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Observational study on the potential psychological factors that affected italian nurses involved in the COVID-19 health emergency

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Abstract. *Background and Aim of the work.* The present study aimed to identify the potential psychological malaise factors affecting the Italian nurses on the front lines of Covid-19 patient care since evidence suggested that they are at high risk of developing psychological disorders. *Methods.* An online questionnaire was administered to 291 Italian nurses, containing information on: sex, years of work experience, region of Italy where nurses worked and the intensive care unit assignment. Then, the anxiety disorders, the impact of the event, the depression and the insomnia conditions and their principal psychological factors influencing nurses during the health emergency. were assessed. *Results.* Nurses worked in Northern Italy registered higher anxiety scores than others (p=0.023); the assignment to the intensive care unit (p=0.042) not influenced these scores. The total impact of event (IES-R) values evidenced that women recorded higher "Avoidance" (p=0.032) and "Hyperarousal" (p=0.003) values than men. The nurses who worked in Northern Italy recorded higher scores of "Hyperarousal" (p=0.010) and IES-R total (p=0.044). More women than men showed insomnia conditions (p=0.038) and nurses with a number of years of work experience not exceeding 10 years recorded greater levels of depression than the others (p=0.031). The psychological factors affected nurses included: the "Pleasure/Interest" dimension which correlated with the "Uncontrollable Thinking" (p=0.007), the "Unsatisfactory sleep/wake rhythm" (p=0.004), and the "Unmanageable pain and weakness" (p=0.001). *Conclusions.* Urgent need to intervene with psychological support programs for health professionals, such as nurses who are facing the health emergency from Covid-19 on the front line. (www.actabiomedica)

Key words: anxiety disorder; covid-19; depression disorder; impact of event; insomnia disorder; nurse; psychological factors.

Background

In late December 2019, coronavirus pneumonia (Covid-19) began to manifest itself in the Chinese city of Wuhan, and then spread nationally and internationally (1). On 30 January 2020, the World Health Organization held an emergency meeting and declared the global Covid-19 epidemic as an international public health emergency (2).

In such a critical situation, healthcare professionals engaged in the front lines in the treatment and care of patients with Covid-19 are at highly risk of developing psychological distress and other mental health symptoms (3, 4). In particular, the growing number cases, the overwhelming and long workload, the great media coverage, the absence of specific drugs and the impression of not being adequately supported affect the mental health of health professionals (5-7).

Previous studies highlighted adverse psychological reactions to the SARS epidemic of 2003 (8,9) and H1N1 flu in 2009: the healthcare community has experienced situations of fear and panic with a consequent psychological impact reporting alarm (10), high levels of stress, anxiety, depression and insomnia (3, 6, 11-14), due to the infection and its ability to contaminate their family members and colleagues.

Furthermore, literature suggested that nurses have a high incidence of anxiety and depression, symptoms associated with their work activity (15-17): the high level of nursing professional stress and exhaustion could lead to behavioral health problems and psychiatric morbidity, including insomnia, anxiety, vague malaise, asthenia, headache, sleep disturbances (insomnia, or hypersomnia), diffuse pains, dyspeptic and eating disorders (3, 18-20). All these critical conditions could be accentuated in critical areas, such as Intensive Care Units, which represent a very stressful work environment, due to organizational difficulties, variable working hours, frenetic operating rhythms, causing stress and influencing individual psychological stability (15, 21-24).

The healthcare professionals engaged in the forefront of treating Covid-19 patients were exposed every day to a high risk of infection, as a source of prolonged distress. So their individual coping skills might not always be enough to cope with it (25).

In this regard, studies subsequent to the state of proclamation of the Covid-19 pandemic have highlighted data not encouraging for nurses directly employed in the care of patients affected by Covid-19 from all over the world. In fact, from Hong Kong (26) to China (27), from Germany (28) to Italy (3,6), the warning was always the same: nurses recorded moderate and severe conditions of anxiety, burnout, depression and insomnia, regardless of the level of care intensity for patients suffering from Covid-19 to which they were assigned. There were also a massive predisposition of the female sex to such psychiatric disorders compared to the male one, perhaps connected to the social role of women in their own family, associated with the experienced irregular hours and higher workloads with psychological instability, since they have often been transferred from their unit to the departments for the treatment of Covid-19 patients.

