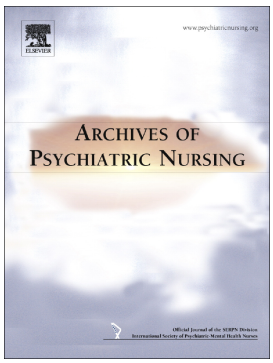

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Increased use of psychoactive substances among Brazilian health care professionals during the COVID-19 pandemic

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ABSTRACT

This study aimed to estimate the prevalence of increased psychoactive substance use (PSU) and associated factors among health care professionals. A cross-sectional and analytical study with 12,086 Brazilian health professionals was undertaken. An online questionnaire was used to gather data concerning sociodemographic factors, increased consumption of alcoholic beverages, tobacco, and hypnotics or sedatives during the COVID-19 pandemic. The prevalence of tobacco, alcoholic beverages, and hypnotic or sedative consumption were 17.8%, 69.0% and 17.1%, respectively. Regression analyses indicated that having no religion and social isolation were associated with increased PASU during the pandemic. COVID-19 pandemic stressors may increase PASU, and increased PASU may increase the risk of substance use disorders and substance use-related chronic diseases, such as cancer.

Descriptors: COVID-19, Health care workers, Prevalence, Psychoactive substances.

INTRODUCTION

The pandemic caused by the novel coronavirus disease (COVID-19) is a global health crisis that affects the physical and mental health of the general population (Wang et al., 2020). In the mental health sphere, the pandemic can cause symptoms such as panic, phobia, stress, anxiety and sleep disturbances, among other symptoms (Banerjee & Rai, 2020). Specifically, among health care workers (HCW), stress caused by COVID-19 (COVID Stress Scales) can be related to a variety of factors, such as fear of contamination by SARS-COV-2, fear of taking the infection home from work and infecting family members,

occupational stress and increased workload during the pandemic (Taylor et al., 2020a; McKay & Asmundson, 2020; Tan et al., 2021; Clay & Parker, 2020).

The co-occurrence of traumatic stress and the use or abuse of psychoactive substances is well known (María-Ríos & Morrow, 2020). According to the World Health Organization (WHO), 'Psychoactive drugs are substances that, when taken in or administered into one's system (directly act on and alter the function of the central nervous system) affect mental processes, e.g. perception, consciousness, cognition or mood and emotions. Psychoactive drugs belong to a broader category of psychoactive substances, including alcohol and nicotine. "Psychoactive" does not necessarily imply dependence-producing' (WHO, 2020).

Among HCW, PSU is of significant concern (Ribeiro et al., 2019; Scholze et al., 2017; Merlo et al., 2013) due to impairment in performing work tasks, substance use associated chronic diseases and other negative impacts on well-being and quality of life.

COVID-19 stress syndrome involves changing emotional reactions (Taylor et al., 2020b) and other dimensions beyond the individual, such as socioeconomic and labour (job loss or the fear of job loss, for example) factors. In addition, this stress can contribute, through various mechanisms, to the use or abuse of psychoactive substances during the pandemic via activation of the behavioural immune system (BIS) (Schaller & Park, 2011).

Previous studies involving adverse events such as the impacts of disasters, terrorist incidents, natural disasters and the acute respiratory syndrome (SARS) epidemic have reported high rates of substance use, abuse and dependence, including alcohol and tobacco consumption. In this context, it

can be inferred that the COVID-19 pandemic increases the risk for psychoactive substance abuse and dependent behaviours (Klimkiewicz et al., 2021), especially across HCW. Additionally, HCW may be in a position of greater vulnerability to the negative impacts of the COVID-19 pandemic, both in the short and long term, with repercussions on their mental health and consequently, on the use or abuse of psychoactive substances. For example, Alonso et al. (2021) estimated the prevalence of substance use disorders among health professionals in Spain during the first wave of the pandemic at 6.2%.

Furthermore, during pandemics in general, consumption of alcohol and other substances has been a relevant issue for this professional category. In a multicentre United States study involving 1,132 health professionals, 42.6% had a probable diagnosis of alcohol use disorder (Hennein & Lowe, 2020). During the SARS epidemic in 2003, staff at a hospital in Hong Kong increased their pattern of alcohol consumption compared to the period before the crisis (Lau et al., 2005).

The increased use of substances may seem like a reflex response from individuals to a new way of life suddenly imposed by the pandemic. Therefore, this study focuses on assessing the prevalence of increased consumption of psychoactive substances and associated factors among HCW who worked in the direct care of patients in various health care scenarios, independent of their COVID-19 diagnosis.

METHODS AND PROCEDURES

Study design and sample

An analytical cross-sectional study using an online survey was conducted in Brazil from October to December 2020 using respondent-driven sampling. Inclusion criteria were health professionals working in the direct care of patients, affected or not by COVID-19, in any health care setting, in public or private services, and working at least in the last six months before data collection.

