RBSO Revista Brasileira de Saúde Ocupacional
ISSN: 2317-6369 (online)
https://doi.org/10.1590/2317-6369/01322en2022v47edepi1

Research article/
Dossier Epidemiology, Health and Work

Maria Carmen Martinez [a]
https://orcid.org/0000-0002-4427-5976

Maria do Rosário Dias de Oliveira Latorre [b]
http://orcid.org/0000-0002-5189-3457

Frida Marina Fischer [c]
https://orcid.org/0000-0001-9403-6300

[a] WAF Informática e Saúde. São Paulo, SP, Brazil.

[b] Universidade de São Paulo, Faculdade de Saúde Pública, Departamento de Epidemiologia. São Paulo, SP, Brazil.

[c] Universidade de São Paulo, Faculdade de Saúde Pública, Departamento de Saúde Ambiental. São Paulo, SP, Brazil.

Contact:
Frida Marina Fischer
E-mail:
fmfische@usp.br

The authors declare that this study received no funding. One of its coauthors, Frida Marina Fischer, receives a scholarship from CNPq - National Council for Scientific and Technological Development - research grant no. 306963/2021-3

The authors declare no conflict of interests.

The authors report that this study was not presented at any scientific event.

Factors associated with alcohol abuse in nursing professionals in São Paulo State, Brazil

Fatores associados ao consumo abusivo de álcool em profissionais de enfermagem no estado de São Paulo, Brasil

Abstract

Objective: to identify factors associated with alcohol abuse in nursing professionals in São Paulo State. *Methods*: this is a case-control nested in a cross-sectional study. We collected data on demographic characteristics, lifestyle, work ability, occupational features, physical and psychosocial work environment, and alcohol abuse (CAGE Questionnaire). Multiple logistic regression analyses were performed. *Results*: the study involved 119 participants in the case group and 356 in the control group. After age adjustment, alcohol abuse was associated with male sex (OR: 3.39; 95%CI: 1.96;5.85), current or former smoking (OR: 2.11; 95%CI: 1.32;3.38), and poor sleep quality (OR: 1.91; 95%CI: 1.12;3.25); and negatively associated with ≥50 weekly working hours (OR: 0.54;95%CI: 0.32;0.92) and a monthly family income ≥6.1 minimum wages(OR: 0.37; 95%CI: 0.20;0.67). *Conclusions*: working hours and individual characteristics were associated with alcohol abuse. Workplaces should implement programs to prevent and treat alcohol abuse in nursing professionals to reduce workers' and patients' alcohol-related harms.

Keywords: alcohol abuse; alcohol-related disorders; alcohol drinking; nurse practitioners; nursing staff; occupational health.

Resumo

Objetivo*: identificar fatores associados ao consumo abusivo de álcool entre profissionais de Enfermagem no estado de São Paulo.* Métodos*: trata-se de um estudo caso-controle aninhado a um transversal. Foram coletados dados sobre características demográficas, do estilo de vida, capacidade para o trabalho, aspectos ocupacionais, do ambiente de trabalho físico e psicossocial e de consumo abusivo de álcool (questionário CAGE). Foi realizada análise de regressão logística múltipla.* Resultados*: o estudo envolveu 119 casos e 356 controles. Após ajuste por idade, o consumo abusivo de álcool foi associado ao sexo masculino (OR: 3,39; $IC_{95\%}$:1,96;5,85), tabagismo atual ou pregresso (OR: 2,11; $IC_{95\%}$: 1,32;3,38) e à qualidade do sono ruim (OR: 1,91; $IC_{95\%}$:1,12;3,25); e negativamente associado a carga horária de trabalho semanal ≥50 horas (OR: 0,54; $IC_{95\%}$:0,32;0,92) e renda familiar mensal de ≥6,1 salários-mínimos (OR: 0,37; $IC_{95\%}$: 0,20;0,67).* Conclusões*: jornada de trabalho e características individuais estiveram associadas ao consumo abusivo de álcool. Programas de prevenção e tratamento do consumo abusivo de álcool em profissionais da Enfermagem deveriam ser implementados nos locais de trabalho, visando reduzir os danos causados pelo álcool para trabalhadores e pacientes.*

Palavras-chave: *abuso de álcool; transtornos relacionados ao uso de álcool; consumo de bebidas alcoólicas; profissionais de enfermagem; recursos humanos de enfermagem; saúde do trabalhador.*

Received: January 25, 2022
Revised: May 23, 2022
Approved: June 06, 2022

Introduction

Substance users show a constellation of signs and symptoms, with varying degrees of severity, which characterize psychoactive substance dependence syndromes, including alcohol dependence syndrome. Syndrome diagnosis is based on seven criteria: compulsion to drink, increased alcohol tolerance, withdrawal syndrome, withdrawal relief or avoidance by drinking, salience of drink-seeking, narrowing of drinking repertoire, and reinstatement of the dependence syndrome[1,2]. These seven criteria underpin the Diagnostic and Statistical Manual of Mental Disorders – DSM-5 – classification of alcohol use disorder, based on increasing severity, intoxication and/or alcohol withdrawal, and other unspecified elements[1,2]. Substance abuse or misuse differs from chemical dependence in that abuse fails to include increased tolerance and withdrawal syndrome and is based on the negative impacts of repeated use, with an emphasis on harms to mental or physical health, others' criticism on pattern of use, and social consequences, such as accidents, failure to meet commitments, and violence[1,2].

Alcohol is considered the most hazardous psychoactive substance regarding general harms to users and others[3]. The deleterious effects associated with alcohol dependence syndrome or alcohol use disorder encompass physical diseases (different types of cancer, liver problems, and respiratory, renal, heart, and neurological diseases) and mental problems (mood disorders, anxiety, depression, and psychoses), in addition to other negative outcomes, such as increased risk of suicide, violence of different types and intensity, impairment of interpersonal relationships, family problems (including quality of sex life and risky sexual behavior), fertility and pregnancy problems (including fetal alcohol syndrome), involvement in different types of accidents, impaired academic and occupational performance, increased use and cost of health services, absenteeism, workplace accidents, unemployment, early withdrawal from the job market, and social stigma[3-6].