Aim

The aim of this study was to identify the potential psychological malaise factors that upset Italian nurses directly involved in the treatment of patients affected by the SARS-CoV-2 infection, evaluating the impact of the health emergency as the pandemic, the anxiety, the depression and the insomnia conditions.

Materials and Methods

Design

An observational descriptive study was conducted. The on-line questionnaire was developed in an anonymous form through the Google function of Google Modules. It was administered in the period from 25 Mars 2020 to 25 April 2020 through some pages and nursing groups present on the following Facebook and Instagram pages, as: #noisiamopronti, Nurse health professional, Professional nurse, Nurses by passion, NurseTimes, Nurse24.it, Nurse Specialist, Nurseallface, Nursing research, NursesInProgress, Nurses, Active Nurses, Nurses Italy, Nurses supporting health, Nursing Mobility, Nursing Competitions, Informed Nurses. All Italian nurses who worked in a Covid-19 Intensive Care Unit (ICU) were invited to this survey. Their participation was voluntary and each nurse who answered the questionnaire gave their consent to the processing data.

Measure

Based on the existing literature and in accordance with the aim of the study, we created an ad hoc questionnaire consisting of a total of 58 questions, divided into two parts. The first part collected the demographic characteristics of the participants, specifically:

- sex;
- years of work experience, divided in different ranges, as: from 0 to 10 years, from 11 to 20 years and above 20 years;
- region of Italy where nurses worked, as: Northern, Central or Southern Italy;

- if the interviewee already worked in the ICU or he/she was transferred only following the pandemic (ICU assignment).

The second part collected data relating to anxiety, impact to the event, depression and insomnia conditions of nurses, measured by:

- Assessment test Generalized Anxiety Disorder scale (GAD), version 7 (29,30): consisting of 20 answers to which each participant had to respond according to a Likert scales ranging from 1 = "almost never or rarely" to 4 = "almost always". The sum of the values multiplied by a conversion factor of 1.25 allowed us to identify the number of nurses who exceeded the threshold value set at 58.7 which they need psychological help for anxiety, compared to those who did not exceed this reference value;

- Impact of Event Scale – Revised (IES-R) (31,32) consisting of 22 items with a response range that varied from 0 = "not at all to 4= to "extremely". By summing 8 of the 22 items, the level of the sub-scale of the "Avoidance" dimension was obtained, which explored how the subject avoided thinking about the traumatic event. With other 8 items, the level of the "Intrusiveness" sub-scale was registered, which defined how the subject could not help but think about the traumatic event. Finally, by averaging of the latest 6 items, the "Hyperarousal" level was known, which measure how many anger and irritability the interviewed felt indefinitely. The maximum mean score of each of the 3 subscales was 4, hence the maximum total mean score of the IES-R scale was 12. Lower scores were better and a IES-R total score of 33 or higher out of a maximum score of 88 meant the probable presence of a Post-Traumatic Stress Disorder (PTDS);

- "Insomnia Severity Index" (ISI) (33,34): consisting of 7 items that collected information about the participants' sleep/wake status. Each question was measured with a Likert scale, ranging from 0 = "not at all" to 4 =: "very much". The sum of the seven items identified the four risk categories of insomnia. F or total values ranged between 0 and 7, no clinically significant insomnia was identified; for values between 8 and 14, a subthreshold insomnia condition was recorded, for values between 15 and 21, a moderate clinical insomnia condition was registered and, finally, for values between 22 and 28, a severe clinical insomnia status was identified;

- "Patient Health Questionnaire" (PHQ), version 9 (35,36): including 9 questions with an associated Linkert-response range that varied from 0, as: "never" to 3, as: "almost every day". The sum of the answers identified the category risk of the depressive state: values from 0 to 4 identified the absence of the depression condition; values from 5 to 9 identified the subthreshold depression state; values from 10 to 14 identified a mild depression condition; values from 15 to 19 identified a moderate depression state and values higher than 20 identified a severe depression condition.