Sample calculation

For the sample calculation, information on the number of professionals per region of Brazil was considered a reference, according to data from the professional councils provided by the Ministry of Health, base year 2010 (Brasil, 2010). A confidence interval (CI) of 95% was used, with a margin of error equal to 1% plus or minus, obtaining a minimum sample of 5,079 individuals. Following online data collection, 12,086 participants participated in the study. The sample size calculation formula, as described by Valliant et al. (2013), is as follows:

$$n = \frac{1}{\left(\frac{1}{n_0} + \frac{1}{N}\right)},$$

on what

$$n_0 = \frac{z^2 S^2}{d^2}$$

In the formula presented:

• z is the value related to the confidence level established for the survey (to 95% confidence);

• N is the size of the population;

- S is the standard deviation;
- d is the margin of error (pre-established according to the average score to be calculated).

Data collection procedure

Researchers from all macro-regions of Brazil were selected to work in the data collection. Firstly, these researchers were trained on how to conduct an online survey. Each researcher then identified health professionals who met the study inclusion criteria. The first eligible professional identified other professionals to follow the recruitment chain. Participants were encouraged, once a week, to recruit other participants (peers) in their category through their social networks to grow the recruitment chain.

This study followed the Reporting of Observational Studies in Epidemiology STROBE checklist of items that should be included in observational study reports and was guided by the Checklist for Reporting Results of Internet E-Surveys (CHERRIES).

Study questionnaire and pilot study

The questionnaire included multiple-choice questions, divided according to sociodemographic information, questions related to professional category, type of care provided, family isolation during the pandemic, and queries related to the use of tobacco and derivatives, alcoholic beverages, and hypnotics or sedatives during the pandemic (in the three last months) according to the Smoking and Substance Involvement Screening Test (ASSIST) (Henrique et al., 2004). The appearance and content of the study's questionnaire were prepared and validated by 15 experts. A pilot study was performed with participants

contacted through social media and who were requested to participate in the study through a link. Subsequently, respondents were invited to send feedback and comments on the questionnaire via WhatsApp. In addition to minor adaptations to the terminology, all suggested changes were considered. Data collection took place after the pilot study. The questionnaire was hosted at www.surveymonkey.com, allowing only one submission per Internet protocol (IP) address to protect data integrity.

Study outcomes

Three outcomes were considered: use of tobacco and derivatives, alcoholic beverages, and hypnotics or sedatives during the COVID-19 pandemic. In addition, participants were asked, 'In this pandemic period, has your substance use increased?' with exclusive dichotomous responses (Yes or No) for each of the substances.

Data analysis

The absolute and relative frequency of the outcomes and covariates were calculated in an exploratory analysis. First, chi-square and Fisher's exact tests were used to test associations between each outcome and explanatory variables, with a significance level of 5% ($\alpha = 0.05$). Then, separated logistic regression models were performed for each outcome to estimate the adjusted odds ratio (OR) with a respective 95% confidence level (95% CI) (Hosmer & Lemeshow, 2000). In the initial model, the variables that presented a *p*-value less than 0.20 (referring to the estimate of their respective coefficients) were selected for a subsequent model. In this new model, the stepwise method was used to select the best set of variables to explain each outcome. Goodness of fit was assessed using the Hosmer–Lemeshow test, with $p > 0.05$ indicating

model adequacy. Data were analysed using the R statistical program, version 4.0.1, available at www.r-project.org

Ethical considerations

The project was approved by the Research Ethics Committee of Ribeirão Preto School of Nursing at the University of São Paulo. Participants read and registered an Informed Consent Form before participating in the study.

RESULTS

The study reached 12,086 health professionals who worked in direct patient care at various levels of health care in all five Brazilian macro-regions. Respectively, 13, 15 and 35 participants did not answer on the use of tobacco and derivatives, alcoholic beverages, and hypnotics or sedatives. Therefore, for data analysis, 12,073 participants were considered for tobacco and derivatives, 10,071 participants for alcoholic beverages and 12,051 participants for hypnotics or sedatives. As a result, the prevalence of use of tobacco and derivatives, alcoholic beverages and hypnotics or sedatives was 17.8% (95% CI: 17.2–18.48), 69.0% (95% CI: 68.18–69.82) and 17.1% (95% CI: 16.43–17.77), respectively.

Female professionals who declared a religious preference and participants with a postgraduate degree predominated for the three outcomes. Nursing professionals who provided care to patients in any clinical area were the most common professional category across all three variables, with or without a diagnosis of COVID-19. Furthermore, professionals who were not diagnosed with COVID-19, did not provide care in a field hospital and were isolated from family members, reported a higher frequency of increased use of

tobacco products, alcoholic beverages and hypnotics/sedatives. Data are shown in Table 1.

[Insert Table 1 here]

The chances of increased tobacco use were 36% lower among female professionals (OR = 0.64; CI = 0.55–0.75; $p < 0.01$). Being a professional from the Midwest, Southeast and South increased the chances of using tobacco by 1.44, 1.57 and 1.40, respectively, compared to being from the Northeast region.

Professionals who reported no religious preference had increased chances of using tobacco by almost double compared to those who declared a religion (OR = 1.95; CI = 1.10–2.32; $p < 0.01$). On the other hand, higher education and postgraduate studies' professionals had decreased chances of using hypnotics/sedatives, by 23% and 37%, respectively, compared to those who only finished high school.

Not having worked in a field hospital reduced the chances of using tobacco by 22% compared to those who worked in a field hospital (OR = 0.78; CI = 0.67–0.91; $p = 0.002$). Reporting no family isolation increased the chances of using tobacco by 24% compared to those who had been isolated from their families (OR = 0.76; CI = 0.65–0.89; $p < 0.01$).