Alcohol dependence syndrome and alcohol use disorder have multiple etiologies. Genetic and physiological processes influence them, including enzymes related to alcohol metabolism; individual and social vulnerability factors, such as biological, psychological, and behavioral aspects; age; gender; family and socioeconomic background; health policies; alcohol production, distribution, and regulation policies; and advertising of its use[1,2,5,7]. Physical and psychosocial conditions at the work environment may also be associated with patterns of alcohol use[4,8].

The literature finds no safe levels for drinking, classifying it into low risk (low consumption, associated with preventive care against accidents), misuse or abuse (drinking accompanied by adverse events), and dependence (frequent compulsive consumption accompanied by more severe problems)[2]. The impact of alcohol abuse among nursing professionals can manifest itself as deleterious events for other professionals and acquaintances and, most notably, can impact public and patients via errors in care delivery[6,9]. Nursing practice, impaired by the use of alcohol or other psychoactive substances, is defined as a reduction in competence stemming from changes in lifestyle habits, performance, appearance, or other behaviors in the workplace[9]. The problem emerges when professionals are no longer fit to competently, responsibly, and safely deliver care due to the physiological, neurological or behavioral deficits stemming from alcohol use which affect judgement and impair work ability[6].

The estimated frequency or risk of alcohol abuse among different nursing professionals varies greatly. A study with nurses and nursing technicians at a university teaching hospital in the municipality of Rio de Janeiro found behavior consistent with alcohol abuse in 26.6% of its participants, whereas another study found a 7.8% prevalence among nurses at two hospitals in São Luís, in Maranhão State, Brazil[8]. Other studies report a 6.0% prevalence of alcohol abuse in nursing professionals in Alberta, Canada[10]; 23.1%, in nurses on professional development courses at a university in London[11]; and 16.2%, in nursing professionals at the New South Wales Nurses and Midwives' Association in Australia[7].

These rates are likely underestimated since healthcare providers may omit the issue for fearing its consequences[4,8]. Healthcare providers develop coping mechanisms which enable them, up to a certain point, to conceal impairments in their ability to provide adequate safe care, until errors become apparent[6]. The literature evidences that biological, psychic, behavioral, and environmental processes are fundamental for the development of different patterns of alcohol consumption[1,2,4]. Moreover, a number of factors have been associated with drinking patterns in nursing professionals, including sociodemographic characteristics and lifestyle, leisure-time, work-related and health behaviors, family history of alcohol use, access to psychoactive substances, and job stress[4,8-10,12,13]. Despite this, some findings are inconclusive or divergent in the literature.

Considering this gap and the deleterious impact of alcohol abuse on care delivery and considering the scant number of studies on the factors contributing to alcohol use in the nursing profession in Brazil[8],

this study aimed to identify the factors associated with alcohol abuse among nursing professionals in São Paulo State, Brazil.

Methods

Study design and participants

A case-control study, nested within a cross-sectional one, was conducted among nursing professionals in São Paulo State (25.0% of the Brazilian contingent), registered in 14 regional subsections of the *Conselho Regional de Enfermagem de São Paulo* (São Paulo Regional Board of Nursing – Coren-SP). Of the 411,162 eligible professionals, 1.0% (3,993 individuals) were included in this study. Of this population, 942 (2.6%) were currently not practicing the profession, whereas 3,051 (76.4%) were in active service, totalling an overall enrolment rate of 0.74%. Details on the target population and sample have been published elsewhere[14].

As the number of cases was much lower than the number of non-cases, a case-control study was chosen. Its sample size was calculated based on a 50.0% proportion of the risk factors in the control group, α=5.0%, (1-β) = 90.0%, and a 20.0% replacement rate. Cases were defined as individuals reporting alcohol abuse. To increase sample power, a total of three controls per case were randomly selected from the group of participants which reported refraining from abusing alcohol.

Data collection and studied variables

Data was collected between October 2018 and March 2019 with the support of Coren-SP (the Regional Council of Nursing-São Paulo), which sent out e-mails to the chosen professionals containing a link for the data collection form. The form contained questions on sociodemographic characteristics, such as sex (male, female), age (years, categorized into up to 30.9, 31.0 to 40.9, and 41.0 and older), marital status (married/living with a partner or single/divorced/widowed), monthly family income (categorized into up to 6.0 minimum wages or refused to answer and 6.1 and more), municipality within the Coren-SP subsection, and place of residence (capital, countryside). Subsequently, municipality information was added: urbanization rate, i.e., percentage of people living in urban households in comparison to total population in 2015[15] (up to 95.0%, 95.0% and more, according to data distribution frequency) and 2010 human development index - HDI - in points (0.000 to 1.000), according to the last available census[16] (very high – 0.800 and higher, high – 0.700 to 0.799, average – 0.600 to 0.699, low – 0.500 to 0.599, and very low – 0.000 to 0.4999). The form also contained questions about lifestyle: tobacco use (never smoked, former smoker, current smoker), regular practice of physical activity – at least 3x/week in the last 12 months (yes, no), body mass index (kg/m^2, categorized into normal – 18.5 to 24.9, overweight – 25.0 to 29.9, obesity grade I – 30.0 to 34.9, obesity grade II – 35.0 to 39.9, and obesity grade III – 40.0 and more, data not shown), sleep quality assessment via the Karolinska Sleep Questionnaire (KSQ) (with scores ranging from 1 to 5 points, categorized into good – 1 and 2 points, average – 3 points, and poor – 4 and 5 points) and insomnia (from a list of seven insomnia symptoms: no - no symptoms and yes - at least one symptom)[17], work ability via the Work Ability Index- WAI (with scores ranging from 7.0 to 49.0 points. Workers up to 35.0 years of age were categorized as excellent – 45.0 to 49.0, good – 41.0 to 44.9, moderate– 37.0 to 40.9, and poor – 7.0 to 36.9. Workers with 35.0 and above, as excellent – 44.0 to 49.0, good – 37.0 to 43.9, moderate– 28.0 to 36.9, and poor – 7.0 to 27.9)[14,18]. Questions on occupational history included professional category (registered nurse, nurse technician, and nurse assistant), nursing training (graduate degree, college education, and secondary or elementary education), age of entry into the workforce (in years, categorized into up to 14.0, 14.0 to 17.9, and 18.0 or more), time working in nursing (in years, categorized into up to 5.9, 6.0 to 10.9, 11.0 to 15.9, and 16.0 and more), employment contract (formal contract in a private institution, civil servant, self-employed professional or others), area of expertise (hospital, primary health care, emergence services, home care, nursing home, education or others), position/function (direct patient care, leadership, advice/consulting, teaching/education or others), second job (yes or no), working night shifts at their main and/or secondary jobs (yes or no), weekly working hours (categorized into up to 39.9, 40.0 to 49.9, 50.0 to 59.9, 60.0 to 69.9, 70.0 to 79.9, and 80.0 and more), recent history of work-related diseases or accidents (yes or no), and intention to leave the profession based on the question from the NEXT-Study - Nurses' Early Exit Study ('How often during the course of the past year have you thought about giving up nursing?' Answer categories were classified into no – never/sometimes a year and yes – sometimes a month/sometimes a week/every day)[14].

