



# Drug Use Frequency Variation and Mental Health During the COVID-19 Pandemic: an Online Survey

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## Abstract

In December 2019, a new disease caused by a coronavirus was first identified in China and quickly spread across the world, causing a large number of deaths. Quarantine has been implemented in many countries as a measure to prevent the spread of the disease. The impact of this situation on drug use and mental health is still poorly understood. Therefore, this cross-sectional study sought to assess possible associations between quarantine, the use of psychoactive substances, and symptoms of depression and anxiety. The assessment instruments used were the Patient Health Questionnaire-9 (PHQ-9); the General Anxiety Disorder-7 (GAD-7) scale; and an adaptation of the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). The sample consisted of 2398 participants who met the following inclusion criteria: being in quarantine, aged 18 years or older, and living in Brazil. There was a decrease in the frequency of use of practically all drugs investigated in the evaluated sample. However, some factors were associated with less variations in the frequency of substance use before and during quarantine. These factors were being male, single, and having an occupation different from homemaker.

**Keywords** Drug use · COVID-19 · Pandemic · Quarantine · Mental health

In December 2019, a new disease caused by a coronavirus named COVID-19 was first identified in the city of Wuhan, Hubei province, China. The disease quickly spread throughout China and elsewhere in the world, becoming a global pandemic (Triggle et al., 2020). COVID-19 has already caused a large number of deaths worldwide, and there are now millions of cases; however, there are still no approved vaccines or specific drugs to treat this disease (Li et al., 2020).

Currently, quarantine is being implemented in many countries as a measure to prevent the spread of the disease. The term *quarantine* refers to the restriction of movement of people who may have been exposed to a contagious disease, but are not sick, and includes actions that may be voluntary or mandatory (Cetron & Landwirth, 2005).

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In Brazil, COVID-19 was declared a public health emergency on February 3, and on February 6, 2020, Law No. 13979 (Quarantine Law) was introduced, with measures aimed at protecting the population. On March 20, it was recognized that community transmission was taking place across the country, and physical distancing and quarantine were implemented in all Brazilian states (Croda et al., 2020).

In the recent past, other viruses have also caused quarantine periods. In 2002 and 2003, a coronavirus outbreak was responsible for Severe Acute Respiratory Syndrome (SARS) in populations in some areas of China, Singapore, and Canada (Anderson et al., 2004). Middle East Respiratory Syndrome (MERS-COV) emerged in Saudi Arabia in 2012, marking the second introduction of a coronavirus in the human population (de Wit et al., 2016). In 2014, quarantine occurred in many African countries during the Ebola outbreak. Many people who experience quarantine find it an unpleasant and stressful experience for a variety of reasons including separation from family members, uncertainty about possible contamination, and boredom. Increased aggression, violence, and suicide have been reported during quarantine periods (Barbisch et al., 2015; Lau et al., 2005; Zhang et al., 2020). These data reveal that being in quarantine can negatively influence people's emotions and behaviors, which can harm the health of individuals.

An important behavioral aspect observed in other pandemics in which quarantine was necessary was the increased use of psychoactive substances. One year after the SARS-related pandemic in 2003, an increase in alcohol use was reported among Hong Kong residents. In a study of health professionals in Beijing conducted 3 years after the SARS outbreak, it was found that employees who had worked in high-risk wards were 1.5 times more at risk for alcohol use disorder compared to employees who were not exposed to the disease (Chong et al., 2004; Wu et al., 2008). In these studies, it was also possible to observe that the increased alcohol abuse and/or dependence were significantly associated with symptoms of depression and anxiety.

Studies have sought to understand the phenomena and the multifactorial variables that can increase risks or be protective in relation to the misuse of psychoactive substances. Risk factors include individual characteristics (symptoms of depression, anxiety, and insecurity), family history (family breakdown and having people who use drugs in the family), school background (poor performance or school exclusion), social context (violence, lack of work, and leisure), drug availability, media influence, sociodemographic characteristics (sex, age, education, and social class), and lack of religious practice. Important protective factors include strong family bonds and having friends who do not use drugs (Martino et al., 2009; Queiroz Macedo et al., 2014).

