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Levels of Anxiety and Stress Experienced by Nurses in Inpatient Units*

* This article stems from the dissertation entitled: "The Effect of Heart Rate Variability Biofeedback on State-Trait Anxiety Levels in Nursing Professionals: A Randomized Clinical Trial," submitted to the Graduate Nursing Program at the Universidade Federal do Rio Grande do Sul, Brazil.

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Theme: Evidence-based practice; occupational health.

Contribution to the subject: The present study provides data on the risk conditions to which nursing professionals in inpatient units are exposed, the potential outcomes regarding the psychoemotional distress experienced by this population, and the need for interventions that favor the preservation of the mental health of nursing teams. In addition, the relevance of more robust studies on the protective factors for anxiety is emphasized.

Abstract

Objective: To assess state-trait anxiety levels and their correlation with occupational stress and socio-biographical and occupational factors in nursing professionals. **Materials and Methods:** This quantitative, cross-sectional, analytical study was conducted in the inpatient units of a university hospital in southern Brazil, with the participation of 162 nursing professionals. For data collection, socio-biographical and occupational forms, the Stress-Symptom Scale, the Workplace Stress Scale, and the State-Trait Anxiety Inventory were used. The data were analyzed based on descriptive and inferential statistics. **Results:** Nursing professionals have moderate levels of state-trait anxiety. There is a positive correlation between state-trait anxiety scores, stress scores, and stress dimensions ($\rho = 0.811, p < 0.001$). “Trait” anxiety is associated with years of experience in nursing ($PR\ 0.97$) and psychic-mental health follow-up ($PR\ 1.97$). “State” anxiety is associated with sex ($PR\ 0.54$), education ($PR\ 2.26$), and hours of sleep ($PR\ 0.92$). **Conclusions:** “State” anxiety is associated with sex, age, higher education level, and psychic-mental health follow-up; however, years of experience in nursing and hours of sleep were found to be protective factors.

Keywords (Source: DeCS)

Anxiety; occupational stress; inpatient care units; work; nursing.

4 Niveles de ansiedad y de estrés en el trabajo de enfermería en unidades de hospitalización*

* Este artículo es derivado de la tesis de doctorado “Efeito do biofeedback da variabilidade da frequência cardíaca sobre os níveis de ansiedade traço-estado dos profissionais de enfermagem: ensaio clínico randomizado”, sometida al programa de posgrado en Enfermería de la Universidade Federal do Rio Grande do Sul, Brasil.

Resumen

Objetivo: evaluar los niveles de ansiedad estado-rasgo y su correlación con el estrés ocupacional y los factores sociobiográfico y ocupacional en profesionales de enfermería. **Materiales y método:** estudio cuantitativo, analítico y transversal realizado en las unidades de hospitalización de un hospital universitario del sur de Brasil, con la participación de 162 profesionales de enfermería. Para la recolección de datos, se utilizó un formulario sociobiográfico y ocupacional, la Escala de Síntomas de Estrés, la Escala de Estrés Laboral y el Inventario de Ansiedad Estado-Rasgo. Los datos se analizaron con base en la estadística descriptiva e inferencial. **Resultados:** los profesionales de enfermería presentan niveles moderados de ansiedad estado-rasgo. Existe una correlación positiva entre las puntuaciones de ansiedad estado-rasgo, las puntuaciones de estrés y las dimensiones de estrés ($\rho = 0,811, p < 0,001$). La ansiedad “rasgo” se asoció con los años de experiencia en enfermería ($RP\ 0,97$) y el seguimiento de la salud psíquico-mental ($RP\ 1,97$). Por otra parte, la ansiedad “estado” se asoció con el sexo ($RP\ 0,54$), la educación ($RP\ 2,26$) y las horas de sueño ($RP\ 0,92$). **Conclusiones:** la ansiedad “estado” se asoció con el sexo, la edad, el nivel educativo superior y el seguimiento de la salud psíquico-mental; sin embargo, los años de experiencia en enfermería y las horas de sueño actuaron como factor protector.

Palabras clave (Fuente: DeCS)

Ansiedad; estrés laboral; unidades de internación; trabajo; enfermería.

Níveis de ansiedade e de estresse no trabalho da enfermagem em unidades de internação*

* Este artigo é derivado da tese de doutorado intitulada: “Efeito do biofeedback da variabilidade da frequência cardíaca sobre os níveis de ansiedade traço-estado dos profissionais de enfermagem: ensaio clínico randomizado”, submetida ao Programa de Pós-Graduação em Enfermagem da Universidade Federal do Rio Grande do Sul, Brasil.