Participants' psychosocial work environment was assessed via the Job Stress Scale (JSS), adapted, from the Job Content Questionnaire, (JCQ) for use in Brazil based on the Demand-Control Model.

It measures psychological demands (5 to 20 points), control (6 to 24 points), and social support at work (6 to 24 points)[19]. Dimension scores were categorized into high or low according to the means for each score[14]. Demand and control were combined into four categories of job strain risk (high job strain, active job, low job strain, and passive job)[14,19].

Psychosocial environment was assessed by the Brazilian version of the Effort-Reward Imbalance (ERI) questionnaire, structured based on the theoretic model bearing the same name and comprising effort, reward, and overcommitment[20]. The effort-reward ratio was calculated and multiplied by 6/11, giving us a coefficient ranging from 0.17 to 5.00 points, in which scores above 1.00 indicate imbalance[14,20]. Scores were then categorized into tertiles, with higher score indicating greater risk of job strain[14].

Working conditions that may contribute to musculoskeletal disorders were assessed by the version, validated for use in Brazil[21], of the Work-Related Activities That May Contribute to Job-Related Pain and/or Injury (WRAPI) scale. This is a 15-item instrument whose scores range from 0 to 150 points, in which higher scores indicate worse situations[21]. Scores on the scale were categorized into tertiles[14].

Alcohol abuse was measured via the CAGE questionnaire (Cutting down, Annoyance by criticism, Guilty feelings, and Eye-openers). This is a four-item questionnaire with dichotomous responses (yes or no), in which two positive responses indicate clinically significant alcohol use[22,23]. CAGE is not an instrument for diagnosing chemical alcohol dependence but offers satisfactory sensibility and specificity to screen alcohol abuse[22,23].

All employed scales provide satisfactory reliability (Cronbach's Alpha coefficient >0.70), except the JSS control scale (alpha=0.59), which was retained in our analysis due to its relevance to the investigated topic. CAGE has an alpha=0.64 but this value can be explained by the small number of questions making up the instrument.

Statistical analysis

Crude and adjusted logistic regression models were used. A forward stepwise multiple regression analysis was performed, including variables which showed $p<0.20$ in the crude analysis. Association was measure via odds ratio (OR) and, in the final model, a significance level of 0.05 was adopted and 95% Confidence Intervals (95%CI) were calculated. Model fit was determined by the Hosmer-Lemeshow residuals analysis test.

Ethical aspects

This study was approved by the Coren-SP Board and by the Ethics Review Board from the Universidade de São Paulo (nº 2.614.513) on April 23, 2018. Researchers were prohibited access to databases containing registration information on the evaluated professionals to enforce Coren-SP information security rules (invulnerability and confidentiality). All participants signed informed consent forms and individuals' data confidentiality was guaranteed. The principles of the Declaration of Helsinki and of the Council for International Organizations of Medical Sciences were observed.

Results

This study involved 119 individuals in its case group and 356 participants in its control group.

Results from the crude analysis of demographic and lifestyle variables showed an association between alcohol abuse and the male sex (OR: 3.25; 95%CI: 1.94;5.46), not living with a partner (OR: 1.72; 95%CI: 1.13;2.61), monthly family income ≤6.0 minimum wages (OR: 0.45; 95%CI: 0.25;0.78), high/average HDI (OR: 1.60; 95%CI: 1.05;2.45), former (OR: 2.66; 95%CI: 1.59;4.45) or current smoking (OR :1.87; 95%CI: 0.94;3.72), poor sleep (OR: 1.77; 95%CI: 1.08;2.91), and good (OR: 2.99; 95%CI: 1.11;8.06), moderate (OR: 3.67; 95%CI: 1.38;9.75) or poor work ability (OR: 3.64; 95%CI: 1.26;9.93) (**Tables 1** and **2**).

The following occupational variables were associated with alcohol abuse in our crude analysis: age at entry to the workforce <14.0 years (OR: 1.92; 95%CI: 1.04;3.54), <50.0 weekly working hours (OR: 0.48; 95%CI: 0.29;0.78), and intention to leave the nursing profession (OR: 1.67; 95%CI: 1.09;2.57) (**Table 3**).

Crude analysis found no statistical association among occupational characteristics and alcohol abuse (**Table 4**).

