	**Religion**			0.0007			0.9082
	No	1.7	1.2; 2.3		1.0	0.6; 1.8	
	Yes	1			1		
3	**Exposure to stressful event**			0.9629			-
	No	1			-	-	
	Yes	1.0	0.7; 1.5		-	-	
3	**Depressive symptoms**			0.0000			0.0001
	No	1			1		
	Yes	1.9	1.5; 2.6		1.9	1.4; 2.6	
3	**Age at first alcohol intake**			0.0000			0.0000
	<18	5.5	3.0; 10.2		5.3	2.8; 10.2	
	≥18	1			1		
3	**Age at first tobacco use**			0.0963			0.9979
	<18	1.4	0.9; 2.1		1.0	0.6; 1.6	
	≥18	1			1		
3	**Age at first illicit drug use**			0.0004			0.4750
	<18	1.7	1.3; 2.4		1.2	0.7; 2.1	
	≥18	1			1		
3	**Academic major**			0.0750			0.0314
	Health and life sciences	1			1		
	Exact sciences and land/agricultural sciences	1.3	0.8; 2.0		1.4	0.9; 2.2	
	Applied social sciences and humanities	1.3	0.82; 1.9		1.4	0.9; 2.2	
	Linguistics/arts and letters	1.8	1.1; 2.8		2.1	1.3; 3.4	
4	**Class shift**			0.9661			-
	Day	1.0	0.8; 1.3		-	-	
	Night	1			-	-	
4	**Living arrangement**			0.0000			0.0000
	With family or spouse/companion	1			1		
	Alone	2.0	1.4; 3.1		2.1	1.3; 3.2	
	With friends	3.2	2.4; 4.3		2.8	2.0; 3.9	

Level 1: adjusted for sex, age; Level 2: previous adjustment + marital status and economic class; Level 3: previous adjustment + religion, depressive symptoms, age at first alcohol intake, age at first tobacco use e age at first illicit drugs use and academic major; Level 4: previous adjustment + living arrangement. *P-value for linear trend

DISCUSSION

This study sought to evaluate the co-occurrence of consumption of alcohol, tobacco, and illicit drugs by university students and factors associated with this practice. Co-occurrence of intake of these substances was reported by 5.2% of the sample, and it was associated with higher economic class, drug experimentation before age 18, and attending an exact sciences or land/agricultural sciences program. For alcohol and illicit drug use, the prevalence rate was 13.6%. This practice was associated with higher economic class, male gender, depression, having experimented with alcohol before age 18, attending a linguistics or arts and letters program, and living alone or with friends.

In previous Brazilian studies, alcohol was also the psychoactive substance most consumed by university students. The second most consumed substance were illicit drugs, what is not consistent with the national literature, which reports tobacco in this position, followed by drugs – mainly marijuana[26]. One possible explanation for the low prevalence of smoking is that only daily smokers were considered.

Alcohol being the most consumed substance can be explained by the fact that it is the most socially accepted drug. Therefore, its consumption is not seen as a habit to be discouraged or even considered by health professionals[27]. This is a public health issue that must be discussed given the potential health hazards of alcohol consumption[15] and its association with other high-risk behaviors, such as reckless driving and unprotected sex[28]. It would be important to implement a policy of educating students to raise awareness of both health and social problems resulting from the use of substances, especially alcohol, given its high prevalence in this population.

A percentage of individuals who smoke cigarettes and take illicit drugs also consume alcohol, and approximately 5.0% of the sample used all three of these substances. Experimentation with and subsequent continuation of illicit drug use are positively associated with lifetime use of other substances[29], mostly alcohol or tobacco[30]. The development of strategies aimed at preventing first exposure to psychoactive substances is particularly important[29].

Few studies have described combined consumption of two or more substances[5,15,16]. A study of young adults[16] found a 6.8% prevalence rate of co-occurrence of alcohol, tobacco, and marijuana use, similar to the present study. Two other studies with similar populations, students in general[5] and medical students[15], found higher prevalence rates. A study that evaluated substance use in the preceding two months found a 11.2% prevalence rate for alcohol, tobacco, and marijuana use[5]. This higher prevalence may be due to the longer recall period. Another study conducted in Nepal found a 10.2% prevalence rate for current use of the three substances[15]. However, this study analyzed third-year undergraduate students who had been exposed to the university environment for longer than those in the present study. The university environment increases the risk of substance use[5], which may explain this discrepancy. As for the concurrent use of alcohol and illicit drugs, one study found a prevalence of co-occurrence of alcohol and marijuana use of 9.6%[16], similar to the present study. This study evaluated co-occurrence of use considering only cannabis, the most commonly used substance.