Resumo

Objetivo: avaliar os níveis de ansiedade traço-estado e sua correlação com o estresse ocupacional e com os fatores sociobiográficos e ocupacionais nos profissionais de enfermagem. **Materiais e método:** estudo quantitativo, transversal analítico, realizado nas unidades de internação de um hospital universitário do sul do Brasil, com a participação de 162 profissionais de enfermagem. Para a coleta de dados, utilizaram-se formulário sociobiográfico e ocupacional, Escala de Sintomas de Estresse, Escala de Estresse no Trabalho e Inventário de Ansiedade Traço-Estado. Os dados foram analisados com base na estatística descritiva e inferencial. **Resultados:** os profissionais de enfermagem apresentam níveis moderados de ansiedade traço-estado. Existe uma correlação positiva entre os escores de ansiedade traço-estado, os escores de estresse e as dimensões do estresse ($\rho = 0,811, p < 0,001$). A ansiedade “traço” mostrou-se associada aos anos de experiência na enfermagem ($RP\ 0,97$) e ao acompanhamento para saúde psíquico-mental ($RP\ 1,97$). A ansiedade “estado” também mostrou associação com o sexo ($RP\ 0,54$), a escolaridade ($RP\ 2,26$) e as horas de sono ($RP\ 0,92$). **Conclusões:** a ansiedade “estado” mostrou-se associada ao sexo, à idade, ao nível de escolaridade superior, ao acompanhamento para a saúde psíquico-mental; no entanto, os anos de experiência na enfermagem e as horas de sono comportaram-se como um fator protetor.

Palavras-chave (Fonte: DeCS)

Ansiedade; estresse ocupacional; unidades de internação; trabalho; enfermagem.

Introduction

Anxiety is an adaptive response inherent to human existence, defined by an emotionally based subjective experience stemming from exposure to risky situations or fearful anticipation of danger; however, disproportionate reactions that vary in intensity and duration contribute to the pathogenesis of anxiety (1, 2).

Mental disorders are among the leading causes of diseases worldwide. Anxiety is one of the most disabling disorders due to its direct psychological effects and economic and social consequences. The Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) estimated a global prevalence of anxiety disorders in 2020 of 3825 cases per 100,000 people, totaling 298 million people worldwide; however, after adjusting for the COVID-19 pandemic, the estimated global prevalence was 4,802, corresponding to 374 million people, showing a 25.6 % increase in cases of anxiety disorders in 2020 (3).

The prevalence of causal factors for mental disorders in healthcare professionals has reached a remarkable relevance, highlighting the association of anxiety and occupational stress with an increased workload, physical exhaustion, and some aspects of workplace environments that can have dramatic effects on the physical and mental well-being of professionals (1).

In the COVID-19 pandemic context, which involves the entire healthcare network and workforce, the determining role of nursing in providing humanized care in responding to the disease has been highlighted and recognized in several social and academic spheres; nonetheless, the interaction of numerous institutional, professional, and personal factors intensified by the humanitarian crisis may have influenced these professionals' tendencies of becoming ill (4).

In Brazil, this mental disorder has reached higher proportions and affects 9.3 % of the population, being the country with the highest number of anxiety cases worldwide (5). Anxiety prevalence varies among cultures, ethnicities, age groups, and social, economic, and working conditions (5, 6).

The routine experience of stressful conditions can lead to severe suffering, burnout, or psychosomatic diseases with impairment in quality of life and service provision (7, 8). Regarding the effects of anxiety and occupational stress on nursing professionals, continuous exposure to person-centered care, living with pain, experiencing suffering and death processes, work-related demands, and interaction with environmental and social factors expose nursing teams to stressful situations that contribute to acute or chronic anxiety symptoms (9, 10).

All these considerations suggest that nursing professionals have had to face an adverse reality caused by the changes in the perception of anxiety and occupational stress, and they have had to adapt to it. Thus, the importance of data dissemination processes regarding emerging problems in moments of crisis to support evidence-based

intervention strategies and decision-making in institutional, democratic, or legislative settings is emphasized.

In light of the above, this study aimed to evaluate state-trait anxiety levels and their correlation with occupational stress, along with the socio-biographical and occupational factors associated with state-trait anxiety in nursing professionals.

Materials and Methods

Study design

This work is a quantitative, cross-sectional, analytical study.

Population and sample

The study population consisted of 520 nursing professionals working in the inpatient units of a referral university hospital in Porto Alegre, Rio Grande do Sul, Brazil.