All of these variables seem to be affected, in some way, during the current complex period caused by the COVID-19 pandemic. The present study aimed to assess the association between quarantine, drug use, and symptoms of depression and anxiety in a Brazilian population sample.

## Methods

### *Study Design and Participants*

This online survey was approved by National Research Ethics Commission (CONEP) # 031098/2020.

The volunteers were recruited through social media, mainly through Facebook, Instagram, and WhatsApp groups, and by the Institutional Press Office of the Federal University of São Paulo (UNIFESP). The social media groups were composed of students, teachers, and employees of UNIFESP, while members of the public were made aware of the study through various forms of publicity, such as the UNIFESP website. The questionnaire was made available online between April 20, 2020 and May 22, 2020.

The inclusion criteria were individuals aged 18 years old or over who were in quarantine due to the pandemic, were resident in Brazil, and completed the questionnaire in full.

Although 3202 individuals responded to the survey, only 2398 participants met our inclusion criteria. Those who were excluded either did not consent to participate ( $N = 7$ ), were under 18 years old ( $N = 4$ ), were not resident in Brazil ( $N = 9$ ), were not in quarantine ( $N = 318$ ), completed the questionnaire more than once ( $N = 3$ ), or had zero variance in the scales of symptoms of depression and anxiety ( $N = 463$ ) when the responses in the anxiety and depression scales were analyzed, indicating that they had given the same response to all questions, and therefore had not completed the survey properly (Toepoel et al., 2009).

## Measures

The online questionnaire was based on three instruments: the Patient Health Questionnaire-9 (PHQ-9); the Generalized Anxiety Disorder-7 (GAD-7) scale; and an adaptation of the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). All instruments had already been validated for the Brazilian population (de Lima et al., 2009; Group WAW, 2002; Henrique et al., 2004; Moreno et al., 2016; Spitzer et al., 2006).

The Patient Health Questionnaire-9 (PHQ-9) – an instrument consisting of nine items, arranged on a four-point scale: 0 (not once) to 3 (almost every day), with a score ranging from 0 to 27 to evaluate the frequency of signs and symptoms of depression in the past 2 weeks (de Lima et al., 2009).

The Generalized Anxiety Disorder-7 (GAD-7) scale – a self-report screening tool for symptoms of generalized anxiety over a period of 2 weeks. It comprises seven questions, on a four-point scale: 0 (not once) to 3 (almost every day), with a score ranging from 0 to 21 (Spitzer et al., 2006).

The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) – This instrument was validated for online application (Christoff et al., 2016). In our study, only the question in respect of lifetime drug use was maintained unchanged (Group WAW, 2002). The list of drugs was not changed, but the periods of use examined were “before quarantine” and “during quarantine” rather than “the last three months.” The frequency of use was adapted to “never,” “a few times (less than 1×/week),” “sometimes (from 1 to 3×/week),” “frequently (4 to 5×/week),” and “daily or almost every day.”

## Statistical Analysis

The sample size was calculated using the *G\*Power 3.1* software (Faul et al., 2007). To be able to detect a difference of 10% (small effect size) in just one group and two temporal measures (before and during quarantine), with a power of 80% and a significance level of 5%, 199 participants would be needed. For the present study, a minimum sample size of 2150 responses was considered necessary, based on previous estimates that between 15 and 85% of the questionnaires could be invalid (Huang & Zhao, 2020; Schneider et al., 2015). The analyses were conducted in software R version 3.6.1 using the *glmmTMB* package.

The descriptive analysis was done presenting continuous variables as mean and standard deviation; categorical variables were presented as frequency and percentage.

To analyze the variations in the use of each psychoactive substance, before and during quarantine, the non-parametric Wilcoxon test for paired samples was used. For these tests, the dependent variables refer to the frequency of use, categorized as 0 (never), 1 (rarely), 2 (sometimes), 3 (often), and 4 (daily). As a measure of effect size, the Cliff's delta was calculated.

To assess the effects of sociodemographic variables, symptoms of anxiety and depression, and situation in relation to COVID-19 (infected or not infected/length of quarantine/frequency of leaving home) on substance use, an exploratory linear regression model was built. The dependent variable consisted of the variation in the general ASSIST score before and during the quarantine.

