ORIGINAL ARTICLE

Analysis of mental health symptoms and insomnia levels of intensive care nurses during the COVID-19 pandemic with a structural equation model

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Abstract

Background: Faced with this critical situation and directly involved in the treatment and care of COVID-19 patients, front-line healthcare workers are at high risk in terms of mental health symptoms.

Aims and Objectives: To determine the stress, anxiety, depression, and insomnia levels of intensive care nurses during the pandemic with a structural equation model.

Design: A multi-site survey study.

Methods: The study was performed with 194 nurses working in the intensive care units of five hospitals in Istanbul in July 2020. Data were collected using the Depression Anxiety Stress-21 Scale and Insomnia Severity Index electronically. The data were evaluated with descriptive statistics in SPSS package program. In order to test the structural model and hypotheses of the research, path analysis was performed with LISREL statistical software program. A validation study for the suitability of these scales to the study sample was done by the researchers using the confirmatory factor analysis method. The study conforms to the TREND checklist.

Results: In this study, the majority of the intensive care nurses had moderate to extremely severe depression (65.5%), anxiety (58.3%) and stress (72.3%) scores; in addition, 39.7% of the nurses experienced moderate or severe insomnia. Within the framework of a structural model; the effects of stress, anxiety and insomnia on depression, which is the dependent variable, were found to be statistically significant ($p < .001$).

Conclusions: It was found that the majority of the intensive care nurses fighting COVID-19 on the front-line experienced stress, anxiety, depression and insomnia at levels ranging from moderate to extremely severe; in addition, it was determined that there is a positive relationship between stress, anxiety, insomnia and depression.

Relevance to clinical practice: This study, in which we have determined the mental health symptoms and insomnia levels of intensive care nurses, who are in the front-line during the COVID-19 pandemic, constitutes the scientific basis for the effective coping strategies that the authorities will take in this subject.

1 | BACKGROUND

In December 2019, a few cases of pneumonia of unknown aetiology occurred in Wuhan, China's Hubei Province; it spread rapidly in China and internationally, causing great concern around the world (Kang et al., 2020; Pappa et al., 2020). While the causative virus is defined as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new type of virus from the Coronaviridae family; the syndrome was also named coronavirus disease 2019 (COVID-19) by the World Health Organization (WHO). The WHO declared an internationally important public health emergency on January 30, 2020, and a global pandemic on February 11, 2020 (Pappa et al., 2020; Zhan et al., 2020). Faced with this critical situation and directly involved in the treatment and care of COVID-19 patients, front-line healthcare workers are at risk in terms of psychological distress and other mental health symptoms (Lai et al., 2020).

Many physical and mental health problems due to reasons such as increased workload, physical exhaustion, fear of not providing competent care in the new field, insufficiency of personal protective equipment (PPE), lack of special medicines, limitation of ventilator and intensive care unit beds and significant changes in daily social and family life problem may arise (Pappa et al., 2020). Also, many other risk factors can be identified, such as a feeling of inadequate support, concerns about one's own health, unprotected exposure to COVID-19 patients, exposed but not have a positive swab test, fear of infecting family members or others at home, and inability to access the test quickly when necessary, isolation, feelings of uncertainty, social stigma, insecure attachment, or having given up important factors that increase resilience such as physical activity and meditation (Chew et al., 2020; Lai et al., 2020; Liu et al., 2020; Magnavita. Soave et al., 2020; Magnavita et al., 2020; Pappa et al., 2020). For these reasons, healthcare professionals may face many mental health problems such as fear, anxiety, depression and insomnia (Pappa et al., 2020). Understanding the prevalence and patterns of such psychosomatic symptoms is essential, as they can cause undesired overcrowding of hospital emergency rooms and the additional workload on already constrained healthcare systems (Chew et al., 2020).

Protecting healthcare professionals is an important component of public health measures to prevent a large-scale health crisis. Therefore, in order to protect the mental well-being of healthcare professionals exposed to the COVID-19 pandemic, to increase their psychological resilience, and to strengthen the capacity of healthcare systems, it is necessary to implement interventions immediately and to strengthen prevention and intervention strategies by training healthcare professionals on mental health and crisis management (Bao et al., 2020; El-Hage et al., 2020; Pappa et al., 2020). The first step in planning these prevention strategies is to determine

What does this paper contribute to the wider global clinical community?