For sample calculation, a simple random probability sampling was used, stratified by professional category, and a confidence level of 95 %, power of 80 %, and a minimum correlation of 0.25 were considered. Thus, the sample consisted of 162 nursing professionals, retaining a proportionality and representativeness of 32 % (52) nurses and 68 % (110) nursing technicians and assistants.

It is noteworthy that, according to the regulation of nursing practice in Brazil, differences exist between each professional category per level of qualification. Thus, nurses perform all activities and attributions exclusive to nursing; nursing technicians perform mid-level activities, which involve guiding and monitoring nursing work at an assistance level and participating in nursing care planning. Finally, nursing assistants perform mid-level activities of a repetitive nature, which involve auxiliary nursing services provided under supervision and simple execution in treatment processes (11, 12).

Selection and eligibility criteria

For selecting participants, the following inclusion criteria were used: nursing professionals who were active in their positions and had been hired for more than 30 days in any of the work shifts. Those professionals on extended leave (sick leave, social security benefits), maternity leave, vacation, or who had returned from leave less than 15 days ago were excluded from the study.

Data collection

Data collection was carried out between April and August 2020. Four instruments were used for data collection: a socio-

biographical and occupational form, the Stress-Symptom Scale (SSS), the Workplace Stress Scale (WSS), and the State-Trait Anxiety Inventory (STAI).

The authors developed the socio-biographical form based on data that, according to the literature and the subject matter investigated, can present a statistically significant correlation. It contained, in addition to socio-biographical data (sex, age, marital status, education), socio-occupational data (professional category, time in the profession, the field of work in the institution, work shift, which is a form of optimizing time and valuation of the workforce, divided into the morning—7 am-1 pm—, afternoon—1-7 pm—, night—7 pm-7 am—, and intermediate—7 pm-1 am—, work on weekends and holidays only, family income as presented in the Instituto Brasileiro de Geografia e Estatística data, and reference value in Reais—the official currency of the Federative Republic of Brazil), health conditions and chronic diseases. Cronbach's alpha coefficient was 0.74.

The SSS aims to evaluate physical and psychological symptoms and determine the general stress level (GSL); it consists of 13 physical symptom items and 18 psychological symptom items, with Likert-type answers. The calculation is made through the arithmetic mean, in which values greater than 1 indicate stress, ranging from 1.1 (least stress) to 5 (maximum stress).

The WSS is a self-report instrument that evaluates organizational stress of a psychosocial nature and can be used in several work environments and various occupations. In 2004, the instrument was translated into Portuguese and validated by professionals from different organizations, public and private, in the state of São Paulo, demonstrating good psychometric properties (13); moreover, due to its practical utility, it has been used with nursing teams or similar populations (14, 15). The instrument consists of 23 items analyzed based on a five-point Likert scale, in which each item presents a stressor and a type of reaction to this stressor; the scores range from 23 to 115 points. The instrument validation had a Cronbach's alpha coefficient of 0.91, which suggests good psychometric properties (13).

The STAI is a self-report instrument that has been adapted, translated, and validated into Brazilian Portuguese (16) and is considered one of the most used instruments in research and clinical settings in several cultures and nursing teams or equivalent. The instrument consists of 40 items with Likert-type responses, which assess trait anxiety (20 items) with scores ranging from 1—almost never—to 4—almost always, and state anxiety (20 items) with scores ranging from 1—absolutely not—to 4—very much. The estimated scores range from 20 to 80 points and, according to the results, can be classified as low anxiety (20-30), moderate anxiety (31-49), and severe anxiety (greater than or equal to 50). The internal consistency described in the literature for the state anxiety component was $\mu = 0.89$, and for trait anxiety, $\mu = 0.88$ (16).

Data analysis and processing

The analyses were carried out in the Stata software version 14.0, with descriptive analysis having frequencies (absolute and relative) for qualitative variables. Continuous variables were summarized via the means and standard deviation, followed by univariate analysis using the Chi-squared test, Fisher's exact test, and Student's t-test. The prevalence ratios were calculated using Robust Poisson Regression to examine the association between moderate/high versus low trait-state anxiety and the independent variables. The significance level adopted was 5 %.

Ethical aspects

This study was approved by the Ethics Committee and Scientific Committee of the Hospital de Clínicas de Porto Alegre, with the ethical appreciation submission certificate 23346619.0.0000.5327 and Legal Opinion 3.796.246. The informed consent form was included with the questionnaire, following the recommendations of Resolution 466/2012 issued by the Conselho Nacional de Saúde do Brasil, which regulates research with human beings.