Table 1 Workers' distribution and crude logistic regression analysis of the association between alcohol abuse and demographic characteristics among nursing professionals (n=475) in São Paulo State, Brazil, 2019

Characteristics	*Alcohol abuse*					
	No (n=356)		*Yes (n=119)*		*OR*	*95%CI*
	n	*%*	*n*	*%*		
Sex						
Female	317	78.9	85	21.1	1.00	
Male	39	53.4	34	46.6	3.25	(1.94;5.46)
Age (Years)						
Up to 30.9	70	77.8	20	22.2	1.00	
31.0 to 40.9	132	73.7	47	26.3	1.25	(0.69;2.27)
41.0 and more	154	74.8	52	25.2	1.18	(0.66;2.13)
Marital status						
Married/living with a partner	218	79.3	57	20.7	1.00	
Single/divorced/widowed	138	69.0	62	31.0	1.72	(1.13;2.61)
Monthly family income (national minimum wages)						
Up to 6.0 or refused to answer	259	71.7	102	28.3	1.00	
6.1 and more	97	85.1	17	14.9	0.45	(0.25;0.78)
Place of residence						
Capital	120	79.5	31	20.5	1.00	
Countryside	236	72.8	88	27.2	1.44	(0.91;2.30)
Urbanization level						
Up to 95.0%	51	66.2	26	33.8	1.00	
95.0% and more	305	76.6	93	23.4	0.60	(0.35;1.01)
Human development index						
Very high	179	79.6	46	20.4	1.00	
High/average	177	70.8	73	29.2	1.60	(1.05;2.45)

OR: Odds Ratio
95%CI: 95% Confidence Interval

Table 2 Workers' distribution and crude logistic regression analysis of the association between alcohol abuse and lifestyle characteristics among nursing professionals (n=475) in São Paulo State, Brazil, 2019

Characteristics	*Alcohol abuse*					
	No (n=356)		*Yes (n=119)*		*OR*	*95%CI*
	n	*%*	*n*	*%*		
Smoking						
Never smoked	279	79.5	72	20.5	1.00	
Former smoker	48	59.3	33	40.7	2.66	(1.59;4.45)
Current smoker	29	67.4	14	32.6	1.87	(0.94;3.72)
Regular practice of physical activity						
Yes	158	74.5	54	25.5	1.00	
No	198	75.3	65	24.7	0.96	(0.63;1.46)
Sleep quality						
Good/average	297	77.1	88	22.9	1.00	
Poor	59	65.6	31	34.4	1.77	(1.08;2.91)
Insomnia						
No	136	78.6	37	21.4	1.00	
Yes	220	72.8	82	27.2	1.37	(0.88;2.13)
Body mass index						
Normal	133	76.0	42	24.0	1.00	
Overweight	119	76.8	36	23.2	0.96	(0.58;1.59)
Obesity	101	72.7	38	27.3	1.19	(0.72;1.98)
Not informed	3	50.0	3	50.0	3.17	(0.62;16.28)
Work ability						
Excellent	46	90.2	5	9.8	1.00	
Good	117	75.5	38	24.5	2.99	(1.11;8.06)
Moderate	128	71.5	51	28.5	3.67	(1.38;9.75)
Poor	65	72.2	25	27.8	3.54	(1.26;9.93)

OR: Odds Ratio
95%CI: 95% Confidence Interval

Table 3 Distribution of workers and crude logistic regression analysis of the association between alcohol abuse and occupational characteristics among nursing professionals (n=475) in São Paulo State, Brazil, 2019

Characteristics	*Alcohol abuse*				*OR*	*95%CI*
	No (n=356)		*Yes (n=119)*			
	n	*%*	*n*	*%*		
Professional category						
Registered nurse	206	72.8	77	27.2	1.00	
Nurse technician	119	76.3	37	23.7	0.83	(0.53;1.31)
Nurse assistant	31	86.1	5	13.9	0.43	(0.16;1.15)
Nursing education						
Graduate degree	158	72.5	60	27.5	1.00	
College education	48	73.8	17	26.2	0.93	(0.50;1.75)
Secondary and elementary school	150	78.1	42	21.9	0.74	(0.47;1.16)
Age at entry into the workforce (years)						
14.0 and more	324	76.4	100	23.6	1.00	
Up to 14.0	32	62.7	19	37.3	1.92	(1.04;3.54)
Time in nursing						
Up to 5.9	58	79.5	15	20.5	1.00	
6.0 to 10.9	74	75.5	24	24.5	1.25	(0.60;2.60)
11.0 to 15.9	68	75.6	22	24.4	1.25	(0.59;2.63)
16.0 and more	156	72.9	58	27.1	1.44	(0.76;2.73)
Main employment contract						
Formal contract in a private institution	169	72.5	64	27.5	1.00	
Civil servant	136	76.8	41	23.2	0.80	(0.51;1.25)
Others	51	78.5	14	21.5	0.72	(0.38;1.40)
Main area of performance						
Hospital/Primary health care/Emergence services	282	76.6	86	23.4	1.00	
Others	74	69.2	33	30.8	1.46	(0.91;2.35)
Position/function						
Direct patient care	242	74.2	84	25.8	1.00	
Others	114	76.5	35	23.5	0.88	(0.56;1.39)
Second job						
No	247	75.5	80	24.5	1.00	
Yes	109	73.6	39	26.4	1.10	(0.71;1.72)
Working night shifts (main and/or secondary job)						
No	266	76.4	82	23.6	1.00	
Yes	90	70.9	37	29.1	1.33	(0.85;2.10)
Weekly working hours						
Up to 49.9	53	62.4	32	37.6	1.00	
50.0 and more	303	77.7	87	22.3	0.48	(0.29;0.78)
Work-related disease or injury						
No	248	74.5	85	25.5	1.00	
Yes	108	76.1	34	23.9	0.92	(0.58;1.45)
Intention to leave the nursing profession						
No	251	78.2	70	21.8	1.00	
Yes	105	68.2	49	31.8	1.67	(1.09;2.57)

OR: Odds Ratio
95%CI: 95% Confidence Interval

Table 4. Workers' distribution and crude logistic regression analysis between alcohol abuse and working conditions among nursing professionals in São Paulo State, Brazil, 2019