Data analysis

All data were collected in an Excel data sheet and processed thanks to the SPSS software, version 20.0. All categorical variables were presented as frequencies and percentages (GAD, PHQ and ISI values) in relation to demographic characteristics such as: sex, the region to which they belong, years of work experience, the ICU assigned before or during the pandemic. Then for continuous variables, as for IES-R and its subdimensions, data were collected as means ± standard deviations.

For each psychological dimension presented as frequencies and percentages, the Univariate analysis was performed in order to assess significant differences among interviewed nurses divided in different groups, according to their demographic characteristics. While, for the IES-R values t-test for independent test and the ANOVA tests were assessed for the same purposes.

Then, sub-dimensions perceived of their psychological condition were obtained thanks to exploratory

factor analysis using the extraction method of the Maximum Likelihood Analysis and the rotation method of the Varimax with Kaiser Normalization. The significant level was assessed at 0.05.

Finally, among the sub-dimensions of psychological factors perceived, the Sperman correlation analysis was assessed and values were considered as statistically significant for $p<0.01$.

Results

From 25 March 2020 to 25 April 2020, a total of 291 nurses from all regions of Italy anonymously answered to the online questionnaire. Of these, 212 (72.85%) were women and 79 (27.15%) were men. 166 (57%) worked in a region of Northern Italy, 59 (20.27%) worked in a region of Central Italy, 66 (22.73%) worked in a region of Southern Italy. Of the 291 participants, 187 (42.93%) had been working for no more than 10 years, 54 (18.57%) had been working for 11 to 20 years, 50 (17.18%) had been working for over 20 years. 153 (52.58%) of the nurses already worked in the ICU, while 138 (47.42%) of the nurses had been transferred from other wards to ICU in order to treat patients suffered from Covid-19 (Table 1).

No significant differences were recorded among nurses in the GAD values according to sex (p=0.380): of the 221 (75.95%) of nurses who did not register an anxiety disorder, 53.61% were female and 22.34% were male and on the other hand, among nurses who had an anxiety disorder 19.24% were female and 4.81% were male. Furthermore, there was a significant difference (p=0.023) between the levels of anxiety in relation to the Region of Italy: of the 166 (57%) of the responding nurses from Northern Italy, 40 (13.75%) registered an anxiety disorder, compared to 14 (4.81%) of 59 (20.27%) in Central Italy and 15 (5.15%) of 66 (22.73%) in Southern Italy, respectively. On the other hand, there was no significant difference (p=0.350) between the levels of anxiety among nurses in relation to the number of years of work experience. As regards the levels of anxiety disorders recorded according to the assignment to the ICU: nurses who did not report an anxiety disorder were significantly higher than nurses who recorded an anxiety disorder (p=0.042). Moreover, the ICU assignment seemed to not influence the anxiety disorder prevalence among participants (Already ICU: 11.67%; Transferred-ICU: 10%).

Table 1. The Generalized Anxiety Disorder scores (GAD-7) in Italian nurses.

GAD-7 values **Characteristics**	**GAD<58.7** **n=221;75.95%**	**GAD>58.7** **n=70;24.05%**	**F** **p value**
Sex			
Female (n=212;72.85%)	n=156; 53.61%	n=56;19.24%	F=0.773
Male (n=79; 27.15%)	n=65; 22.34%	n=14; 4.81%	p=0.380
Region of workplace			
North (n=166; 57%)	n=126; 43.30%	n=40; 13.75%	F=5.196
Centre (n=59; 20.27%)	n=45; 15.46%	n=14; 4.81%	p=0.023*
South (n=66; 22.73%)	n=51; 17.55%	n=15; 5.15%	
Years of work experience			
0-10 years (n=187; 42.93%)	n=126; 43.30%	n=41; 14.09%	F=0.876
11-20 years (n=54;18.57%)	n=36;12.37%	n=18; 6.19%	p=0.350
>20 years (n=50;38.5%)	n=40; 13.75%	n=10; 3.43%	
ICU Assignment			
Already ICU (n=153;52.58%)	n=119; 40.89%	n=34; 11.67%	F=4.176
Transferred-ICU (n=138;47.42%)	n=104; 35.74%	n=32; 10%	p=0.042*

Abbreviation: ICU: Intensive Care Unit.
*$p \leq 0.05$: Univariate Analysis as statistically significant.