Results

A total of 162 nursing professionals participated in the study, with a prevalence of females ($n = 138$; 85.2 %), with a mean age of 43 years ($SD \pm 8.9$), who were married/had a consensual union ($n = 105$; 64.8 %), and with a mean number of children of 2.1 ($SD \pm 1$). Regarding their level of education, 61 (37.7 %) participants had completed high school; 29 (17.9 %) had incomplete higher education; 23 (14.2 %) had completed higher education; 36 (22.2 %) had a specialization, and 13 (8 %) had a master's/doctorate.

The participants' mean time working in nursing was 18 years ($SD \pm 7.7$). When asked about their perception of how stressed they felt, 48 (29.6 %) reported feeling slightly stressed, 75 (46.3 %) felt moderately stressed, and 27 (16.7 %) felt quite stressed (Table 1).

Table 1. Sociodemographic and occupational profiles of the nursing professionals included in the study ($n = 162$). Porto Alegre, Rio Grande do Sul, Brazil, 2022

Factor	Nurse	Nursing assistant	Nursing technician	Total	p-value
N	52	29	81	162	
Sex					
Female	45 (86.5 %)	28 (96.6 %)	65 (80.2 %)	138 (85.2 %)	0.100
Male	7 (13.5 %)	1 (3.4 %)	16 (19.8 %)	24 (14.8 %)	
Age, mean (SD)	39.3 (8.0)	52.8 (6.4)	41.8 (7.6)	43.0 (8.9)	< 0.001

Factor	Nurse	Nursing assistant	Nursing technician	Total	p-value
Education					< 0.001
High school	0 (0.0 %)	20 (69.0 %)	41 (50.6 %)	61 (37.7 %)	
Incomplete higher education	0 (0.0 %)	4 (13.8 %)	25 (30.9 %)	29 (17.9 %)	
Complete higher education	5 (9.6 %)	4 (13.8 %)	14 (17.3 %)	23 (14.2 %)	
Specialization	34 (65.4 %)	1 (3.4 %)	1 (1.2 %)	36 (22.2 %)	
Master's/doctorate	13 (25.0 %)	0 (0.0 %)	0 (0.0 %)	13 (8.0 %)	
Marital status					< 0.001
Married or with a partner	37 (71.2 %)	10 (34.5 %)	58 (71.6 %)	105 (64.8 %)	
Without a partner	15 (28.8 %)	19 (65.5 %)	23 (28.4 %)	57 (35.2 %)	
Family income					< 0.001
Up to BRL 2,500	0 (0 %)	0 (0 %)	3 (3.7 %)	3 (1.9 %)	
BRL 2,501 to BRL 4,500	0 (0 %)	14 (48.3 %)	30 (37.0 %)	44 (27.2 %)	
BRL 4,501 to BRL 6,500	11 (21.2 %)	9 (31 %)	33 (40.7 %)	53 (32.7 %)	
More than BRL 6,500	41 (78.8 %)	6 (20.7 %)	15 (18.5 %)	62 (38.3 %)	
Physical activity					0.63
No	28 (53.8 %)	16 (55.2 %)	50 (61.7 %)	94 (58 %)	
Yes	24 (46.2 %)	13 (44.8 %)	31 (38.3 %)	68 (42 %)	
BMI, mean (SD)	25.5 (3.7)	28.1 (4.9)	27.3 (4.6)	26.9 (4.5)	0.020
Work shift at the institution					< 0.001
Morning	16 (%)	2 (%)	36 (%)	54 (%)	
Afternoon	18 (%)	11 (%)	32 (%)	61 (%)	
Night	9 (%)	16 (%)	12 (%)	37 (%)	
Intermediate	1 (%)	0 (%)	1 (%)	2 (%)	
Mainly on weekends and holidays	8 (%)	0 (%)	0 (%)	8 (%)	
Time working in nursing in years, mean (SD)	15.1 (7.9)	25.6 (5.0)	16.9 (6.5)	17.9 (7.7)	< 0.001
Time working in the institution in years, mean (SD)	9.4 (8.3)	19.0 (4.8)	8.0 (7.0)	10.4 (8.2)	< 0.001
Time working in the sector, mean (SD)	5.6 (5.2)	13.9 (6.5)	5.5 (5.8)	7.0 (6.6)	< 0.001
Integrative therapies					0.16
No	33 (63.5 %)	20 (69 %)	62 (76.5 %)	115 (71 %)	
Yes	19 (36.5 %)	9 (31 %)	17 (21 %)	45 (27.8 %)	
Feels stressed					0.57
Not at all	2 (3.8 %)	0 (0 %)	7 (8.6 %)	9 (5.6 %)	
Slightly	14 (26.9 %)	10 (34.5 %)	24 (29.6 %)	48 (29.6 %)	
Moderately	28 (53.8 %)	11 (37.9 %)	36 (44.4 %)	75 (46.3 %)	
Quite	7 (13.5 %)	7 (24.1 %)	13 (16 %)	27 (16.7 %)	
Totally	1 (1.9 %)	1 (3.4 %)	1 (1.2 %)	3 (1.9 %)	