Characteristics	*Alcohol abuse*					
	No (n=356)		*Yes (n=119)*		*OR*	*95%CI*
	n	*%*	*n*	*%*		
Demands at work						
Low	52	71.2	21	28.8	1.00	
High	304	75.6	98	24.4	0.80	(0.46;1.39)
Control at work						
High	284	74.7	96	25.3	1.00	
Low	72	75.8	23	24.2	0.95	(0.56;1.59)
Social support at work						
High	302	76.1	95	23.9	1.00	
Low	54	69.2	24	30.8	1.41	(0.83;2.41)
Risk of job strain						
Low strain job	42	68.9	19	31.1	1.00	
Active job	242	75.9	77	24.1	0.70	(0.39;1.28)
Passive job	10	83.3	2	16.7	0.44	(0.09;2.22)
High strain job	62	74.7	21	25.3	0.75	(0.36;1.56)
Effort at work						
Low	273	75.4	89	24.6	1.00	
High	83	73.5	30	26.5	1.11	(0.69;1.79)
Rewards at work						
High	291	75.6	94	24.4	1.00	
Low	65	72.2	25	27.8	1.19	(0.71;2.00)
Overcommitment						
Low	202	75.4	66	24.6	1.00	
High	154	74.4	53	25.6	1.05	(0.69;1.60)
Effort-reward imbalance						
No	295	76.4	91	23.6	1.00	
Yes	61	68.5	28	31.5	1.49	(0.90;2.47)
Work-related activities which lead do pain and/or injury						
Low	133	80.1	33	19.9	1.00	
Moderate/high	223	72.2	86	27.8	1.55	(0.99;2.45)

OR: Odds Ratio
95%CI: 95% Confidence Interval

Multiple logistic regression analysis showed that the following independent variables were statistically associated with alcohol abuse: male sex (OR: 3.39; 95%CI=1.96;5.85), current or former smoking (OR: 2.11; 95%CI: 1.32;3.38), and poor sleep (OR: 1.91; 95%CI: 1.12;3.25). Risk of alcohol abuse was lower among professionals who had a ≥50-hour working week (OR: 0.54; 95%CI: 0.32;0.92) and a ≥6.1 minimum-wage monthly family income (OR: 0.37; 95%CI: 0.20;0·67). After controlling our model for age, Hosmer-Lemeshow residual analysis (χ^2: 7.15; p: 0.31) showed a good model fit (**Table 5**).

Table 5 Multiple logistic regression analysis of factors associated to alcohol abuse among nursing professionals in São Paulo State, 2019.

	$OR_{adjusted}$	95%CI
Sex		
Female	1.00	
Male	3.39	(1.96;5.85)
Smoking		
Never smoked	1.00	
Former/current smoker	2.11	(1.32;3.38)
Weekly working hours		
Up to 49.9	1.00	
50.0 and more	0.54	(0.32;0.92)
Monthly family income (national minimum wages)		
Up to 6.0 or refused to answer	1.00	
6.1 and more	0.37	(0.20;0.67)
Sleep quality		
Good/average	1.00	
Poor	1.91	(1.12;3.25)
Age (Years)		
Up to 40.9	1.00	
41.0 and more	1.09	(0.69;1.72)

OR: Odds Ratio
95%CI: 95% Confidence Interval

Discussion

This study assessed nursing professionals' sociodemographic and occupational variables, lifestyle, aspects related to environmental and psychosocial work conditions, and their association with alcohol abuse. The following individual characteristics (independently of other variables and adjusted for age) best explain our alcohol abuse outcome: male sex, current/former smoking, poor sleep, < 50 weekly working hours, and <6.1 minimum-wage monthly family income.

Alcohol abuse was higher among men than women. This finding is consistent with other national and international studies showing sex differences in alcohol consumption frequency and amount. In Brazil, a population survey found recent drinking in 39.2% of male and 15.2% of female and binge drinking in 21.6% of male and 6.6% of female[24]. A study conducted with adults in Norway reported 14.0% and 4.0% rates of problematic drinking and a 26.0% and 13.0% prevalence of alcohol intoxication among male and female, respectively[12]. A Brazilian study with physicians and nurses at two hospitals in Maranhão State found 16.7% and 6.1% rates of alcohol misuse in men and women, respectively[8]. Moreover, a study with nursing professionals in Minas Gerais State found a 4.3 higher risk of alcohol abuse in men than women[13].

Sex-dependent biological factors influence drinking patterns. Female's lower weight, higher body fat, and lower capacity to metabolize ethanol in their livers favor higher blood alcohol levels and greater vulnerability to the effects of alcohol[24,25]. A range of factors may also influence the relation between alcohol and gender, including age, socioeconomic status, educational attainment, marital status, and occupational characteristics[24,26]. Cultural and social aspects shape perceptions and attitudes regarding alcohol, influencing men and women's consumption patterns. These differ according to country, geographic location, work environment, professions, social equity, and gender[12,23,26]. However, the gap between these marked sex and gender differences in drinking behavior has narrowed. Binge and risky drinking have increased among women over the last few decades, especially in younger adults, in line with shifts in their social role[12,24,25].

This study found a higher risk of alcohol abuse among former or current smokers than in individuals who have never smoked. The literature shows a consistent association between alcohol abuse or dependence and smoking[27,28]. A survey involving primary care users in Brazil showed that smokers were 3.4 times more likely to abuse alcohol than non-smokers[29]. A study involving physicians and nurses in Maranhão State found that healthcare providers who smoked showed a 6.0 times greater risk of alcohol use than other participants[8]. Similarly, a study conducted in Minas Gerais State with nursing professionals found a risk of alcohol abuse 8.9 times higher among smokers than in non-smokers[13].