Regarding the analysis of increased use of alcoholic beverages during the COVID-19 pandemic, professionals from the Midwest, Southeast and South regions had increased chances of increased consumption of alcoholic beverages by 1.27, 1.38 and 1.18, respectively, compared to professionals from the Northeast region. Professionals who did not have a religious preference had increased chances of consuming alcoholic beverages by 1.58 compared to those who had a religion (OR = 1.58; CI = 1.41–1.77; $p < 0.01$).

Regarding professional training, participants who had higher education and postgraduate studies increased their consumption of alcoholic beverages by 1.26 and 1.30, respectively, compared to those who only finished high school. Professionals who worked with 'both' types (patients with suspected COVID-19 and patients with other clinical conditions) had increased chances of increasing their consumption of alcoholic beverages by 1.22 compared to those who only worked with COVID-19 patients (OR = 1.22; CI = 1.08–1.37; p = 0.001).

Family isolation contained significant findings. Professionals who were not isolated from family members are 29% less likely to increase their consumption of alcoholic beverages than those who were isolated from family members (OR = 0.71; CI = 0.65–0.77; p < 0.01).

For the analysis of hypnotics/sedatives, being female increased the chances of increased consumption by 1.33 compared to males (OR = 1.33; CI = 1.15–1.55; p < 0.01). Being from the North region reduced the chances of using these substances by 27% compared to being from the Northeast region (OR = 0.73; CI = 0.61–0.88; p = 0.001).

Professionals without a religious preference had increased chances of using hypnotics/sedatives by 1.29 compared to those who had one (OR = 1.29; CI = 1.10–1.52; p = 0.001). Having a COVID-19 diagnosis increased the odds by 1.23 for the use of hypnotics/sedatives compared to professionals who did not have a COVID-19 diagnosis (OR = 1.23; CI = 1.09–1.38; p = 0.001). Not taking a training course on COVID-19 increased the chances of using hypnotics/sedatives by 1.19 compared to professionals who had completed one (OR = 1.19; CI = 1.06–1.34; p = 0.004). (See Table 2)

[Insert Table 2 here]

When we consider only the nursing professionals, the chances of increased tobacco use were 40.0% lower among female professionals (OR = 0.60; CI = 0.49–0.73; $p < 0.01$). Being a professional from the Midwest, Southeast and South increased the chances of using tobacco by 1.57, 1.71 and 1.64, respectively, compared to being from the Northeast region.

Nursing professionals who reported no religious preference had increased chances of using tobacco by almost double compared to those who declared a religion (OR = 1.64; CI = 1.19–2.27; $p < 0.01$). Furthermore, professionals who reported marital status married had decreased chance of using tobacco (OR = 0.75; CI = 0.64–0.89; $p < 0.01$). Professionals who reported ethnicity black had increased chance of using tobacco (OR = 1.34; CI = 1.02 – 1.76; $p = 0.03$). On the other hand, higher education and postgraduate studies' professionals had decreased chances of using hypnotics/sedatives, by 21% and 32%, respectively, compared to those who only finished high school.

Professionals that have qualification reduced the chances of using tobacco by 19% compared to those who worked in a field hospital (OR = 0.81; CI = 0.68–0.96; $p <0.01$). Reporting no family isolation decreased the chances of using tobacco by 19% compared to those who had been isolated from their families (OR = 0.81; CI = 0.67–0.97; $p < 0.01$).

Regarding the analysis of increased use of alcoholic beverages during the COVID-19 pandemic, nursing professionals from the Midwest and Southeast regions had increased chances of increased consumption of alcoholic beverages by 1.32 and 1.42, respectively, compared to professionals

from the Northeast region. Nursing rofessionals who did not have a religious preference had increased chances of consuming alcoholic beverages by 1.56 compared to those who had a religion (OR = 1.56; CI = 1.35–1.79; $p < 0.01$). Nursing professionals who reported marital status married had decreased chances of consuming alcoholic beverages by 24% compared to those who reported marital status single (OR = 0.76; CI = 0.69–0.83; $p < 0.01$).

Nursing professionals who reported education college and graduate had increased chances of consuming alcoholic beverages by 1.21 and 1.26, respectively, compared to those who reported high school. Furthermore, nursing professionals who reported provides care to patients with covid 19 had decreased chances of consuming alcoholic beverages by 12% compared to those who reported provides care to patients with both types of patients.

Family isolation contained significant findings for these professionals. Nursing Professionals who were not isolated from family members are 31% less likely to increase their consumption of alcoholic beverages than those who were isolated from family members (OR = 0.69; CI = 0.63–0.77; $p < 0.01$).

For the analysis of hypnotics/sedatives, being female increased the chances of increased consumption by 1.36 compared to males (OR = 1.36; CI = 1.12–1.65; $p < 0.01$).

Professionals without a religious preference had increased chances of using hypnotics/sedatives by 1.23 compared to those who had one (OR = 1.23; CI = 1.02–1.50; $p = 0.03$).

Nursing professionals who reported marital status married had decreased chances of consuming alcoholic beverages by 15% compared to those who reported marital status single (OR = 0.85; CI = 0.74–0.97; $p < 0.01$).