To calculate the general ASSIST score, the frequencies of use reported for each substance were summed; the variation was calculated as a delta of the measures before and during the quarantine (ASSIST during quarantine—ASSIST before quarantine).

The following predictors were added to the model: sociodemographic variables of the research participants (sex, age, marital status, income, occupation, and with whom the person lives), variables related to COVID (disease diagnosis, frequency of departure from residence, and quarantine time), and scores from the PHQ-9 and GAD-7 scales. Correlated variables were included as interactions (income and occupation, marital status, and with whom the individual lives).

## Results

### *Sociodemographic Characteristics*

Of the interviewed individuals, 72.89% were female, 74.73% were white, 52.2% were aged between 18 and 30 years old, 58.63% were single, 62.59% had at least completed college. With regards to income, 47.08% had a family income of between US\$ 197.92 to US\$ 1187.5 per month, 47.20% were employed, 30.89% lived with a partner, 69.18% did not have children, and 85.28% lived in the Southeast of Brazil. As only 0.16% of participants reported "other" gender, they were not included in further analyses. Table 1 shows the participants' sociodemographic characteristics.

### *Quarantine-related Features*

Most of the respondents (96.54%) were not diagnosed with COVID-19. At the time the survey was completed, the majority of respondents (69.31%) had been quarantined for more than 1 month and were still quarantined (96.46%). In respect of the frequency of leaving home, half of the interviewees stated that they left their residence at least 1 day a week (49.95%). The main reasons for leaving home were going to the supermarket (37.95%) and/or to the drugstore (22.96%). Table 2 shows the data related to quarantine.

Regarding the symptoms of depression, the PHQ-9 scores indicated that 12.81% ( $N = 224$ ) of women and 20.59% ( $N = 133$ ) of men had no, or minimal symptoms; 26.43% ( $N = 462$ ) of women and 33.59% ( $N = 217$ ) of men had mild symptoms; 24.31% ( $N = 425$ ) of women, and 23.22% ( $N = 150$ ) of men had moderate symptoms; 21.85% ( $N = 382$ ) of women and 15.17% ( $N = 98$ ) of men had moderately severe symptoms; and 14.60% ( $N = 255$ ) of women and 7.43% ( $N = 48$ ) of men had severe symptoms of depression.

**Table 1** Sociodemographic characteristics of the sample

Characteristics	<i>N</i> (%)	
Sex	Male	646 (26.95)
	Female	1748 (72.89)
	Other	4 (0.16)
Age	18–30 years old	1252 (52.22)
	31–40 years old	611 (25.48)
	41–50 years old	282 (11.76)
	51–60 years old	188 (7.84)
	61–70 years old	60 (2.50)
	>70 years old	5 (0.20)
Color/race	White	1792 (74.73)
	Black	141 (5.88)
	Mixed race	387 (16.14)
	Yellow	70 (2.92)
	Indigenous	8 (0.33)
Marital status	Single	1406 (58.63)
	Married/stable union	832 (34.70)
	Divorced/separated	146 (6.09)
	Widowed	14 (0.58)
Education level	Incomplete elementary school	3 (0.13)
	Complete elementary school	8 (0.33)
	Incomplete high school	13 (0.54)
	Complete high school	179 (7.47)
	Incomplete college	694 (28.94)
	Complete college	516 (21.52)
	Incomplete post graduate course	191 (7.96)
	Complete post graduate course	794 (33.11)
Monthly family income*	No income	40 (1.67)
	Up to US\$ 197.92	99 (4.13)
	From US\$ 197.92 to US\$ 593.75	527 (21.98)
	From US\$ 593.75 to US\$ 1187.5	602 (25.10)
	From US\$ 1187.5 to US\$ 1781.25	379 (15.80)
	From US\$ 1781.25 to US\$ 2375.00	258 (10.76)
	From US\$ 2,375.00 to US\$ 2968.75	172 (7.17)
	More than US\$ 2968.75	321 (13.39)
Occupation**	Student	1119 (35.50)
	Employed	1488 (47.20)
	Unemployed	293 (9.30)
	Homemaker	214 (6.80)
	Economically inactive	38 (1.20)