The total IES-R values and related sub dimensions did not register high values such as to configure a PTSD. Significant differences were highlighted in relation to sex (p=0.010): women recorded higher total IES-R values (6.19±2.32) than men (4.93±0.81). Significant differences were also recorded in the sub-dimensions of the "Avoidance" and the "Hyperarousal" (p=0.032; p=0.003, respectively): women recorded higher "Avoidance" (2.14±0.95) and "Hyperarousal" (2.15±0.83) values than men (1.69±0.93 for "Avoidance"; 1.64±0.81 for "Hyperarousal", respectively). As regards the Region of workplace, there were significant differences between the "Hyperarousal" (p=0.010) and the total IES-R values (p=0.044): nurses who worked in the Northern Italy recorded higher scores of "Hyperarousal" (2.06±1.34) and IES-R total (6.18±0.921) compared to nurses from Central Italy (1.96±1.00 for "Hyperarousal"; 5.90±0.88 for IES-R total) and Southern Italy (1.96±1.06 for "Hyperarousal"; 5.87±3.20 for IES-R total, respectively). By considering the years of work experience, the only statistically significant difference was recorded between the "Hyperarousal" values (p=0.029): nurses registering a number of years of work experience between 11 and 20 years reported higher "Hyperarousal" values (2.34±0.77) than those with 0-10 years of work experience (1.92±0.84) and those with more than 20 years (1.98±0.91). Other significant differences in the IES-R total scores and its sub-dimensions as a function of the number of years of work experience were not found (Table 2).

Regarding the levels of insomnia (Table 3), the only significant difference recorded was according to sex (p=0.038): more women had subclinical (22.68%), moderate (27.49%) and severe (9.62%) insomnia condition compared to men (8.59% for sub-clinical, 7.56% for moderate, 9.62% for severe insomnia). Considering the other demographic variables, the levels of insomnia did not show any significant difference (p=0.603 for "Region of work"; p=0.185 for "Years of work experience"; p=0.314 for "ICU Assignment", respectively).

Finally, considering the depression condition (Table 4), there was a significant difference between nurses in relation to the number of years of work experience (p=0.031): nurses with a number of years of work experience not exceeding 10 recorded levels of depression greater than the others, in all the clinical dimensions considered (16.44% for sub-clinical; 18.90% for mild; 14.09% for moderate and 7.19% for severe). For all the other demographic variables, on the other hand, no significant differences were found (p=0.076 for sex; p=0.087 for Region of workplace; p=0.466 for ICU Assignment).

By considering all the GAD-7, the IES-R, the PHQ-9 and the ISI values, it was obtained that the potential psychological factors which affected nurses during the Covid-19 pandemic included (Table 5): the "Uncontrollable thinking"; the "Unsatisfactory sleep/wake rhythm"; the "Unmanageable pain and weakness"; the "Pleasure/Interest".

As shown in the Table 6 the "Pleasure/Interest" dimension statistical significantly correlated with the "Uncontrollable Thinking" (p=0.007), the "Unsatisfactory sleep/wake rhythm" (p=0.004), and the "Unmanageable pain and weakness" (p=0.001), respectively.

There were no statistically significant correlations between the "Uncontrollable Thinking" and the "Unsatisfactory sleep/wake rhythm" (p=0.913) or the "Unmanageable pain and weakness" (p=0.147) and between the "Unmanageable pain and weakness" and the "Unsatisfactory sleep/wake rhythm" (p=0.517).

Discussion and conclusions

This study aimed to highlight the psychological condition of Italian nurses directly involved in the care of patients with Covid-19 according to sex, number of years of work experience, the Region of Italy where nurses provided their service and in depending on whether the nurses worked or not in the ICU before the health emergency.

The choice of certain demographic variables over others was by no means random. In fact, the data reported in the literature showed a greater involvement of the female sex in the onset of certain psychiatric disorders compared to the male sex (3,6,37,38). To this, we also wanted to investigate how the number of years of work experience and therefore, the exposure to stressful activity determined a further accentuation of pathological conditions, also associated with the type of department, comparing nurses that already working

Table 2. The Event Impact Scale (IES-R) in Italian nurses.