Nursing professionals with qualification had decreased chances of consuming alcoholic beverages by 21% compared to those without qualification (OR = 0.79; CI = 0.69–0.90; $p < 0.01$).

Family isolation contained significant findings for these professionals. Nursing Professionals who were not isolated from family members are 39% less likely to increase their consumption of alcoholic beverages than those who were isolated from family members (OR = 0.61; CI = 0.52–0.70; $p < 0.01$). (See Table 3)

[Insert Table 3 here]

Furthermore, the results show that there is evidence of an association between the region where the professional works and the consumption of tobacco and alcohol (See table 4). The results show, for the nursing professionals that consumes tobacco, that 22.8% of professionals are from the Northeast region, 14% are from the North region, 19.1% are from the Midwest region, 34.5% are from the Southeast region and 9, 7% are from the southern region. Also, for the nursing professionals that consumes alcohol, 27.7% of professionals are from the Northeast region, 13% are from the North region, 19.5% are from the Midwest region, 31.4% are from the Southeast region and 8, 5% are from the southern region.

[Insert Table 4 here]

DISCUSSION

During the pandemic, health professionals were overworked, fatigued and faced stressful situations, fears and stigmas (Klimkiewicz et al., 2021), which significantly contributed to their well-being and habits and lifestyles that

can compromise mental health. Those changes include alcohol, tobacco and other substance use patterns. In this sense, the present study estimated the prevalence of, and factors associated with increased use of psychoactive substances (tobacco and derivatives, alcoholic beverages, and hypnotics or sedatives) among health professionals during the COVID-19 pandemic across all five macro-regions of Brazil.

The increased use of tobacco products during the pandemic was reported by 17.8% of health professionals, comparable to the increase in daily cigarette consumption observed during the lockdown among doctors in Italy (Sio et al., 2020) and also across health professionals in Turkey (Firat et al., 2021), whose proportions were 43.61% and 22.4%, respectively. Furthermore, in a study by Papa et al. (2021), health professionals reported starting smoking more tobacco during the pandemic, suggesting that health professionals confronted various stressors during the pandemic that can activate behavioural responses such as relapsing in the case of ex-smokers (Patwardhan, 2020), starting smoking or increasing daily cigarette consumption (Phua et al., 2005; Bao et al., 2020).

Therefore, stressful and worrying factors such as fear of becoming infected, fear of taking the disease home, work overload and frustration, among others, predispose individuals to the use of cigarettes and their derivatives (Stubbs et al., 2017). However, attitudes beneficial to health can also be adopted during crises. For example, in England, smokers had a higher rate of attempts to quit smoking or reduce alcohol consumption during the lockdown (Jackson et al., 2021). These changes can be explained as the pandemic served as a ‘moment for reflection’ on health and healthy habits, leading some

people to change health-related behaviours, although the opposite can also occur significantly.

Female gender was a protective factor for increased tobacco and derivative use in this study, unlike that observed in a Canadian study in which no difference was observed between the sexes concerning changes in the pattern of tobacco consumption among workers in general during the COVID-19 pandemic (Zajacova et al., 2020). This result corroborates data in the literature, which shows that women smoke less often or practice less harmful behaviours for health than men.

Regarding excessive alcohol consumption, a cohort study by Fat et al. (2020) indicated that men have much greater cultural patterns of alcohol consumption than women. However, if this same trend is considered for the use of other drugs, since the literature shows that women practice less harmful behaviours related to health than men (Tan et al., 2021), in this study, the female sex had a higher risk of reporting increased use of hypnotics and sedatives compared to males. In addition, a study performed in Sweden revealed that women were more likely than men to use benzodiazepines (adjusted OR = 1.11, 95% CI 1.07–1.14) and benzodiazepine-related drugs (adjusted OR = 1.14; 95% CI 1.12–1.17) (Johnell & Fastbom, 2011).

Increasing cigarette consumption was negatively associated with higher educational levels (higher education and postgraduate studies). In addition, the literature has shown that the impact of the COVID-19 pandemic on mental health is related to education, with a significant adverse effect (Bekele et al., 2021).

Several studies have documented the influences of religion on the adoption of lifestyle habits and consequently, the consequences on physical and mental health (Kang et al., 2020; Umucu & Lee, 2020; Zacher & Rudolph, 2021). In the present study, not having a religion was associated with a higher risk of reporting increased consumption for all substances analysed.

The role of regional predictors in the risk of increased consumption of the analysed substances is unclear. However, the initial phase of the COVID-19 pandemic affected Brazilian regions differently, possibly influencing the behaviour of health professionals involved in care during the pandemic. Compared to the Northeast region, professionals from the North, Midwest, Southeast and South regions showed higher risks of increased tobacco consumption, while a higher risk of consumption of alcoholic beverages was found in the Midwest and Southeast regions. In contrast, the risk of increased consumption of hypnotics/sedatives was significantly lower only in the North region. Given the regional variations in the risks of increased substance use presented here, one cannot simply expect that the larger the region, the greater the risk of increased substance use (Dixon & Chartier, 2016). Instead, these increases depend on the spread of the pandemic in each state in each region, the levels of other stressors present in other cities in the region and restrictions on the sale of alcoholic beverages in each city in the region, as established by law.