**Table 1** (continued)

Characteristics		<i>N</i> (%)
Interviewee lives with*	Partner (spouse, boyfriend/girlfriend or fiancé)	919 (30.89)
	With my children	552 (18.56)
	Family (parents and/or sibling(s))	996 (33.48)
	Friends	144 (4.84)
	Alone	269 (9.04)
	Other relatives	95 (3.19)
Children	No	1659 (69.18)
	1	345 (14.39)
	2	294 (12.26)
	3	77 (3.21)
	4 or more	23 (0.96)
Brazilian region	North	18 (0.75)
	Northeast	129 (5.38)
	Midwest	70 (2.92)
	Southeast	2045 (85.28)
	South	136 (5.67)

\*Refers to family monthly income. The Dollar Real exchange rate on April 20, 2020 was 5.28

\*\*Participants could select more than one answer

In respect of anxiety symptoms, the GAD-7 scores indicated that 10.18% ( $N = 178$ ) of women and 17.80% ( $N = 115$ ) of men had no or minimal symptoms; 29.41% ( $N = 514$ ) of women and 35.91% ( $N = 232$ ) of men had mild symptoms of anxiety; 40.90% ( $N = 715$ ) of women and 34.83% ( $N = 225$ ) of men had moderate symptoms; and 19.51% ( $N = 341$ ) of women and 11.46% ( $N = 74$ ) of men had severe anxiety symptoms.

### **Data Related to the Use of Psychoactive Substances**

In respect of lifetime drug use (used at least once in a lifetime), 58.97% ( $N = 381$ ) of men and 41.01% ( $N = 717$ ) of women had used tobacco derivatives; 90.86% ( $N = 587$ ) of men and 84.55% ( $N = 1478$ ) women had consumed alcoholic beverages. Regarding the use of illicit drugs, 58.51% ( $N = 378$ ) of men and 42.16% ( $N = 737$ ) of women had used marijuana, 19.34% ( $N = 125$ ) of men and 6.63% ( $N = 116$ ) of women had used cocaine/crack, 28.48% ( $N = 184$ ) of men and 14.98% ( $N = 262$ ) of women had used amphetamine/ecstasy, 30.49% ( $N = 197$ ) of men and 6.46% ( $N = 113$ ) of women had used hallucinogens, 8.04% ( $N = 52$ ) of men and 1.60% ( $N = 28$ ) of women had used opioids/opiates, 16.40% ( $N = 106$ ) of men and 4.11% ( $N = 72$ ) of women had used hypnotics/sedatives, 28.79% ( $N = 186$ ) of men and 11.21% ( $N = 196$ ) of women had used inhalants, and 8.35% ( $N = 54$ ) of men and 1.8% ( $N = 26$ ) of women had used other types of drugs.

With regard to the frequency of use of psychoactive substances before and during quarantine, in general, there was a decrease in the use of practically all substances investigated in this study (except hypnotics, but without statistically significant variation). Although

**Table 2** Quarantine-related data

Characteristics	<i>N</i> (%)		
COVID-19 infection status	Diagnosed with COVID-19	19 (0.79)	
	Suspected/probable case of COVID-19	64 (2.67)	
	Not diagnosed with COVID-19	2315 (96.54)	
When did you start quarantine?	Less than 1 week	8 (0.33)	
	1 to 2 weeks	16 (0.68)	
	From 3 to 4 weeks	337 (14.05)	
	More than 1 month	1662 (69.31)	
	More than 2 months	349 (14.55)	
	3 months or more	26 (1.08)	
When did you end quarantine?	Not finished yet	2313 (96.46)	
	Less than 1 week	35 (1.46)	
	1 to 2 weeks	26 (1.09)	
	From 3 to 4 weeks	13 (0.54)	
	More than 1 month	10 (0.41)	
	More than 2 months	0	
3 months or more		1 (0.04)	
	How often do you leave, or did you leave, your residence during the quarantine period?	I have not/did not leave home	352 (14.68)
		1 day a week	1198 (49.96)
		2 days a week	422 (17.60)
		3 days a week	188 (7.84)
		4 days a week	69 (2.88)
5 days a week		66 (2.75)	
6 days a week		18 (0.75)	
Every day		85 (3.54)	
Why do you/did you leave home?	I have not/did not leave home	272 (5.52)	
	Supermarket	1869 (37.95)	
	Drugstore	1131 (22.96)	
	Work	353 (7.16)	
	Go to the hospital or other health services (example: vaccine, medical consultation, emergency room)	267 (5.4)	
	To visit family members	253 (5.13)	
	To visit friends	84 (1.78)	
	To do sports or outdoor recreational activities	254 (5.15)	
	Walking pet	213 (4.32)	
	Other reasons	228 (4.63)	

there was a statistically significant decrease in drug use, the effect size was small, as evidenced by the Cliff Delta values, which remained less than 0.2 (Table 3).