Regarding associated factors, economic class and academic major were the two variables associated with both outcomes. The poorer the respondent, the lower the odds of co-occurrence of substance use, which can be explained by the fact that lower purchasing power can hinder access to substances[31]. There is evidence that substance use in adults, particularly alcohol, may be price-sensitive, with consumption declining as price increases[32]. Other studies that evaluated alcohol use by university students also found higher intake among those with higher income[17]. A study that evaluated the association between household income in adolescence and substance use in early adulthood found higher odds of abusive alcohol, marijuana, and cocaine use among those with higher household incomes[33]. Also, greater substance use in communities with high socioeconomic status is partly attributable to permissive parental attitudes[34].

The lowest prevalence of substance use was found among students of health and life sciences programs in this present study. Controversially, the literature reports that use of legal drugs and tranquilizers is highest among students of health sciences, especially in medical school[35]. This difference may be attributable to the fact that we evaluated only freshmen and only illicit drug use.

In the present study, students who consumed illicit drugs before age 18 were more likely to use the three substances and those who consumed alcohol before age 18 were more likely to use alcohol and drugs. Some authors have found that alcohol use at an early age leads to alcohol-related problems but not to marijuana-related problems[36], while others suggest a broader effect, in which onset of use of any substance (e.g., alcohol or tobacco) increases the risk of using these and other psychoactive substances[37]. A review study identified initiation of substance use at an early age increases the risk of abuse and dependence and may also be an early indicator of mental disorders[38].

The reinforcement or establishment of education and health promotion policies with a focus on drug use should be implemented in primary or elementary schools. It would also be important to raise awareness among parents, especially those with high economic power, against the use of drugs by their children. Men were more likely to

consume alcohol and illicit drugs compared to women. Male gender is a risk factor for use of both legal and illicit drugs[5,16]. This may be related to the prevailing social structure that provides greater freedom to men compared to women[15]. Furthermore, men perceive lower risk associated with substance use compared to women[37].

Depressive symptoms were also associated with co-occurrence of use of alcohol and illicit drugs in this study. Another study also found that depressed individuals are more likely to consume alcohol, tobacco, and marijuana or alcohol and marijuana[16]. The stressful nature of academic life can be considered an initial cause and driver of such use[39].

Living alone or with friends were associated with co-occurrence of use of alcohol and illicit drugs in this study. Students living with other students are at a greater risk of developing problematic consumption patterns and/or engaging in other risky behaviors[5], while those living with their parents are at lower risk of using legal or illegal substances[40]. This highlights the protective role of family and close relatives against negative peer influences[41].

Some limitations of this study must be highlighted. Due to the cross-sectional design, the main limitation is the possibility of reverse causation bias in some associations. Losses to follow-up and refusals were significant and this may have led to selection bias. Students who were not found could present higher drug use leading to difficulties to attend classes and a greater possibility of dropping the university. As the losses were greater among men and students in the field of exact sciences and land/agricultural sciences, i.e., those with a greater chance of using any substance, the prevalence found could be underestimated. Self-reporting of substance use, even with assurances of anonymity, may not have been sufficient for some students to reveal their actual practices, either due to self-censorship, failure to recall experiences, or feelings of guilt. In this context, the prevalence of illicit drug use found in this study may be higher. Another possible issue was the long duration of data collection. Students who were interviewed at the end of fieldwork are more exposed to the university environment than those who were interviewed at the beginning.

Approximately 5% of this sample of first-year university students exhibited co-occurrence of use of alcohol, tobacco, and illicit drugs, while 13.6% consumed both alcohol and illicit drugs. These findings help identify those individuals who are at the highest risk for drug-related health problems. We hope the results of the present study may contribute to a better understanding of substance use and provide inputs for the development of interventions.

CONCLUSION

Concomitant consumption of alcohol and drugs was higher than the concomitant consumption of the three substances, and factors such as trying drugs before the age of 18 and being of higher economic status were associated.

CONTRIBUTIONS

Gbènankpon Mathias Houvèssou, **Isabel Oliveira Bierhals** and **Mariângela Freitas da Silveira** contributed to the preparation and design of the study; the acquisition, analysis and interpretation of data; and the writing and/ or revision of the manuscript. **Betina Daniele Flesch** contributed to the acquisition, analysis and interpretation of data; and the writing and/ or revision of the manuscript.

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