Increased use of alcoholic beverages during the pandemic was reported by 69% of health professionals in the present sample. In addition, research with doctors in Italy (Sio et al., 2020), with health workers in London (Papa et al., 2021), with workers in Finland (Oksanen et al., 2021), with university students

(Moura et al., 2022) and population-based research in Germany (Koopmann et al., 2020) and Poland (Szajnoga et al., 2021), reported increased consumption of alcoholic beverages during the COVID-19 pandemic, showing that the trend of increasing consumption of alcoholic beverages occurs in the population as a whole. However, it is expected that public policies for control and regulation would reduce consumption as they reduce the areas where alcohol can be consumed, such as bars, restaurants, parties and celebrations.

On the other hand, social isolation per se can induce an increase in home consumption due to the low cost and easy access to supermarkets and convenience stores, places considered below the regulation of sales (Garcia & Sanchez, 2020; Reynolds & Wilkinson, 2020) and which, sometimes primarily sell alcohol, and this is similar to people in remote work as found in a national survey in Poland (Szajnoga et al., 2021) and Brazil (Garcia & Sanchez, 2020).

In the present study, the increased consumption of alcoholic beverages was associated with higher educational levels (higher education and postgraduate studies), as observed in a study in Canada that involved workers in general during the COVID-19 pandemic (Zajacova et al., 2020).

Occupation and educational status are still factors that place women at a socioeconomic disadvantage and exacerbate the vulnerable situations of those abusing or dependent on psychoactive substances. Moreover, other factors related to social and economic issues can also explain the greater use of substances among more educated women, as observed in recent decades (Moura et al., 2022; Santos et al., 2019).

These factors include female empowerment, dual family and work responsibilities, financial independence, family and professional pressures, and

long working hours. Indeed, purchasing power and the consumer environment shape substance use and dependence patterns, while higher incomes facilitate access to a greater variety of substances, with women also having access to prescribed medicines (Santos et al., 2019).

A Brazilian study indicated that educational level was associated with the consumption of alcoholic beverages. Adults with a higher educational level showed a prevalence of alcohol use 30.5% higher than adults with lower levels of education (IBGE, 2013).

Furthermore, regarding the use of psychoactive substances, behavioural responses such as increased use of these substances were reported in different post-crisis periods, such as the attacks of 11 September 2001, the SARS-COV-1 outbreak in 2003 and disasters such as Hurricane Katrina in 2005 (Lau et al., 2005; Wu et al., 2008; Makwana, 2019; Beaudoin, 2011; Jordan et al., 2019). These behaviours can help people cope with a multifaceted crisis that generates stressors that activate the behavioural immune system (Schaller & Park, 2011). However, this confrontation may reflect psychological problems triggered during the pandemic, such as anxiety disorders, depression, stress and frustration, among others (Singh et al., 2021). Therefore, this increased use should be seen as a potential risk factor for health and well-being, especially for professionals who fit into the high-risk categories of the variables identified in this study.

People face the challenges and problems of everyday life in different ways, and with the restrictions and quarantine measures since the beginning of the pandemic, some people were forced to change their daily lives and quickly adapt to new social and circulation rules, which can be a source of

psychological stress. Thus, the stress experienced contributes positively to the use or increased use of psychoactive substances (Koob & Kreek, 2007). In these situations, using substances can be self-medication, an alternative for relieving stress or psychological distress, being used to distance themselves from the problems they have experienced (Rodriguez et al., 2020; Rehm et al., 2020).

Evidence of the influence of the COVID-19 pandemic on the use of psychoactive substances, both among health professionals and in the general population, remains limited. However, excessive alcohol consumption is a significant risk factor for mental illness, with an association between increased alcohol consumption for the relief of anxiety with depression, stress and low life satisfaction (Keyes et al., 2019; Boschloo et al., 2012; McHugh & Weiss, 2019; Sæther et al., 2019). For example, in the Chinese province of Hubei, during the pandemic, Ahmed et al. (2020) identified an increase in harmful alcohol consumption associated with high rates of stress, depression and low levels of mental well-being.

Excessive use of tobacco and alcohol can directly increase the risk of COVID-19 due to adverse immunological mechanisms (Enos, 2020), as well as the indirect risk due to the reduction of surveillance (Koelega, 1995) – compliance with precautionary and protective measures, hand hygiene, physical distance, or respiratory etiquette. In addition, consequences from excessive use of these substances can persist in the long term, even after the triggering, stressful event has passed.

Not having experienced ‘family isolation’ was a protective factor for reporting increased alcohol consumption. For some workers, even in non-crisis

moments, the family is a powerful psychological support system, especially in a crisis such as that experienced by health professionals during the pandemic. Thus, professionals who were not isolated from their families during the pandemic, even if they had developed coping mechanisms for the crisis, resorted less to increased consumption of alcoholic beverages as an 'escape'. However, elements of each person's personality strongly contributed to their behaviour during the pandemic (Zajenkowski et al., 2020), so the increase in the consumption of psychoactive substances cannot be attributed to the pandemic crisis in a deterministic way.

The World Health Organization has released a book with five sections (Grounding, Unhooking, Acting on your values, Being kind and Making room) each containing a new idea and technique to cope with stress. These strategies can be useful in times of great stress such as those experienced during the COVID-19 pandemic (WHO, 2021).