During quarantine, many individuals increased their use of cigarettes: 36% of people who consumed 6 to 10 cigarettes daily, started to consume 11 or more; 30% of people who consumed 11 to 20 cigarettes daily, started to consume 21 or more; and 33% of people who consumed 21 to 30 cigarettes daily, started to consume more than 31 cigarettes. On the other hand, it was observed that those who used tobacco sporadically decreased this use

**Table 3** Frequency of use of psychoactive substances before and during quarantine caused by COVID-19. The total number of individuals and the respective percentage are shown

Substance	T	0 n (%)	1 n (%)	2 n (%)	3 n (%)	4 n (%)	Test statistic <sup>+</sup>	<i>p</i>	Delta
Tobacco derivatives	B	1686 (70)	357 (15)	87 (4)	57 (2)	207 (9)	-13.33	<0.001*	0.11007
	D	1975 (82)	135 (6)	52 (2)	48 (2)	184 (8)			
Alcoholic beverages	B	435 (18)	1115 (47)	718 (30)	108 (5)	18 (1)	-7.816	<0.001*	0.06255
	D	803 (34)	711 (30)	590 (25)	189 (8)	101 (4)			
Marijuana	B	1669 (70)	449 (19)	113 (5)	55 (2)	108 (5)	-14.247	<0.001*	0.13362
	D	2021 (84)	136 (6)	75 (3)	43 (2)	119 (5)			
Cocaine/crack	B	2290 (96)	92 (4)	9 (0)	2 (0)	1 (0)	-4.819	<0.001*	0.02121
	D	2341 (98)	42 (2)	8 (0)	2 (0)	1 (0)			
Amphetamine/ecstasy	B	2168 (91)	211 (9)	10 (0)	3 (0)	2 (0)	-11.358	<0.001*	0.07175
	D	2340 (98)	48 (2)	5 (0)	0 (0)	1 (0)			
Inhalants	B	2256 (94)	132 (6)	4 (0)	1 (0)	1 (0)	-8.44	<0.001*	0.04181
	D	2356 (98)	38 (2)	0 (0)	0 (0)	0 (0)			
Hypnotics/sedatives	B	2144 (90)	162 (7)	25 (1)	20 (1)	43 (2)	-1.657	0.098	0.02082
	D	2198 (92)	87 (4)	34 (1)	20 (1)	55 (2)			
Hallucinogens	B	2198 (92)	182 (8)	9 (0)	3 (0)	2 (0)	-9.39	<0.001*	0.05219
	D	2323 (97)	65 (3)	5 (0)	1 (0)	0 (0)			
Opioids/opi-ates	B	2332 (97)	54 (2)	4 (0)	2 (0)	2 (0)	-3.253	0.001*	0.01004
	D	2356 (98)	34 (1)	4 (0)	0 (0)	0 (0)			
Others	B	2305 (96)	45 (2)	9 (0)	4 (0)	29 (1)	-2.949	0.003*	0.01037
	D	2332 (97)	27 (1)	3 (0)	5 (0)	27 (1)			

<sup>+</sup>Test statistic for the paired-sample Wilcoxon test; \* $p < 0.01$ ; B, before; D, during; 0 = no use, 1 = a few times (less than once a week), 2 = sometimes (1 to three times a week), 3 = frequently (from 4 to 5 times a week), 4 = daily or almost every day

even more. Specifically, in relation to the quantities consumed, there was a small decrease in the use of tobacco ( $V = -2.451$ ,  $p = 0.014$ ,  $\text{delta} = 0.0390$ ) and alcohol doses ( $V = -3.429$ ,  $p < 0.001$ ,  $\text{delta} = 0.0398$ ), as shown in Table 4.