Co-use of alcohol and tobacco is highly frequent and exacerbates the negative effects of either substance by itself, particularly for comorbidities associated with cancer, heart disease, pulmonary problems, and behavioral disorders[27,28]. The literature evidences that the neurobiological mechanisms these substances have in common potentiate their interactions and health and behavioral effects. Their main mechanisms are crossed-reinforcement and crossed-tolerance via activation of the mesolimbic dopamine pathway. This triggers the reward effects of both substances and crossed-tolerance due to common genetic interaction, favoring an increase in tolerance and sensitization by reducing responses to one substance by the use of the other[27,28]. Consequently, alcohol and tobacco reduce inhibitory control and potentiate the reward effect of one another. Nicotine increases the sedative and intoxicating effects of alcohol and alcohol promotes the urge to smoke[27,28]. Psychosocial and social factors may also favor the concurrent use of both substances, including individual differences in gender, age, behavioral and physiological effects, psychological characteristics and psychiatric conditions, and parents or close acquaintances' use[27,28].

In our sample, poor self-reported sleep was associated with a greater likelihood of alcohol abuse. A study with nurses at a hospital in Rio de Janeiro found a 3.1% prevalence of high risk of alcohol consumption among participants without insomnia versus 6.2% in those with self-reported insomnia symptoms[29]. A study of a population-based cohort in China showed, after adjusting for confounding variables, an association between higher alcohol consumption and poorer sleep ($p< 0.001$) and between alcohol abuse with short sleep (OR: 1.31), snoring (OR: 1.38), and sleep apnea (OR: 1.47)[30].

Alcohol can cause or exacerbate sleep disorders by acting on the receptor and neurotransmission systems involved in sleep regulation[31,32]. The main effect of alcohol on sleep is that, upon reaching the brain, it promotes the neurotransmission of gamma-aminobutyric acid (GABA), blocking cholinergic neurotransmission and promoting a suppressing effect on rapid eye movement – REM – sleep[31,32]. These effects differ depending on the situations in which alcohol is consumed. For non-alcoholic drinkers, its initial effect on sleep stems from its sedative action, shortening sleep onset latency, reducing REM sleep, increasing slow-wave sleep, and, as hours elapse, disrupting sleep and increasing wakefulness[31,32]. On the other hand, in individuals who suffer from alcohol abuse or dependence, both acute intoxication and withdrawal are associated with increased sleep onset latency, followed by a pattern of sleep disturbances with increased wakefulness[31,32]. The depressant effects of alcohol on the central nervous system may also affect respiratory centers, impairing the tonus of the pharyngeal muscles and narrowing the pharynx during sleep, favoring sleep apnea[33]. As chronic alcohol use develops, tolerance against sleep induction occurs, but not against its other negative effects on sleep quality and duration[32]. During acute abstinence from alcohol, sleep latency increases, and REM returns to, or exceeds, basal levels, and sleep time decreases during alcohol withdrawal[32]. Sleep disturbances can persist for years after alcohol cessation, of which insomnia is the most common one[31,32]. Changes in individuals' circadian rhythm can favor substance use as a means to aid sleep, thus possibly creating a vicious circle of alcohol consumption and sleep disorders[31,32].

In this study, higher family income (over six minimum monthly wages) was a protective factor against alcohol abuse in the investigated population. This result conflicts with the study conducted with physicians and nurses from Maranhão, which found

a 1.9 times higher risk of alcohol misuse among participants with a higher monthly income than in those with lower incomes[8]. This finding also differs from the results of a study among primary healthcare users in São Paulo, in which the group with an income of six minimum monthly wages or more had a 4.9 greater chance of abusing alcohol than the groups in lower income brackets[33]. Evidence on the associations between socioeconomic or educational levels and alcohol use is conflicting, although people with lower socioeconomic levels seem to be at a higher risk of alcohol abuse. This disparity in results might stem from differences in consumption patterns and habits, which tend to relate to social circumstances, such as financial resources, access to health services, employment situation, living conditions, access to engagement in healthy habits (such as an adequate diet and physical activity), stress, and support for psychological coping[24,34].

Long working weeks (main job, second job – when applicable – plus household work) were a protective factor against alcohol abuse in the studied population. A 2015 meta-analysis showed higher alcohol use in those working 49-54 hours (OR: 1.13) and ≥55 hours (OR: 1.12) per week than in individuals with shorter working weeks[35]. Another meta-analysis, conducted in 2021, showed that, in general, longer working hours were associated with high alcohol consumption (grams per week) and risk of drinking, although its results were inconclusive and showed low statistical power[36]. The relation between long working hours and alcohol use may be due to characteristics of the work environment (such as high demand and low control) and to individual aspects (such as personality traits, sleep issues or mental health problems)[35]. Note also that, besides the inconclusive results in the literature, our findings may be due to the fact that we considered working hours as the combined sum of both formal work and informal household labor. In this study, longer working hours were associated with less smoking, not being single, working in a hospital/primary care/emergency room, and working night shifts (data not shown). Thus, we may infer that aspects such as heading a family, working in areas associated with a greater level of responsibility, and having fewer free hours or nights are characteristics which reduce opportunities for drinking.

Notably, in this study, personal characteristics proved to act as important factors associated with alcohol abuse, whereas occupational aspects played a minor role in it. The physical and mental stressors inherent to the nursing profession may contribute to alcohol use in this group, but the literature currently has insufficient evidence to support these associations[8]. We might explain our results by the complex multi-causal nature of the factors underlying alcohol abuse, including individual and sociocultural conditions and public policy aspects[2,5].

Another aspect we should consider is the healthy worker effect, in which workers in poorer health suffer voluntary or involuntary exclusion from employment, whereas those healthier and fitter ones remain in the workforce[37]. In this study, this effect would create a scenario in which professionals who abuse alcohol would still be at the early stages of their health decline and without apparent impairments to their work ability or perception and job demand assessment and coping. This effect is important as impaired work ability is a determinant of voluntary or involuntary employment termination and a risk factor for shorter employment time among healthcare providers[37]. Alcohol use is negatively associated with work ability. Besides harming health, alcohol use reduces level of attention, worsens motor coordination, and lengthens response times, ultimately reducing effectiveness on the job and increasing impulsiveness and irritability[38].

Alcohol-related harms for individuals, family, and society are profound, far-reaching, and varied, with no safe levels of drinking[3]. Alcohol abuse among nursing professionals can impair their work ability, harm their physical and mental health, favor productivity loss, absenteeism, work-related accidents, and pose a risk to patients[6,9,38]. Thus, health institutions should implement actions aimed at preventing and controlling alcohol abuse and dependence.