BRL: Brazilian Real short for the official currency of the Federative Republic of Brazil; BMI: Body Mass Index; SD: standard deviation.

Source: Prepared by the authors.

Regarding the SSS, considering the instrument's minimum and maximum scores (0-5), it was noted in the "physical symptoms" category that the highest scores were for muscular pain, with a mean of 3.3 ($SD \pm 1.8$) and for the psychological symptoms, anxiety scored a mean of 3.23 ($SD \pm 1.82$; Table 2).

Table 2. Stress symptoms of the nursing professionals in the study ($n = 162$). Porto Alegre, Rio Grande do Sul, Brazil, 2022

	Mean	SD	Min	Max
Physical symptoms				
Increased blood pressure	1.68	1.41	1.00	5
Increased respiratory rate	1.41	1.12	1.00	5
Shortness of breath	1.44	1.18	1.00	5
Dermatological conditions	2.09	1.65	1.00	5
Higher incidence of diseases	1.9	1.57	1.00	5
Insomnia	2.59	1.87	1.00	5
Gastritis and ulcers	1.8	1.56	1.00	5
Nausea and vomiting	1.38	1.1	1.00	5
Constant tiredness	2.7	1.85	1.00	5
Muscle pain	3.33	1.8	1.00	5
Dizziness	1.64	1.38	1.00	5
Increased cholesterol	1.68	1.48	1.00	5
Sexual disorders	2.08	1.71	1.00	5
Psychological symptoms				
Reduced ability to focus	2.58	1.86	1.00	5
Demotivation	2.3	1.75	1.00	5
Anxiety	3.23	1.82	1.00	5
Carelessness with appearance	1.88	1.54	1.00	5
Fear	2.09	1.7	1.00	5
Mood swings	2.72	1.83	1.00	5
Nervousness	1.63	1.41	1.00	5
Constant thoughts on a specific subject	2.38	1.77	1.00	5
I feel insecure	2.15	1.67	1.00	5
Change in appetite	2.71	1.87	1.00	5
I am easily irritated	2.52	1.81	1.00	5
I feel distressed	2.75	1.8	1.00	5
I worry excessively	2.7	1.83	1.00	5
I am more emotional	2.6	1.79	1.00	5
I am more nervous	2.52	1.79	1.00	5
I forget appointments	1.62	1.34	1.00	5
I cry more often	1.98	1.57	1.00	5
I feel intense loneliness	1.49	1.23	1.00	5

Source: Prepared by the authors.

Table 3 shows WSS ($M = 1.88$, $SD \pm 0.69$), GSL ($M = 2.15$, $SD \pm 0.88$), trait anxiety ($M = 37.75$, $SD \pm 10.01$), and state anxiety ($M = 40.04$, $SD \pm 10.54$) classified as moderate for nursing professionals. Regarding the dimensions of occupational stress, the highest means were found in autonomy and control ($M = 2.05$, $SD \pm 0.8$) and interpersonal relationships ($M = 1.87$, $SD \pm 0.84$).

Table 3. Descriptive analysis of the general scores and dimensions of the WSS, SSS, and STAI for the nursing professionals included in the study ($n = 162$). Porto Alegre, Rio Grande do Sul, Brazil, 2022

Dimensions	<i>n</i>	%
WSS		
Low	52	32.1
Moderate	96	59.26
High	14	8.64
Score	1.88*	0.69**
WSS dimensions		
Autonomy and control	2.05*	0.8**
Roles and work environment	1.83*	0.7**
Relationship with the boss	1.8*	0.8**
Interpersonal relationships	1.87*	0.84**
Growth and appreciation	1.8*	0.8**
SSS		
Physical level	1.98*	0.83**
Psychological level	2.33*	1.11**
GSL	2.15*	0.88**
Trait anxiety		
Score	37.75*	10.01**
Low (L)	103	63.58
Moderate (M)	56	34.57
High (H)	3	1.85
State anxiety		
Score	40.04*	10.54**
Low (L)	88	54.32
Moderate (M)	70	43.21
High (H)	4	2.47

*mean; ** SD

Source: Prepared by the authors.