Event Impact Scale/ Characteristics	Avoidance μ±s.d.	Intrusiveness μ±s.d.	Hyperarousal μ±s.d.	Total μ±s.d.
Sex				
Female (n=212;72.85%)	2.14±0.95	1.90±0.78	2.15±0.83	6.19±2.32
Male (n=79; 27.15%)	1.69±0.93	1.61±0.80	1.64±0.81	4.93±0.81
p value [a]	p=0.032*	p=0.059	p=0.003*	p=0.010*
Region of workplace				
North (n=166; 57%)	1.79±0.78	2.07±0.85	2.06±1.34	6.18±0.92
Centre (n=59; 20.27%)	1.88±0.79	2.06±0.85	1.96±1.00	5.90±0.88
South (n=66; 22.73%)	1.96±1.07	1.95±1.07	1.96±1.06	5.87±3.20
p value [b]	p=0.211	p=0.062	p=0.010*	p=0.044*
Years of work experience				
0-10 years (n=187;42.93%)	1.97±0.94	1.78±0.76	1.92±0.84	5.67±2.31
11-20 years (n=54;18.57%)	2.24±0.93	1.96±0.74	2.34±0.77	6.53±2.20
>20 years (n=50;38.5%)	1.97±1.10	1.86±0.95	1.98±0.91	5.77±2.77
p value [b]	p=0.294	p=0.060	p=0.029*	p=0.071
ICU Assignment				
Already ICU (n=153;52.58%)	2.02±1.00	1.87±0.85	2.04±0.90	5.93±2.53
Transferred-ICU (n=138;47.42%)	2.03±0.97	1.76±0.72	1.97±0.80	5.77±2.20
p value[a]	p=0.393	p=0.427	p=0.378	p=0.355

Abbreviation: ICU: Intensive Care Unit; μ±s.d.: mean ± standard deviation.
p value [a]: t-test for independent sample; p value [b]: ANOVA test; *p≤0.05: statistically significant.

for some time in the ICU with nurses that have taken over following the health emergency (15).

Finally, we considered the different Regions of Italy, given that at the time of data collection, the pandemic did not follow a homogenous spread throughout the Italian territory as it showed a greater prevalence in the Regions of Northern Italy. Therefore, we would have expected a worse psychological condition among nurses who worked in Northern Italy than in Central and Southern Italy.

The results confirmed our expectations: female nurses recorded higher levels in the IES-R assessment and the sub-dimension of the "Hyperarousal" and also in the levels of the insomnia condition. Nurses working in Northern Italy recorded higher levels of anxiety, of IES-R both in the total evaluation and in the "Hyperarousal" sub dimension. Additionally, nurses with up to ten years of work experience showed more severe depression levels, while those with work experience between 11 and 20 showed worse levels in the

Table 3. The Insomnia Severity Index (ISI) Scores in Italian nurses.

Insomnia Severity Index/ Characteristics	**Absence of insomnia Score:0-7 n=65;22.34%**	**Sub threshold Insomnia Score:8-14 n=91;31.27%**	**Moderate Insomnia Score:15-21 n=102;35.05%**	**Severe Insomnia Score:22-28 n=33;11.34%**	**F p value***
Sex					
Female (n=212;72.85%)	n=38; 13.06%	n=66; 22.68%	n=80; 27.49%	n=28; 9.62%	F=4.350
Male (n=79; 27.15%)	n=27; 9.28%	n=25; 8.59%	n=22; 7.56%	n=5; 1.72%	p=0.038*
Region of workplace					
North (n=166; 57%)	n=32; 11%	n=51; 17.52%	n=64; 21.93%	n=23; 7.90%	F=0.271
Centre (n=59; 20.27%)	n=15; 5.15%	n=21; 7.22%	n=15; 5.15%	n=4; 1.37%	p=0.603
South (n=66; 22.73%)	n=18; 6.18%	n=19; 6.53%	n=23; 7.90%	n=6; 2.06%	
Years of work experience					
0-10 years (n=187;42.93%)	n=48; 16.49%	n=54; 18.56%	n=62; 21.31%	n=23; 7.90%	F=1.763
11-20 years (n=54;18.57%)	n=6; 2.06%	n=20; 6.87%	n=23; 7.90%	n=5; 1.72%	p=0.185
>20 years (n=50;38.5%)	n=11; 3.78%	n=17; 5.84%	n=17; 5.84%	n=5; 1.72%	
ICU Assignment					
Already ICU (n=153;52.58%)	n=39; 13.40%	n=45; 15.46%	n=51; 17.52%	n=18; 6.19%	F=1.018
Transferred-ICU (n=138;47.42%)	n=26; 8.93%	n=46; 15.81%	n=51; 17.52%	n=17; 5.84%	p=0.314

Abbreviation: ICU: Intensive Care Unit.
*p≤0.05: Univariate Analysis as statistically significant.