- Considering that this study confirmed the findings of other studies that intensive care nurses have much higher levels of anxiety, stress, depression and insomnia. It is clear that hospitals and the nurses would benefit from immediate interventions designed to lower the stress levels of their intensive care nurses.

- Other interventions, such as open communication, limiting shift hours, providing rest areas, as well as broad access and detailed guidelines on the use and management of protective equipment, and specific training in the treatment and care of COVID-19 patients, should be considered and implemented immediately.

- Also, perhaps it is important to train more intensive care nurses so that these nurses can devote more time to COVID-19 patients and take a break from care.

- It is known from studies of police and other high-stress occupations that members of the profession are at higher risk of suicide, leaving their profession, divorce and other negative life outcomes. Given the pandemic, societal ageing and other factors, professional nursing knowledge and skills are desperately needed and no country can afford for their nurses or other healthcare workers to fall into mental and physical decline. It should not be forgotten that the epidemic can become worse if the treatment and care for COVID-19 patients has to be provided by less educated and experienced colleagues.

and report the mental health level in healthcare professionals (Chen et al., 2020; Pappa et al., 2020).

Since the first months of the COVID-19 pandemic, many scientific studies (Kang et al., 2020; Lai et al., 2020; Zhan et al., 2020) have evaluated the likelihood that healthcare professionals may be affected by depression, anxiety, post-traumatic stress disorder, and psychological distress. The large number of studies made it possible to produce a few systematic reviews and meta-analyses (Pappa et al., 2020; Sanghera et al., 2020). However, all these studies were cross-sectional; no longitudinal study has been produced so far, and some studies had negative results (Magnavita, Soave, Ricciardi, & Antonelli, 2020). The lack of longitudinal, pre-post design common to most studies conducted during the pandemic also prevents us from attributing the observed events strictly to the pandemic itself. As a result, there is still little evidence of an increase in mental health problems and sleep disturbances in healthcare workers during the

pandemic. Based on this, the aim of this study is to determine the anxiety, depression and insomnia levels of intensive care nurses during the COVID-19 pandemic and to help fill this apparent gap.

1.1 | Hypotheses

H1: Stress has a statistically significant effect on depression.
H2: Anxiety has a statistically significant effect on depression.
H3: Insomnia has a statistically significant effect on depression.

2 | METHODS

2.1 | Design

This study carried out as a multi-site survey study to determine the stress, anxiety, depression and insomnia levels of intensive care nurses during the COVID-19 pandemic with a structural equation model. This study was performed and reported in accordance with the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) guideline for nonrandomised controlled trials (File S1).

2.2 | Participants and sample

The population of the study consisted of a total of 314 nurses working in the intensive care units of a total of 5 hospitals, including 1 university hospital and 4 training research hospitals in Istanbul. The sample of the study consisted of 194 nurses working in the intensive care units of these hospitals between 13–31 July 2020, who did not have a leave or report and were willing to participate in the study, thus reaching 61.7% of the population.

2.3 | Instruments

The data conducted with the "Individual Characteristics Form" were developed by the researchers in the light of the literature (Lai et al., 2020; Liu et al., 2020; Zhu et al., 2020) that evaluates the socio-demographic characteristics of the intensive care nurses, the "Depression Anxiety Stress-21 Scale (DASS-21)" that evaluates the levels of depression, anxiety, and stress, and the "Insomnia Severity Index" that evaluates the insomnia level.

2.3.1 | Individual characteristics form

It consists of questions such as age, gender, education status, the working year, training for the care of patients with COVID-19 infection, health problems during the pandemic, and the need for psychological counselling, etc.

2.3.2 | Depression Anxiety Stress-21 Scale (DASS-21)

The Depression Anxiety Stress-42 Scale (DASS-42), developed by Lovibond and Lovibond (1995), consists of 42 items and 3 subscales: depression, anxiety, and stress to create a scale that can be filled by the patient, that will include the main symptoms of anxiety and depression, meet high psychometric standards, and that can distinguish between anxiety and depression (Lovibond, & Lovibond, 1995; Sarıçam, 2018). Depression Anxiety Stress-21 Scale was developed by Lovibon and Lovibond (1995) in order to shorten the period by selecting the items of DASS-42. DASS-21, whose validity and reliability was made by Sarıçam (2018), contains 7 items to evaluate each subscale. Cronbach's alpha internal consistency reliability coefficient was found as $\alpha = 0.87$ for the depression subscale, $\alpha = 0.85$ for the anxiety subscale, and $\alpha = 0.81$ for the stress subscale (Sarıçam, 2018).