CONCLUSIONS

The findings of this study indicate the need to identify groups that are more vulnerable to these behavioural changes and consequently, to the harmful effects of the increased use of psychoactive substances during the COVID-19 pandemic. It also identifies an urgency to begin interventions that minimise, in the short and long term, the direct adverse effects of substance use and indirect effects of the pandemic on the mental health of health professionals.

Furthermore, stress caused by the COVID-19 pandemic can be both a trigger for and a consequence of the use of psychoactive substances. Therefore, it is urgent to develop strategies that promote the interests of public

health in the context of non-pharmacological measures to prevent COVID-19, given the association between social isolation and the increased use of psychoactive substances observed in this study.

Limitations

The cross-sectional methodological design of the present research that does not allow cause–effect relationships to be established is a limitation, along with the use of a self-report survey to measure the increase in the use of alcohol beverages, tobacco and derivatives, and hypnotics or sedatives. Another limitation refers to the recruitment of participants because, as the research was developed online, there may have been an overrepresentation of professionals who are skilled in the use of computers and social networks.

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Table 1. Analysis of factors associated with increased substance use among professionals who worked during the pandemic. (N = 12,086). Brazil, 2020

Variables	Tobacco products			Alcoholic beverages			Hypnotics/ sedatives		
	Yes	**No**	**p***	**Yes**	**No**	**p***	**Yes**	**No**	**p***
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Sex			**<0.01**			**0.002**			**<0.01**
Male	255 (10.7)	2,134 (89.3)		745 (31.2)	1,642 (68.8)		234 (9.8)	2,147 (15.7)	
Female	635 (6.6)	9,049 (93.4)		2,710 (28.0)	6,974 (72.0)		1,210 (12.5)	8,461 (87.5)	
Region			**<0.01**			**<0.01**			**0.025**
Northeast	210 (5.8)	3,423 (94.2)		951 (26.2)	2,683 (73.8)		461 (12.7)	3,169 (87.3)	
North	117 (6.6)	1,660 (93.4)		423 (23.8)	1,354 (76.2)		173 (9.7)	1,603 (90.3)	
Midwest	172 (8.1)	1,955 (91.9)		663 (31.2)	1,462 (68.8)		257 (12.1)	1,865 (87.9)	
Southeast	310 (8.9)	3,179 (91.1)		1,115 (32.0)	2,372 (68.0)		432 (12.4)	3,044 (87.6)	
South	81 (7.7)	966 (92.3)		303 (28.9)	745 (71.1)		121 (11.5)	927 (88.5)	
Religion			**<0.01**			**<0.01**			**0.006**
Religious preference (Yes)	695 (6.6)	9,868 (93.		2,880 (27.	7,681 (72.		1,231 (11.	9,313 (88.	

		4)		3)	7)		7)	3)	
Religious preference (No)	195 (12.9)	1,315 (87.1)		575 (38.1)	935 (61.9)		213 (14.1)	1,295 (85.9)	
Education			**<0.01**			**<0.01**			0.579
High school	210 (9.7)	1,960 (90.3)		526 (24.2)	1,646 (75.8)		249 (11.5)	1,921 (88.5)	
College	267 (7.9)	3,109 (92.1)		985 (29.2)	2,388 (70.8)		418 (12.4)	2,954 (87.6)	
Postgraduate studies	413 (6.3)	6,114 (93.7)		1,944 (29.8)	4,582 (70.2)		777 (11.9)	5,733 (88.1)	
Type of patients served			**0.006**			**<0.01**			0.060
With COVID	167 (8.3)	1,835 (91.7)		602 (30.1)	1,401 (69.9)		236 (11.8)	1,765 (88.2)	
In general	307 (6.5)	4,415 (93.5)		1,228 (25.8)	3,525 (74.2)		532 (11.2)	4,215 (88.8)	
Both	416 (7.8)	4,898 (92.2)		1,625 (30.6)	3,690 (69.4)		676 (12.7)	4,628 (87.3)	
Professional category			0.621			**<0.01**			**<0.01**
Nursing professional	657 (7.3)	8,370 (92.7)		2,475 (20.2)	6,551 (79.8)		1,051 (11.7)	7,963 (88.3)	
Physician	111 (8.6	1,187		456 (27.	841 (72.		218 (16.	1,078	

	)	(91.4)		4)	6)		8)	(83.2)	
Physical therapist	43 (6.4)	627 (93.6)		204 (35.2)	466 (64.8)		55 (8.2)	613 (91.8)	
Psychologist	13 (7.0)	174 (93.0)		59 (30.4)	128 (69.6)		17 (9.1)	169 (90.9)	
Speech therapist	4 (6.8)	55 (93.2)		17 (31.6)	41 (68.4)		2 (3.4)	56 (96.6)	
Occupational therapist	4 (10.3)	35 (89.7)		17 (29.3)	22 (70.7)		8 (20.5)	31 (79.5)	
Odontologist	14 (5.8)	226 (94.2)		65 (43.6)	175 (56.4)		29 (12.1)	210 (87.9)	
Other	44 (8.0)	509 (92.0)		162 (27.1)	392 (70.8)		64 (11.6)	488 (88.4)	
Worked in a field hospital			**<0.01**			0.118			0.072
Yes	315 (8.8)	3,256 (91.2)		1,057 (29.6)	2,512 (70.4)		456 (12.8)	3,106 (87.2)	
No	575 (6.8)	7,927 (93.2)		2,398 (28.2)	6,104 (71.8)		988 (11.6)	7,502 (88.4)	
COVID diagnosis			0.282			0.794			**0.004**
No	620 (7.5)	7,595 (92.5)		2,345 (28.5)	5,869 (71.5)		934 (11.4)	7,261 (88.6)	
Yes	270	3,588		1,110	2,747		510 (13.	3,347	