### **Sociodemographic Characteristics and Their Association with the Impact on People's Mental Health in Quarantine and Variations in the Frequency of Drug Use**

The variables associated with a greater variation in the frequency of use of psychoactive substances are shown in Table 5. According to the statistical analysis used in this study, when compared to women, men had a lesser variation in the frequency of substance use ( $\beta = -0.502$ ,  $p = 0.004$ ). Regarding marital status, compared to single people, married ( $\beta = 0.945$ ,  $p < 0.001$ ), and divorced ( $\beta = 1.135$ ,  $p = 0.011$ ) individuals had a greater variation in the frequency of use. The number of days the individual leaves home during quarantine period was also related to a greater variation in the frequency of use ( $\beta = 0.123$ ,  $p = 0.012$ ).

In respect of occupation, being employed, a student, unemployed, or economically inactive had no influence on substance use. However, an increase variation in use was associated with being a homemaker ( $\beta = 0.577$ ,  $p = 0.046$ ).



**Table 4** Amounts of cigarettes and doses of alcoholic beverages consumed daily before and during quarantine caused by COVID-19. The total number of individuals and the respective percentage are shown.

Substance	T	Does not use	From 1 to 5	From 6 to 10	From 11 to 20	From 21 to 31	More than 31	Test statistic	<i>p</i>	Delta
Tobacco derivatives	B	1895 (79)	338 (14)	76 (3)	67 (3)	9 (0)	9 (0)	-2.451	0.014	0.0390
	D	2029 (85)	184 (8)	77 (3)	63 (3)	28 (1)	13 (1)			
Alcohol	B	Does not use	From 1 to 2	From 3 to 4	5 or 6	7, 8, or 9	More than 10	-3.429	<0.001*	0.0398
	D	732 (31)	1018 (43)	325 (14)	187 (8)	68 (3)	52 (2)			
		887 (37)	867 (36)	347 (14)	172 (7)	57 (2)	48 (2)			16 (1)

+ Test statistic for the paired-sample Wilcoxon test; *p*<0.01; B, before; D, during

**Table 5** Linear regression with the predicted factors for the variation in psychoactive substances use before and during quarantine ( $n = 2394$ )

	$\beta$	95% CI		$p$
Sex (reference = female)				
Male	-0.502	-0.843	-0.161	0.004
Age	0.010	-0.008	0.028	0.256
Monthly family income (reference = more than US\$ 2968.75)				
From US\$ 1781.25 to US\$ 2,375.00	-0.389	-2.372	1.595	0.701
From US\$ 593.75 to US\$ 1187.5	0.089	-1.633	1.811	0.919
From US\$ 197.92 to US\$ 593.75	-0.904	-2.617	0.809	0.301
Up to US\$ 197.92	-0.479	-2.373	1.416	0.621
Work and study (reference = Neither of them)				
Just work	0.089	-1.543	1.721	0.915
Just study	-0.798	-2.538	0.941	0.368
Work and study	-0.862	-2.814	1.090	0.387
Housework (reference = no)				
Housework	0.577	0.011	1.144	0.046
Marital status (reference = single)				
Married	0.945	0.480	1.411	0.000
Divorced	1.135	0.260	2.010	0.011
Widowed	2.412	-0.337	5.161	0.085
Lives with children (reference = does not live with children)				
Live with children	1.026	-0.055	2.107	0.063
Lives with friends (reference = does not live with friends)				
Live with friends	0.011	-0.621	0.643	0.973
Individual situation concerning COVID-19 (reference = not diagnosed with COVID-19)				
Not diagnosed with COVID-19	0.092	-1.583	1.766	0.914
Suspected/probable case of COVID-19	0.260	-1.617	2.137	0.786
Number of days the person left home during quarantine	0.123	0.027	0.219	0.012
Start of quarantine (reference = less than 1 week)				
1 to 2 weeks	0.957	-2.142	4.057	0.545
From 3 to 4 weeks	2.052	-0.536	4.639	0.120
More than a month	1.580	-0.995	4.156	0.229
More than 2 months	1.781	-0.810	4.372	0.178
3 months or more	2.396	-0.545	5.337	0.110
<i>Patient Health Questionnaire-9 (PHQ-9)</i>	0.023	-0.010	0.056	0.165
<i>General Anxiety Disorder-7 (GAD-7)</i>	-0.029	-0.073	0.015	0.196
Region (reference = Midwest)				
Northeast	0.594	-0.466	1.653	0.272
North	-0.050	-1.971	1.870	0.959
Southeast	-0.239	-1.108	0.630	0.590
South	-0.004	-1.057	1.049	0.994
Monthly family income and occupation (reference = more than US\$ 2,968.75)				
From US\$ 1781.25 to US\$ 2375.00, works	0.583	-1.523	2.690	0.587
From US\$ 593.75 to US\$ 1187.5, works	-0.015	-1.850	1.820	0.987
From US\$ 593.75 to US\$ 1187.5, works	0.562	-1.326	2.449	0.560
Up to US\$ 197.92, works	0.251	-2.649	3.150	0.865