"Hyperarousal" sub dimension in the IES-R assessment. Furthermore, the data collected explained the main state of malaise of Italian nurses directly involved in the care of patients affected by Covid-19, as: the condition of a thought about the pandemic defined as "uncontrollable", a condition of sleep/wake rhythm considered "unsatisfactory", a perception of pain and weakness as "unmanageable". All these conditions were then directly correlated with a perception of pleasure and one's interests.

In this regard, a study conducted in China (39) found high levels of anxiety among health workers compared to the general population. Similar results, were recorded in the Iranian study (40): nurses reported a high anxiety component among health workers, especially linked to the fear of infecting themselves and their families. Also in a Polish study (41) anxiety levels among nurses were assessed around to 38.8%. Fortunately, our data, at least in the dimension of anxiety-related disorders, differed from the data present in

Table 4. The Patient Health Questionnaire (PHQ-9) scores in Italian nurses.

PHQ/ Characteristics	Absence of depression Score0-4 n=35; 12.03%	Sub-threshold depression Score5-9 n=73; 25.08%	Mild major depression Score10-14 n=72; 24.74%	Moderate major depression Score15-19 n=73; 25.08%	Severe major depression Score>20 n=38; 13.06%	F p value*
Sex						
Female (n=212;72.85%)	n=19; 6.53%	n=47; 16.15%	n=58; 19.93%	n=57; 19.59%	n=31; 10.65%	F=3.178
Male (n=79; 27.15%)	n=16; 5.50%	n=26; 8.93%	n=14; 4.81%	n=16; 5.50%	n=7; 2.41%	p=0.076
Region of workplace						
North (n=166; 57%)	n=11; 3.78%	n=36; 17.52%	n=41; 14.09%	n=47; 16.15%	n=31; 10.65%	F=2.951
Centre (n=59; 20.27%)	n=12; 4.12%	n=7; 2.41%	n=18; 6.18%	n=16; 5.50%	n=6; 2.06%	p=0.087
South (n=66; 22.73%)	n=12; 4.12%	n=20; 6.87%	n=13; 4.47%	n=14; 4.81%	n=7; 2.41%	
Years of work experience						
0-10 years (n=187;42.93%)	n=22; 7.56%	n=48; 16.44%	n=55; 18.90%	n=41; 14.09%	n=21; 7.19%	F=4.715
11-20 years (n=54;18.57%)	n=7; 2.41%	n=13; 4.47%	n=8; 2.75%	n=19; 6.52%	n=7; 2.41%	p=0.031*
>20 years (n=50;38.5%)	n=6; 2.06%	n=12; 4.12%	n=9; 3.08%	n=16; 5.50%	n=7; 2.41%	
ICU Assignment						
Already ICU (n=153;52.58%)	n=17; 5.84%	n=43; 14.78%	n=39; 13.40%	n=37; 12.71%	n=17; 5.84%	F=0.533
Transferred-ICU (n=138;47.42%)	n=18; 6.18%	n=32; 10.10%	n=31; 10.65%	n=34; 11.68%	n=23; 7.90%	p=0.466

Abbreviation: ICU: Intensive Care Unit.
*p≤0.05: Univariate Analysis as statistically significant.

literature: participants with an anxiety disorder were equal to 24.05%. In all the studies cited, including ours, the female component appeared to be the most interested. It was also interesting to note how the literature emphasized anxiety disorder among nurses working in intensive care units (42-44). Anyway, from our data it emerged that the disorder was present in an almost overlapping manner between nurses already present in the ICU and those transferred to following the health emergency, underlining how the ICU environment was not significantly decisive in the onset of anxiety disorder. Of particular interest, however, was the data reported in our study on the prevalence of anxiety disorder compared to the regions of Italy. In fact, the anxiety levels also reflected the trend of spread of the infection, causing a state of anxiety more present among nurses in Northern Italy.