	(7.0)	(93.0)		(28.8)	(71.2)		2)	(86.8)	
Received training on COVID-19			0.078			0.131			**0.003**
Yes	603 (7.1)	7,890 (92.9)		2,466 (29.0)	6,030 (71.0)		967 (11.4)	7,509 (88.6)	
No	287 (8.0)	3,293 (92.0)		989 (27.7)	2,586 (72.3)		477 (13.3)	3,099 (86.7)	
Family isolation			**<0.01**			**<0.01**			**<0.01**
Yes	623 (8.0)	7,205 (92.0)		2,422 (30.9)	5,411 (69.1)		1,061 (13.6)	6,756 (86.4)	
No	248 (6.1)	3,811 (93.9)		964 (23.8)	3,088 (76.2)		367 (9.1)	3,682 (90.9)	
Not applicable	19 (10.2)	167 (89.8)		69 (37.1)	117 (62.9)		16 (8.6)	170 (91.4)	

* Chi-square test

Table 2. Odds ratios by logistic regression for substance use. Brazil, 2020

Tobacco products				
Variable	**Crude**		**Adjusted**	
	OR (CI95%)	***p*-value**	**OR (CI95%)**	***p*-value**

Sex (Female)	0.59 (0.50–0.68)	<0.01	0.64 (0.55–0.75)	<0.01*
Region (Midwest compared to Northeast)	1.43 (1.16–1.77)	<0.01	1.44 (1.17–1.78)	<0.01*
Region (Southeast compared to Northeast)	1.59 (1.33–1.91)	<0.01	1.57 (1.30–1.89)	0.014*
Region (South compared to Northeast)	1.37 (1.05–1.78)	0.024	1.40 (1.07–1.83)	<0.01*
Religion (declared no preference)	2.10 (1.78–2.49)	<0.01	1.95 (1.10–2.32)	<0.01*
Education (college compared to high school)	0.80 (0.663–0.97)	0.023	0.78 (0.64–0.94)	0.010*
Education (graduate compared to high school)	0.63 (0.53–0.75)	<0.01	0.63 (0.53–0.76)	<0.01*
Provided assistance in a field hospital (no compared to yes)	0.750(0.650–0.865)	<0.01	0.78 (0.67–0.91)	0.002*
Family isolation (no compared to yes)	0.752(0.646–0.876)	<0.01	0.76 (0.65–0.89)	<0.01*
Alcoholic beverages				
	Crude		**Adjusted**	
Variable	**OR (CI95%)**	***p*-value**	**OR (CI95%)**	***p*-value**
Region (Midwest compared to Northeast)	1.28 (1.14–1.44)	<0.01	1.27 (1.13–1.43)	<0.01*
Region (Southeast compared to Northeast)	1.33 (1.20–1.47)	<0.01	1.38 (1.24–1.53)	<0.01*
Region (South compared to Northeast)	1.15 (0.98–1.34)	0.08	1.18 (1.01–1.37)	0.039*
Religion (declared no preference)	1.64 (1.46–1.83)	<0.01	1.58 (1.41–1.77)	<0.01*
Education (college compared to high school)	1.29 (1.14–1.46)	<0.01	1.26 (1.12–1.43)	<0.01*
Education (graduate compared to high school)	1.33 (1.19–1.48)	<0.01	1.30 (1.16–1.46)	<0.01*
Provides care to patients with and without a diagnosis of COVID-19 (both,	1.025(0.916–1.146)	0.668	1.22 (1.08–1.37)	0.001*

compared to providing care only to patients diagnosed with COVID-19)				
Family isolation (no compared to yes)	0.697(0.639–0.761)	<0.01	0.71 (0.65–0.77)	<0.01*
Hypnotics/sedatives				
	Crude		**Adjusted**	
Variable	**OR (CI95%)**	***p*-value**	**OR (CI95%)**	***p*-value**
Sex (Female)	1.31 (1.132–1.52)	<0.01	1.33 (1.15–1.55)	<0.01*
Region (North compared to Northeast)	0.74 (0.617–0.89)	<0.01	0.73 (0.61–0.88)	0.001*
Religion (not having religion)	1.24 (1.06–1.46)	<0.01	1.29 (1.10–1.52)	<0.01
COVID diagnosis (yes)	1.18 (1.06–1.33)	<0.01	1.23 (1.09–1.38)	<0.01
Training on COVID-19 (no)	1.19 (1.06–1.34)	<0.01	1.19 (1.06–1.34)	<0.01

*p-value < 0.05; Crude OR = Crude odds ratio; OR adjusted = Odds ratio adjusted

Table 3. Odds ratios by logistic regression for substance use – Nursing professionals. Brazil, 2020