**Table 5** (continued)

	$\beta$	95% CI		<i>p</i>
From US\$ 1781.25 to US\$ 2375.00, studies	−0.179	−2.411	2.052	0.875
From US\$ 593.75 to US\$ 1187.5, studies	0.187	−1.753	2.126	0.850
From US\$ 197.92 to US\$ 593.75, studies	1.417	−0.534	3.369	0.155
Up to US\$ 197.92, studies	1.049	−1.172	3.271	0.355
From US\$ 1781.25 to US\$ 2375.00, both occupations	1.203	−1.291	3.697	0.344
From US\$ 593.75 to US\$ 1187.5, both occupations	0.285	−1.867	2.437	0.795
From US\$ 197.92 to US\$ 593.75, both occupations	1.495	−0.669	3.658	0.176
Up to US\$ 197.92, both occupations	−0.048	−2.772	2.676	0.973
Marital status and if lives with children (reference = single, does not live with children)				
Married, lives with children	−0.870	−2.050	0.310	0.149
Divorced, lives with children	−0.371	−1.978	1.236	0.651
Widowed, lives with children	−2.919	−6.898	1.060	0.150

Data from participants who marked the category “others” in relation to sex were excluded, as they had a small sample size.

No associations were found between the variation in the frequency of use regarding psychoactive substances during quarantine and the following categories: age, family income, living with children or friends, situation concerning COVID-19 (has been diagnosed, has not been diagnosed, or is a suspected case), start of quarantine, anxiety and depression scales scores, and region where the person lives.

The variables included as interactions (income and occupation; marital status and other members of household) were not associated with an increase in the frequency of drug use.

## Discussion

This study analyzed the use of psychoactive substances in a sample of Brazilian individuals and the ways in which this use was related to the quarantine period caused by COVID-19, as well as to mental health, using scales measuring symptoms of depression and anxiety. It was found that there was a decrease in the frequency of use of virtually all psychoactive substances investigated in this study. This finding is in line with what has been found in some recent research, where an increase in drug use was not found during the COVID-19 pandemic (Di Renzo et al., 2020; Sidor & Rzymiski, 2020).

It is interesting to observe that a considerable number of individuals increased their use of cigarettes during quarantine. In the research by Bommele et al. (2020), an 18.9% increase in smoking was reported due to COVID-19, being associated with the stress caused by the pandemic. As a possible explanation for the increase in the quantity of cigarettes consumed among those who were already moderate or heavy smokers, one can highlight the effect of the situation, which may be directly linked to the possibility of smoking or not. According to the Premack principle (Premack, 1959), it is not possible to dissociate certain behaviors from the context in which they occur, and the behavior takes into account the time of exposure with environmental discriminative stimuli. People who smoke have been identified as being more vulnerable to COVID-19 infection and its associated complications (Brake et al., 2020). It means that the more someone stays at home, more likely

it is to smoke, independently of stress, and the pandemic. Thus, greater attention should be paid to this group, and it is important to understand whether changes in smoking patterns are associated with emotional distress or are simply a response to boredom (García-Álvarez et al., 2020; Volkow, 2020).

Regarding lifetime use, men showed higher percentages of use related to all drugs. This data is similar to what was found in the three household surveys on the consumption of psychoactive substances in the Brazilian population (Bastos et al., 2017; Galduróz et al., 2002).