Table 5. Psychological factors influencing Italian nurses during the Covid-19 pandemic.

	Psychological Factors			
Scores	**Uncontrollable Thinking**	**Unsatisfactory sleep/wake rhythm**	**Unmanageable pain and weakness**	**Pleasure/ Interest**
GAD-1	.406	.347	.362	.464
GAD-2	.502	.125	.423	.412
GAD-3	.443	.074	.538	.327
GAD-4	.322	.290	.511	.447
GAD-5	-.026	-.264	.161	-.515
GAD-6	.332	.048	.653	.123
GAD-7	.093	.306	.548	.211
GAD-8	.123	.436	.569	.322
GAD-9	-.104	-.205	.009	-.648
GAD-10	.305	.071	.557	.108
GAD-11	.116	.035	.659	-.140
GAD-12	.133	.119	.717	.052
GAD-13	-.189	.019	-.127	-.337
GAD-14	.025	.121	.632	-.120
GAD-15	.011	.285	.527	.063
GAD-16	.090	.129	.545	-.163
GAD-17	.060	-.008	.060	-.568
GAD-18	.195	.136	.554	-.008
GAD-19	-.136	-.617	.033	-.340
GAD-20	.284	.457	.314	.155
IES-1	.552	.152	.163	.057
IES-2	.361	.752	-.008	-.009
IES-3	.530	.219	.058	.106
IES-4	.505	.303	.236	.274
IES-5	.431	.128	.022	-.324
IES-6	.637	.291	.112	.118
IES-7	.556	.071	.089	.020
IES-8	.502	-.063	.197	-.094
IES-9	.720	.292	.181	.095
IES-10	.646	.256	.367	.274
IES-11	.420	.222	.009	.020
IES-12	.728	.124	.208	.177
IES-13	.715	.205	.254	.187
IES-14	.745	.099	.142	.116
IES-15	.381	.811	.022	.044
IES-16	.675	.297	.069	.186
IES-17	.689	.079	.197	.123
IES-18	.571	.249	.337	.313

Scores	Psychological Factors			
	Uncontrollable Thinking	Unsatisfactory sleep/wake rhythm	Unmanageable pain and weakness	Pleasure/ Interest
IES-19	.549	.141	.439	.149
IES-20	.471	.422	.144	.152
IES-21	.501	.285	.019	.089
IES-22	.426	.122	.156	-.109
INSOMNIA- 1a	.175	.814	.167	.061
INSOMNIA-1b	.237	.811	.184	.034
INSOMNIA-1c	.148	.682	.223	-.026
INSOMNIA 2	.078	.742	.185	.154
INSOMNIA 3	.046	.457	.306	-.006
INSOMNIA 4	.224	.271	.362	.257
INSOMNIA 5	.277	.560	.302	.240
PHQ-1	.230	.206	.340	.431
PHQ-2	.440	.249	.326	.480
PHQ-3	.260	.801	.059	.149
PHQ-4	.231	.537	.353	.280
PHQ-5	.234	.499	.263	.280
PHQ-6	.446	.180	.406	.235
PHQ-7	.409	.407	.349	.162
PHQ-8	.338	.251	.411	.196
PHQ-9	.233	-.107	.449	.191

Notes: Extraction method is Maximum Likelhood Analysis. Rotation method is Varimax with Kiser Normalization.
Abbreviations: GAD: Generalized Anxiety Disorder; IES: Event Impact Scale; INSOMNIA: the Insomnia Severity Index; PHQ: Patient Health Questionnaire.

Table 6. Correlations of the psychological conditions in the Italian nurses during the Covid-19 pandemic.

Sperman's Rho	Uncontrollable thinking	Unsatisfactory sleep/wake rhythm	Unmanageable pain and weakness	Pleasure/ Interest
Uncontrollable thinking	1.000	0.913	0.147	0.007*
Unsatisfactory sleep/wake rhythm	0.913	1.000	0.517	0.004*
Unmanageable pain and weakness	0.147	0.517	1.000	0.001*
Pleasure/Interest	0.007*	0.004*	0.001*	1.000

* Correlation is significant at the 0.01 level (2-tailed).