Spearman's correlation was carried out to understand the performance pattern between the scores of the scales, finding a positive correlation between the stress symptoms, GSL, workplace stress, and their associated domains with the STAI scores (Table 4).

Table 4. Correlation between the general scores and dimensions of the WSS, the SSS, and the STAI scores for the nursing professionals included in the study ($n = 162$). Porto Alegre, Rio Grande do Sul, Brazil, 2022

Scores	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
EET											
(1) Score	1.00										
Dimensions (WSS)											
(2) Autonomy and control	0.90	1.00									
(3) Roles and work environment	0.87	0.79	1.00								
(4) Relationship with the boss	0.90	0.72	0.73	1.00							
(5) Interpersonal relationships	0.85	0.69	0.67	0.75	1.00						
(6) Growth and appreciation	0.84	0.64	0.68	0.80	0.73	1.00					
SSS											
(7) Physical level	0.38	0.41	0.30	0.26	0.36	0.28	1.00				
(8) Psychological level	0.46	0.48	0.39	0.34	0.41	0.39	0.65	1.00			
(9) GSL	0.47	0.49	0.39	0.34	0.43	0.38	0.86	0.94	1.00		
STAI											
(10) State score	0.51	0.50	0.42	0.41	0.50	0.45	0.51	0.67	0.66	1.00	
(11) Trait score	0.56	0.53	0.49	0.43	0.52	0.51	0.51	0.67	0.67	0.81	1.00

Spearman's $\rho = 0.811$; $*p < 0.001$

Source: Prepared by the authors.

Table 5 presents the means and standard deviations between the stress and anxiety scales and the sociodemographic and labor variables included in the study. It is noteworthy that females have higher GSL ($p = 0.03$), trait anxiety ($p = 0.05$), and state anxiety ($p = 0.05$) scores. Participants who reported practicing no physical activities ($p = 0.006$) and those with complete higher education ($p = 0.05$) presented higher trait anxiety levels. Regarding psychic-mental health follow-up, there was a significant difference between participants who received follow-up in their GSL ($p = 0.003$), WSS ($p = 0.008$), and trait anxiety (< 0.001) scores.

Table 5. The association between stress and anxiety according to nursing professionals' sociodemographic and occupational variables. Porto Alegre, Rio Grande do Sul, Brazil, 2022

Variable	GSL		WSS		Trait anxiety		State anxiety	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Sex								
Female	2.22	0.91	1.91	0.68	38.40	10.10	40.69	10.67
Male	1.77	0.62	1.77	0.73	34.04	8.79	36.29	9.03
p-value	0.03		0.27		0.05		0.05	
Education								
High school	2.02	0.81	1.73	0.59	35.64	9.05	38.43	9.93
Incomplete higher education	2.33	1.14	1.91	0.73	36.10	9.16	38.86	10.36
Complete higher education	2.34	0.96	2.20	0.72	42.13	10.30	43.78	9.30
Specialization	2.13	0.80	1.93	0.72	38.69	10.28	40.92	11.30
Master's/doctorate	2.10	0.62	1.86	0.76	41.00	12.55	41.15	12.95
p-value	0.65		0.08		0.05		0.30	