Programs to prevent and manage substance dependence (including alcohol) within the workplace can potentially reduce alcohol-related harms at population and individual levels[39,40]. Local professionals within institutions can conduct such interventions and nurses, social workers or physicians can manage them. For the best effect, these healthcare providers can engage as a multidisciplinary team in programs which include management and family members. Outsourced specialized services may also implement such interventions. These actions should be continuous, integrated, and tailored for each worker, encompassing individual and family group sessions (approaches, visits, and assessments), support groups, specialized admissions, clinical admissions, referrals to community groups (e.g., Alcoholics Anonymous), and preventive educational actions aimed at all workers[39,40]. Social standards and fear of repercussions lead workers to conceal their drinking habits in the workplace when it reaches abusive levels[39], rendering monitoring actions important for early detection, referral to adequate treatment, and follow-up of workers who abuse alcohol.

Although we drew this study from the population of professionals in the most populous state in Brazil, who practice in a range of settings with different levels of care complexity, we might consider its external validity as acceptable only for groups of nursing professionals with similar demographics and occupational features. Our results corroborate previous reports, yielding new insights while highlighting the need to promote individual and group resources as strategies to address alcohol abuse among the nursing staff.

This study has some limitations. First, it contains measurement biases because, although we used a validated questionnaire to assess alcohol abuse, we failed to collect further details on the type and amount of consumed alcoholic beverages. To minimize analysis bias, we controlled our evaluation by age, considered occupational factors and sociodemographic and life-style characteristics, and collected data on the different nursing professional categories and expertise areas. Lastly, since this is a case-control study nested within a cross-sectional one, it precluded any assessment of prevalence or causality between the independent variables and alcohol use in the studied population.

Conclusions

Our results showed that the following factors best explained alcohol abuse in the investigated population: male sex, current or former smoking, poor sleep, <50 weekly working hours, and <6.1 minimum-wage monthly family income. Programs to prevent and treat alcohol abuse in nursing professionals should be implemented in the workplace to strengthen staff's individual resources (health, functional capacities, competence, work experiences, and learning[17]) and reduce alcohol-related harms in workers and healthcare users.

Authors' contribution

Martinez MC, Latorre MRDO, and Fischer MF substantially contributed to the study design; data collection, analysis, and interpretation; manuscript draft and critical review; and the approval of its final published version. They take full public responsibility for the conducted study and for the published content.

Acknowledgements

The authors would like to thank the Regional Council of Nursing-São Paulo - Coren-SP - for its logistic support in divulging this research and collecting its data.

References

1. Stockwell T. The alcohol dependence syndrome: a legacy of continuing clinical and scientific importance. Addiction. 2015;110(Suppl 2):8-11.
2. Araújo MR, Laranjeira R. A evolução do conceito de dependência química. In: Gigliotti A, Guimarães A, organizadores. Dependência, compulsão e impulsividade. Rio de Janeiro: Rubio; 2017. p. 57-68.
3. Iranpour A, Nakhaee N. A review of alcohol-related harms: a recent update. Addict Health. 2019;11(2):129-37.
4. Vieira MLC, Oliveira EB, Souza NVDO, Lisboa MTL, Xavier T, Rossone FO. Patterns of alcohol use among nursing workers, and its association with their work. Rev Enferm UERJ. 2013;21(6):729-35
5. Andrade AC, organizador. Álcool e a saúde dos brasileiros: panorama 2020 [Internet]. São Paulo: Centro de Informações Sobre Saúde e Álcool; 2020 [cited 16 Sept 2021]. Available from: https://cisa.org.br/images/upload/Panorama_Alcool_Saude_CISA2020.pdf
6. Toney-Butler TJ, Siela D. Recognizing Alcohol and Drug Impairment in the Workplace in Florida. In: StatPearls [Internet]. Treasure Island: StatPearls Publishing; 2022. [cited 2022 Sept 12]. Available from: https://pubmed.ncbi.nlm.nih.gov/29939551/
7. Perry L, Xu X, Gallagher R, Nicholls R, Sibbritt D, Duffield C. Lifestyle health behaviors of nurses and midwives: the 'fit for the future' study. Int J Env Res Public Health. 2018;15(5):945.
8. Tobias JSP, da Silva DLF, Ferreira PAM, da Silva AAM, Ribeiro RS, Ferreira ASP. Alcohol use and associated factors among physicians and nurses in northeast Brazil. Alcohol. 2019;75:105-12.
9. Strobbe S, Crowley M. Substance use among nurses and nursing students: a joint position statement of the emergency nurses association and the international nurses society on addictions. J Addict Nurs. 2017;28(2):104-6.
10. Kunik D. Substance use disorders among registered nurses: prevalence, risks and perceptions

in a disciplinary jurisdiction. J Nurs Manag. 2015;23(1):54-64.