Even the data relating to the depressive state were not at all encouraging: our data showed that as many as 37.4% of nurses reported a mild, moderate and severe depressive state. This condition appeared to be more marked in our sample than in those of other studies evidenced in literature, such as the study by Lai et al. (45) which assessed the depressive state among health workers in 34 Chinese hospitals and found that 39.2% of respondents suffered from a depressive state, more prevalent among women. In another study conducted in Wuhan, between February and March 2020 (46), 994 participants between medical and nursing staff showed that 36.9% had below-threshold depressive disorders (mean PHQ-9: 2.4), 34.4% had mild disturbances (mean PHQ-9: 5.4), 22.4%, had moderate disturbances (mean PHQ -9: 9.0), and 6.2% had severe disturbances (mean PHQ-9: 15.1). On the other hand, our data recorded a high prevalence of the depression condition, which did not detect significant differences in relation to sex but rather detected a significant component of cases of depression among nurses with a number of years of work experience not exceeding 10 years.

Another relevant aspect was the assessment of the impact of the pandemic event that influenced the lives of nurses. In the literature rather high levels of IES-R were reported compared to our data (47), despite value recorded was less than the past epidemic outbreak, as the SARS (48) and the MERS (49) suggesting that the IES-R score increased with age. Our data reported a significant, albeit not alarming, increase in IES-R levels among nurses with a number of years of work experience between 11 and 20 years. Also in this case, the nurses working in the regions of Northern Italy recorded significantly higher levels in the total values of IES-R and the "Hyperarousal" sub dimension compared to other colleagues.

Moreover, the current literature showed as the state of insomnia among nurses during the pandemic was a relevant problem.In Wuhan, China, between January and February 2020, 1.830 health workers had highlighted how the condition of insomnia was also very present, especially among first-line workers versus second-line workers (median ISI scores (IQR) between front-line and second-line workers: 6.0 [2.0-11.0] vs 4.0 [1.0-8.0]; $p<0.001$) and, above all, participants recorded greater symptoms of severe insomnia (severe insomnia among front-line workers' vs second-line workers: 9 (1.7%) vs 3 (0.4%), $p<0.001$). Furthermore, it was found that working as a front-line health care practitioner with direct engagement of COVID-19 patients was an independent risk factor for symptoms of depression, anxiety, insomnia and distress, as front-line health professionals were particularly at risk (50). In another Chinese study, conducted on 1.563 health workers involved in the front line in the care of patients with Covid-19, it was shown that the level of education, the environment of isolation, the concerns related to the pandemic, the type of work placement, higher workloads, especially during the night shift, were all determinants of unsatisfactory sleep (51). Still, a further study conducted in China between February and March 2020, involving 2.182 healthcare workers (doctors and other healthcare professionals) showed higher prevalence rates of insomnia (38.4 vs 30.5%; $p<0.01$), compared to non-medical health professionals (52). Our data were in agreement with what was reported in the literature (3, 50-52): in fact, high levels of insomnia were recorded, especially among women, while the number of years of work experience, or the region of belonging or the assignment in the ICU were no significant.

Moreover, the four relevant factors of the state of malaise of Italian nurses appeared to be in line with what had already been amply highlighted in the literature: in fact, a condition of "uncontrollable thinking" emerged among nurses, that was of concern about the pandemic and in the literature reported fear of becoming infected and infecting one's family as major influencing factors. Another important aspect was the perception of one's own need for rest considered unsatisfactory, which was reflected in the high workload, also due to the excessive number of working hours that nurses had to endure at least at the beginning of the pandemic when Healthcare Companies were still in a state of reorganization and relocation of human resources. This condition was then linked to the condition of unmanageable pain and weakness, almost uncontrollable, also due to the condition of excessive depression among the nurses. All this could then be directly correlated to the perception of one's own interest and pleasure which has worsened in this context.

These conditions described the literature had a unique message: nurses directly involved in the care of patients affected by Covid-19 need psychological support to cope with their malaise. All the studies on the subject reinforce this hope: the urgent need to intervene with psychological support programs for health professionals, such as nurses, who are facing the health emergency from Covid-19 on the front line.

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