Tobacco products				
Variable	**Crude**		**Adjusted**	
	OR (CI95%)	***p*-value**	**OR (CI95%)**	***p*-value**
Sex (Female)	0.55 (0.46, 0.67)	<0.01	0.60 (0.49-0.73)	<0.01
Region (Midwest compared to Northeast)	1.45 (1.14, 1.86)	<0.01	1.57 (1.22-2.02)	<0.01
Region (Southeast compared to Northeast)	1.70 (1.37, 2.11)	<0.01	1.71 (1.36-2.15)	<0.01
Region (South compared to Northeast)	1.48 (1.09, 2.01)	0.01	1.64 (1.19-2.27)	<0.01
Religion (declared no preference)	2.11 (1.72, 2.58)	<0.01	1.89 (1.53-2.33)	<0.01
Marital status (Married compared to single)	0.71 (0.60, 0.83)	<0.01	0.75 (0.64-0.89)	<0.01
Ethnicity (Black compared to White)	1.41 (1.09, 1.83)	0.01	1.34 (1.02-1.76)	0.03
Education (college compared to high school)	0.76 (0.61, 0.94)	0.01	0.791 (0.64-0.98)	0.03
Education (postgraduate compared to high school)	0.60 (0.49, 0.72)	<0.01	0.68 (0.56-0.83)	<0.01
Provided assistance in a field hospital (no compared to yes)	0.73 (0.62, 0.86)	<0.01	0.73 (0.62-0.87)	0.002*
Qualification (yes compared to no)	0.82 (0.70, 0.98)	0.03	0.81 (0.68-0.96)	<0.01
Family isolation (no compared to yes)	0.82 (0.69, 0.98)	0.03	0.81 (0.67-0.97)	<0.01*

Alcoholic beverages				
	Crude		Adjusted	
Variable	**OR (CI95%)**	***p*-value**	**OR (CI95%)**	***p*-value**
Sex (Female compared to Male)	0.81 (0.72, 0.92)	<0.01	0.86 (0.76-0.98)	0.02
Region (Midwest compared to Northeast)	1.28 (1.11, 1.46)	<0.01	1.32 (1.15-1.52)	<0.01
Region (Southeast compared to Northeast)	1.33 (1.18, 1.51)	<0.01	1.42 (1.26-1.61)	<0.01
Religion (declared no preference)	1.65 (1.44, 1.90)	<0.01	1.56 (1.35-1.79)	<0.01
Marital status (Married compared to single)	0.74 (0.67, 0.81)	<0.01	0.76 (0.69-0.83)	<0.01
Education (college compared to high school)	1.22 (1.07, 1.40)	<0.01	1.21 (1.05-1.39)	<0.01
Education (graduate compared to high school)	1.25 (1.11, 1.41)	<0.01	1.26 (1.12-1.43)	<0.01
Provides care to patients with and without a diagnosis of COVID-19 (patients diagnosed with COVID-19 both, compared to both)	0.71 (0.63, 0.79)	0.02	0.88 (0.79-0.98)	0.02
Family isolation (no compared to yes)	0.67 (0.61, 0.75)	<0.01	0.69 (0.63-0.77)	<0.01
Hypnotics/sedatives				
	Crude		**Adjusted**	
Variable	**OR (CI95%)**	***p*-value**	**OR (CI95%)**	***p*-value**
Sex (Female)	1.32 (1.09, 1.60)	<0.01	1.36 (1.12-1.65)	<0.01
Religion (not having religion)	1.22 (1.01, 1.48)	0.04	1.23 (1.02-1.50)	0.03
Marital status (Married compared to single)	0.83 (0.73, 0.95)	<0.01	0.85 (0.74-0.97)	0.01
Qualification (yes compared to no)	0.79 (0.69, 0.91)	<0.01	0.79 (0.69-0.90)	<0.01
Family isolation (no compared to yes)	0.61 (0.52, 0.70)	<0.01	0.61 (0.52-0.70)	<0.01

*p-value < 0.05; Crude OR = Crude odds ratio; OR adjusted = Odds ratio adjusted

Table 4. Analysis of region associated with increased substance use among nursing professionals who worked during the pandemic. (N = 8,990). Brazil, 2020

Variables	Tobacco products			Alcoholic beverages			Hypnotics/ sedatives		
	Yes	**No**	**p***	**Yes**	**No**	**p***	**Yes**	**No**	**p***
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Region			**<0.01**			**<0.01**			**0.075**
North east	148(22,8)	2,565(30,8)		681(27,7)	2,032(31,1)		326(31,2)	2,387(30,0)	
North	91(14,0)	1,282(15,4)		319(13,0)	1,054(16,1)		132(12,6)	1,241(15,6)	
Midwest	124(19,1)	1,478(17,7)		480(19,5)	1,122(17,2)		191(18,3)	1,411(17,8)	
South east	224(34,5)	2,279(27,3)		773(31,4)	1,730(26,5)		312(29,8)	2,191(27,6)	
South	63(9,7)	736(8,8)		209(8,5)	590(9,0)		85(8,1)	714(9,0)	

HIGHLIGHTS

- The use of psychoactive substances increased during the COVID-19 pandemic.
- Tobacco use increased among respondents with no religious preference.
- Alcohol use increased among higher education respondents.
- Social isolation was associated with the use of psychoactive substances.
- Women had higher chances of increasing their use of hypnotics and sedatives.