11. Bakhshi S, Sun F, Murrells T, While A. Nurses' health behaviours and physical activity-related health-promotion practices. Br J Community Nurs, 2015;20(6):289-96.
12. Bratberg GH, Wilsnack SC, Wilsnack R, Haugland SH, Krokstad S, Sund ER, et al. Gender differences and gender convergence in alcohol use over the past three decades (1984-2008), The HUNT Study, Norway. BMC Public Health, 2016;16(723).
13. Junqueira MAB, Ferreira MCM, Soares GT, Brito IE, Pires PLS, Santos MAS, et al. Alcohol use and health behavior among nursing professionals. Rev Esc Enf USP. 2017;51;e03265.
14. Martinez MC, Latorre MRDO, Fischer FM. Work ability and intending to leave the nursing profession in São Paulo. Rev Enferm da UERJ, 2021;29:e57941.
15. Fundação SEADE - Sistema Estadual de Análise de Dados. SEADE População. População Urbana e Rural [Internet]. São Paulo: Governo do Estado de São Paulo. [cited 2022 Sept 12]. Available from: https://populacao.seade.gov.br/populacao-urbana-e-rural/
16. Instituto Brasileiro de Geografia e Estatística - IBGE. São Paulo. Pesquisas. IBGE [Internet]. Rio de Janeiro: IBGE. [cited 2022 Sept 12]. Available from: https://cidades.ibge.gov.br/brasil/sp/sao-paulo/pesquisa/37/0?tipo=cartograma
17. Vasconcelos SP, Fischer FM, Reis AOA, Moreno CRC. Factors associated with work ability and perception of fatigue among nursing personnel from Amazonia. Rev Bras Epidemiol. 2011;14(4):688-97.
18. Tuomi K, Ilmarinen J, Jahkola A, Katajarinne L, Tulkki A. Índice de capacidade para o trabalho. São Carlos:EduFSCar; 2010.
19. Alves MGM, Chor D, Faerstein E, Lopes CS, Werneck GL. Short version of the "job stress scale": a Portuguese-language adaptation. Rev Saude Publica. 2004;38(2):164-71.
20. Chor D, Werneck GL, Faerstein E, Alves MGM, Rotenberg L. The Brazilian version of the effort-reward imbalance questionnaire to assess job stress. Cad Saude Publica. 2008;24(1):219-24.
21. Coluci MZO, Alexandre NMC. Cross-cultural adaptation of an instrument to measure work-related activities that may contribute to osteomuscular symptoms. Acta Paul Enferm. 2009;22(2):149-54.
22. Mayfield D, McLeod G, Hall P. The CAGE questionnaire: validation of a new alcoholism screening instrument. Am J Psychiatry. 1974;131(10):1121-3.
23. Laranjeira R, coordenação. Usuários de substâncias psicoativas: abordagem, diagnóstico. 2a ed. São Paulo: Conselho Regional de Medicina do Estado de São Paulo/Associação Médica Brasileira; 2003 [cited 2021 Sept 16]. Available from: https://www.cremesp.org.br/?siteAcao=Publicacoes&acao=detalhes&cod_publicacao=23
24. Machado IE, Monteiro MG, Malta DC, Lana FCF. Pesquisa Nacional de Saúde 2013: relação entre uso de álcool e características sociodemográficas segundo o sexo no Brasil. Rev Bras Epidemiol. 2017;20(3):408-22.
25. Mendonça AKRH, Jesus CVF, Figueiredo MBGA, Valido DP, Nunes MAP, Lima SO. Alcohol consumption and factors associated with binge drinking among female university students of health area. Esc Anna Nery. 2018;22(1):e20170096.
26. Hashemi NS, Thørrisen MM, Skogen JC, Sagvaag H, Ruiz de Porras DG, Aas RW. Gender differences in the association between positive drinking attitudes and alcohol-related problems. The WIRUS Study. Int J Environ Res Public Health. 2020;17(16):5949.
27. Adams S. Psychopharmacology of tobacco and alcohol comorbidity: a review of current evidence. Curr Addict Rep. 2017;4:25-34.
28. Cross SJ, Lotfipour S, Leslie FM. Mechanisms and genetic factors underlying co-use of nicotine and alcohol or other drugs of abuse. Am J Drug Alcohol Abuse. 2017;43(2):171-85.
29. Portela LF, Luna CK, Rotenberg L, Costa-Silva A, Toivanen S, Araújo T, et al. Job Strain and Self-Reported Insomnia Symptoms among Nurses: What about the Influence of Emotional Demands and Social Support?. Biomed Res Int. 2015;2015:820610.
30. Zheng D, Yuan X, Ma C, Liu Y, VanEvery H, Sun Y, et al. Alcohol consumption and sleep quality: a community-based study. Public Health Nutr. 2020;24(15):4851-8.
31. Colrain IM, Nicholas CL, Baker FC. Alcohol and the sleeping brain. Handb Clin Neurol. 2014;125:415-31.
32. Reid-Varley WB, Ponce Martinez C, Khurshid KA. Sleep disorders and disrupted sleep in addiction, withdrawal and abstinence with focus on alcohol and opioids. J Neurol Sci. 2020;411:116713.
33. De Vargas D, Bittencourt MN, Barroso LP. Padrões de consumo de álcool de usuários de serviços de atenção primária à saúde de um município brasileiro. Cienc Saude Colet. 2014;19(1):17-25.
34. Probst C, Roerecke M, Behrendt S, Rehm J. Socioeconomic differences in alcohol-attributable mortality compared with all-cause mortality: a systematic review and meta-analysis. Int J Epidemiol. 2014;43(4):1314-27.
35. Virtanen M, Jokela M, Nyberg ST, Madsen IEH, Lallukka T, Ahola K, et al. Long working hours and alcohol use: systematic review and meta-analysis of published studies and unpublished individual participant data. BMJ. 2015;350:g7772.
36. Pachito DV, Pega F, Bakusic J, Boonen E, Clays E, Descatha A, et al. The effect of exposure to long working hours on alcohol consumption, risky drinking and alcohol use disorder: A systematic review and meta-analysis from the WHO/ILO Joint

Estimates of the Work-related Burden of Disease and Injury. Environ Int. 2021;146:106205.

37. Martinez MC, Fischer FM. Work Ability as Determinant of Termination of Employment: To Resign or Be Dismissed? J Occup Environ Med. 2019;61(6):e272-81.

38. Izu M, Silvino ZR, Cortez EA. Work ability of a hospital nursing team: a correlational study. Online Braz J Nurs. 2016;15(4).

39. Felix Junior IJ, Schlindwein, VLDC, Calheiros PRV. A relação entre o uso de drogas e o trabalho: uma revisão de literatura PSI. Estud Pesqui Psicol. 2016;16(1):104-22.

40. Yuvaraj K, Eliyas SK, Gokul S, Manikandanesan S. Effectiveness of Workplace Intervention for Reducing Alcohol Consumption: a Systematic Review and Meta-Analysis. Alcohol and Alcoholism. 2019;54(3):264–71.