Variable	GSL		WSS		Trait anxiety		State anxiety	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Marital status								
Married or with a partner	2.22	0.88	1.90	0.66	38.62	10.50	40.91	11.01
Without a partner	2.03	0.89	1.85	0.74	36.16	8.91	38.42	9.49
p-value	0.14		0.46		0.13		0.19	
Family income								
Up to BRL 2,500	3.18	0.66	2.81	1.25	49.33	8.08	49.33	1.15
BRL 2,501 to BRL 4,500	2.27	1.09	1.94	0.67	36.70	8.34	39.30	9.01
BRL 4,501 to BRL 6,500	2.11	0.81	1.81	0.65	37.43	10.75	40.43	10.83
More than BRL 6,500	2.05	0.77	1.86	0.69	38.21	10.36	39.77	11.44
p-value	0.23		0.32		0.20		0.34	
Physical activity								
No	2.36	0.92	1.89	0.64	39.48	9.96	41.29	10.79
Yes	1.86	0.74	1.87	0.75	35.37	9.66	38.31	9.99
p-value	< 0.001		0.56		0.006		0.12	
Smoker								
Yes	2.45	1.19	1.88	0.64	39.69	9.65	42.81	8.17
p-value	0.41		0.89		0.37		0.18	
Alcoholic beverages								
Yes	2.23	0.95	1.93	0.69	38.05	11.03	41.04	10.79
p-value	0.54		0.54		0.94		0.43	
Stimulating beverages								
Yes	2.22	0.90	1.90	0.70	37.50	9.96	40.25	10.52
p-value	0.16		0.68		0.56		0.64	
Professional category								
Nurse	2.08	0.74	1.91	0.70	39.79	10.66	40.90	11.46
Nursing assistant	2.08	0.96	1.82	0.59	35.21	8.91	38.66	10.13
Nursing technician	2.23	0.95	1.89	0.72	37.36	9.81	39.98	10.13
p-value	0.70		0.96		0.13		0.85	
Work shift in the institution								
Morning	2.31	0.93	2.02	0.73	38.17	9.48	40.39	10.29
Afternoon	2.17	0.87	1.87	0.74	39.62	9.99	41.39	10.49
Night	1.92	0.85	1.73	0.56	34.08	9.58	37.65	11.00
Intermediate	1.76	0.59	1.74	0.74	36.00	21.21	38.50	19.09
Weekends and holidays	2.13	0.83	1.82	0.47	38.13	11.39	38.75	9.16
p-value	0.28		0.43		0.11		0.64	
Professional with more than one job								
Yes	2.06	0.79	1.70	0.72	37.58	11.81	38.77	12.48
p-value	0.67		0.08		0.53		0.25	
Physical health problema								
No	2.09	0.86	1.82	0.68	37.30	9.87	39.43	10.55
Yes	2.36	0.93	2.08	0.68	39.13	10.45	41.90	10.40
p-value	0.08		0.02		0.38		0.17	
Psychic-mental follow-up								
No	2.04	0.86	1.80	0.65	36.19	9.54	38.87	10.24
Yes	2.49	0.88	2.15	0.76	42.69	9.98	43.72	10.73
p-value	0.003		0.008		< 0.001		0.12	

Source: Prepared by the authors.

In the Poisson regression model, for each year of experience in nursing, a 0.97 times lower prevalence of trait anxiety in the moderate-high levels was found compared to professionals with low levels of anxiety. Psychic-mental health follow-up had a 1.97 times higher prevalence of trait anxiety in the moderate-high levels compared to the low levels (Table 6).

Nursing professionals with complete higher education had a 2.26 times higher prevalence of state anxiety than those with high school education. In turn, the male sex and hours of sleep also showed a trend of 0.54 and 0.92 times lower prevalence of state anxiety in the moderate-high levels, respectively (Table 6).

Table 6. Multivariate analysis between anxiety and sociodemographic and labor variables. Porto Alegre, Rio Grande do Sul, Brazil, 2022

Variables	PR*	p	[CI 95 % PR]	
Trait anxiety				
Time working in nursing in years	0.97	0.037	0.94	1
Psychic-mental follow-up	1.97	0.001	1.32	2.93
State anxiety				
Sex (male)	0.54	0.078	0.27	1.07
Age	1.04	0.062	1	1.08
Education				
Incomplete higher education	1.21	0.495	0.7	2.08
Complete higher education	2.26	0.001	1.37	3.71
Specialization	1.49	0.151	0.86	2.57
Master's/doctorate	1.01	0.986	0.44	2.33
Time working in nursing in years	0.97	0.14	0.92	1.01
Psychic-mental follow-up	1.35	0.117	0.93	1.98
Alcoholic beverages	1.3	0.156	0.91	1.86
Hours of sleep	0.92	0.166	0.83	1.03

* PR: prevalence ratio, calculated through multivariate Poisson regression; CI: confidence interval.

Source: Prepared by the authors.

Discussion

The present study evaluated state-trait anxiety levels and their correlation with occupational stress in nursing professionals working in inpatient units. This study found a positive correlation between occupational stress and state-trait anxiety in this group of nursing professionals. A similar study conducted in Turkey found a statistically significant positive correlation between anxiety and depression scores and perceived stress scores ($r = 0.487$, $p = 0.001$; $r = 0.537$, $p = 0.001$, respectively) in healthcare professionals (17).

The nursing professionals in this study had a higher prevalence of muscle pain and anxiety as manifestations of stress, which

aligns with the literature (18, 19). A study conducted in Denmark found that high stress was consistently associated with a greater probability of lower back pain episodes in healthcare professionals (moderate stress: OR [odds ratio] = 1.44, 95 % CI = 1.12-1.86; high stress: OR = 2.30, 95 % CI = 1.61-3.29 [20]). Another study carried out in Jordan indicated that anxiety was significantly associated with increased cumulative trauma disorders in the shoulder ($\beta = 0.10$; $p = 0.003$) and wrist ($\beta = 0.08$; $p = 0.003$ [19]).