However, in respect of the variation in the frequency of consumption of psychoactive substances, men had less variation compared to women, that is, they maintained the pattern of use prior to the pandemic. The comparison between single, married, and divorced people also showed that single people showed a decrease in the frequency of use variation, while the number of days the individual left home during quarantine was associated with an increase in the frequency of use. It should be noted that collective meetings, in bars and parties, were suspended during the quarantine period by COVID-19, making these gatherings impossible and, consequently, influencing the drug use.

The new family dynamics, in which people spend more time at home, causes significant changes between relationships, requiring greater efforts by parents and guardians who need to reconcile remote work, domestic chores, and childcare (Kramer & Kramer, 2020; Marques et al., 2020). This affects mainly those who were already homemakers, which further reduces the frequency of use of psychoactive substances. Family income was not associated with the variation in the frequency of use of psychoactive substances.

Finally, there was no association between the variation in the frequency of drug use during the pandemic and scores in the depression (PHQ-9) and anxiety (GAD-7) scales. However, the mental health of quarantined individuals is something that requires attention. The personal suffering related to the COVID-19 pandemic can lead to an increase in problems related to mental health and alcohol use and/or to the worsening of long-term use patterns (Rehm et al., 2020). Previous studies of other pandemics have shown that its effects on substance use are not immediate, usually appearing after the end of the disease outbreak period (Chong et al., 2004; Wu et al., 2008). Our study did not allow the detection of these long-term effects since the data collection was carried out at the beginning of the quarantine in Brazil. Further longitudinal studies may evidence negative impacts of COVID-19 on mental health and substance use.

There is also the impact of the media on the population, which through headlines and sensational images can contribute to increased anxiety and fear (Shigemura et al., 2020). On the other hand, we can see that a greater number of women had symptoms of moderately to severe depression and anxiety compared to men during the pandemic. These findings are in line with the literature, where a higher prevalence of depression and anxiety is described among females. According to surveys conducted in Brazilian cities, depression affects 17.0% of women and 7.3% of men, while anxiety affects 35.8% of women and 19.5% of men (Viana & Andrade, 2012; Vorcaro et al., 2001).

Some considerations and limitations must be discussed. This was a survey based on an online questionnaire composed of a convenience sample, which can lead to a selection bias by attracting people with problems related to drug use or mental health. Only individuals who had a technological device with an internet connection were able to access the survey. It is also necessary to take into account the large number of participants with higher levels of education and salary than those in the general population, which can facilitate compliance with the quarantine measure. In addition, there is a recall bias among respondents, as some questions refer to the period before quarantine, which may influence the accuracy of

the results. Another important consideration is that the study contained no data on anxiety and depression symptoms before quarantine, so we were not able to identify any changes in these factors. Finally, this research reflects the local reality of the Brazilian population, specifically the one that resides in the Southeast (Brazilian region of highest socioeconomic status), so the results may not necessarily be generalizable to other populations.

The clinical relevance of this study is to suggest that single male individuals having a different occupation from a homemaker had the smallest variations in the frequency of use of psychoactive substances, that is, they maintained the pattern of use prior to the pandemic. The identification of these and other associations with drug use can be mobilized to guide medical interventions as well as educational and preventive programs.

## Conclusion

Our data show that there was a decrease in the use of practically all psychoactive substances addressed in this study, including alcohol and tobacco, during the COVID-19 pandemic. However, in respect of moderate and heavy smokers, there was an increase in daily consumption. Some factors are associated with less variations in the frequency of substance use before and during quarantine, particularly being male, having a different occupation from a homemaker, and being single. There was a greater perception of symptoms of anxiety and depression among women in the quarantine period than men, but this was not associated with any variation in the frequency of drug use. It is important to note that data collection began early in the quarantine period imposed in Brazil and that the results may only reflect short-term effects. The pandemic is still developing, and the long-term consequences can only be assessed with longitudinal studies.

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## Declarations

**Conflict of Interest** The author declare no competing interest.

**Ethical Approval** All procedures performed in this study involving human participants were in accordance with the ethical standards of University's Research Ethics Board and with the 1975 Helsinki Declaration.

**Informed Consent** Informed consent was obtained from all participants.

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