A study conducted in a hospital in Guangxi city, China, with 180 nursing professionals identified a positive correlation between the dimensions of stress load and total anxiety score ($r = 0.676$; 95 % CI = 0.667 and 0.663), which indicates that the higher the stress load, the higher the total anxiety score; therefore, anxiety can be considered a significant factor affecting nurses' stress load (21). In the present study, a similar correlation was found, which supports the relationship between the stress and anxiety variables regarding the physical and psychological impact caused by the COVID-19 pandemic.

This study found that participants who stated they did not practice physical activities had higher levels of trait anxiety, corroborating the findings of the study conducted with nurses in Hong Kong, which found a significant association between anxiety symptoms and physical inactivity (OR = 2.658; 95 % CI = 1.833-3.854 [22]). The same study revealed that nurses who reported having poor physical health were 2.9 times more likely to have anxiety symptoms than those who reported having good physical health (22).

The results presented here are consistent with those found in previous studies (23-25), which have shown that women are more prone to develop sleep disorders (OR = 1.36; 95 % CI = 1.00-1.86; $p = 0.04$) and moderate/high levels of anxiety (OR = 1.96; 95 % CI = 1.45-2.64; $p = 0.0001$) than men (25).

The present study showed that nurses working in inpatient units with higher levels of education had higher levels of anxiety when compared to those professionals with a medium level of education. A similar study conducted in Bangladesh found that nurses were significantly associated with lower scores on the anxiety and stress subscale ($p < 0.001$) compared to nursing professionals with a master's degree (26). A study in Greece reported that nurses with graduate degrees were 3.44 and 4.24 times more likely to experience anxiety symptoms than nursing assistants. These findings may be attributed to the level of responsibility, professional expectations, and self-assessment processes in the professional practice of nurses who have attained a higher level of education, which creates a predisposition to anxiety (27).

In this sample, women had higher anxiety and stress scores than men, which is consistent with the prevalence of anxiety disorders being twice as high in women in the general population (25). The results of a recent study demonstrated a significant difference in

the levels of psychological symptoms for anxiety, depression, and stress among nurses, being more prevalent in female nurses than in male nurses (26). In the context of the COVID-19 pandemic, several authors suggest that exposure to stressful conditions and adverse work experiences may lead to an increased risk of psychological effects associated with progressive deterioration in mental health among healthcare professionals (26, 28).

Although several studies describe the increase in anxiety associated with the length of experience described in healthcare professionals and especially in nurses (19, 21, 22), this study found that having experience in nursing reduces the prevalence of anxiety by 0.97 times. In this sense, a study carried out in Israel reported that nurses with more years of professional experience had better subjective health ($\beta = 0.086$; $p = < 0.01$ [29]). However, the multivariate analysis of a study in Greece showed that work experience in nursing did not emerge as a significant predictor of elevated anxiety symptoms (27); these findings may indicate the importance of further research on the theme.

While the study has achieved its objective, the data should be viewed in light of some limitations. First, the cross-sectional design hinders adequately assessing causal relationships. Second, the present study used self-administered psychometric instruments, in which responses may have been influenced by social and institutional desirability. Finally, the sample belongs to a single health-care institution, which may limit the generalizability of the data.

The present study provides evidence of the prevalence of anxiety and stress in nursing professionals working in inpatient units and its multifactorial. It has been proven that the interaction of some factors assessed in anxiety and stress symptomatology presents similar properties between the study population and nursing professionals in other contexts. Based on the data identified, the need to establish complementary interventions in the work environment to address such factors comprehensively is restated.

Conclusions

This study has shown that nurses working in inpatient units had moderate trait anxiety, state anxiety, and workplace stress. The main stress symptoms were muscle pain and anxiety; furthermore, a directly proportional correlation exists between the STAI and WSS. In turn, years of nursing experience had a positive association with trait anxiety, while psychic-mental health follow-up had a negative association with it.

The main factors that tended to increase state anxiety were having completed higher education, not practicing physical activities, and psychic-mental health follow-up. However, other factors such as being male, having experience in nursing, and hours of sleep showed a tendency towards reducing state anxiety.

Finally, this study's results suggest a psychosocial risk condition and the need to develop strategies to prevent health problems for nursing professionals.

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