2.3.3 | The Insomnia Severity Index

The Insomnia Severity Index (ISI) was developed by Bastien et al., (2001), and its Turkish validity and reliability were determined by Boysan et al., (2010). It is a 7-item self-report questionnaire assessing the nature, severity, and impact of insomnia. The characteristics that the items of the scale measure are: (1) severity of sleep onset, (2) sleep maintenance, (3) early morning awakening problems, (4) sleep dissatisfaction, (5) interference of sleep difficulties with day time functioning, (6) noticeability of sleep problems by others, and (7) distress caused by the sleep difficulties. The scores that can be obtained from the scale range from 0–28. As the total score increases, the severity of insomnia also increases. A score between 0–7 is evaluated as the absence of insomnia, a score between 8–14 as the sub-threshold insomnia, a score between 15–21 as moderate insomnia, and 22–28 as severe insomnia. The Cronbach's alpha internal consistency reliability coefficient of the scale evaluating the insomnia severity was found to be $\alpha = 0.79$ (Bastien et al., 2001; Boysan et al., 2010).

2.4 | Data collection

The data were collected electronically during the working days of the intensive care nurses and at time intervals that did not interfere with the workflow order. The nurses were asked to fill in the "Personal Characteristics Form", "Depression Anxiety Stress-21 Scale" and "Insomnia Severity Index". The data collection form took an average of 10–15 min to respond.

2.5 | Ethical considerations

Written permission from the relevant hospitals and ethics permission from the Ethics Committee (Approval Number: 2020/08-07)

TABLE 1 Sociodemographic characteristics of the intensive care nurses (N = 194)

Characteristics	Mean ± SD
Age	29.99 ± 7.12
Working time (years)	8.05 ± 7.50
Working time in the intensive care unit (years)	*5.54 ± 5.34*
Weekly working time (in hours)	49.78 ± 12.05
	n (%)
Gender	
Female	138 (71.1)
Male	56 (28.9)
Marital status	
Married	73 (37.6)
Single	121 (62.4)
Presence of children	
Yes	59 (30.4)
No	135 (69.6)
Education status	
Health vocational high school	22 (11.3)
Associate degree	7 (3.6)
Undergraduate	122 (62.9)
Postgraduate	43 (22.2)
Training status in the care of a patient with COVID−19	
Yes	119 (61.3)
No	75 (38.7)
Health problems during the pandemic	
Yes	58 (29.9)
No	136 (70.1)
Psychological counselling during the pandemic	
Yes	46 (23.7)
No	148 (76.3)
Thinking that the measures taken to prevent the spread of COVID−19 are sufficient	
Yes	42 (21.6)
No	152 (78.4)

Abbreviation: SD, Standard deviation.

were obtained before starting the study. Also before initiating the data collection process, because the use of human beings in the study required protection of an individual right, the "informed consent" condition was required as an ethical principle, and written permissions of the nurses who met the sampling criteria and who were willing to participate in the study were obtained too.

2.6 | Data analysis

The obtained data were transferred to the computer environment and evaluated in SPSS 22.0 (IBM Corp.) package program, and descriptive statistics (frequency, percentage, mean, standard deviation, median, range) were made in the analysis of descriptive data. In order to test the structural model and hypotheses of the research, path analysis was applied with LISREL statistical software program. Before testing the hypotheses and structural model created in line with the purpose of the study, the validity and reliability analyses of the scales for the research variables were performed. With the results obtained, it was predicted that these scales produce more consistent results for testing the structural model.

A validation study for the suitability of these scales to the study sample was done by the researchers using the confirmatory factor analysis method. One of the frequently used methods in the validation of scales is the confirmatory factor analysis method. In the literature, it is stated that the structural validity of the scales is provided with three basic measurement models, which are generally one factor (unrelated) model, first-order multi-factor model, and second-order multi-factor model in confirmatory factor analysis (Gürbüz, & Şahin, 2015; Yalap, & Baygın, 2020). Based on these alternative model strategies, the comparison of different measurement models of a scale is made and the most compatible model is revealed. In this study, one factor (unrelated) model was chosen among the confirmatory factor analysis methods applied for the validity of the scales.

3 | RESULTS

The findings of the study were discussed in two stages. First, descriptive data (frequency, mean, standard deviation, and median) were examined. The results are indicated in Tables 1 and 2. In the second stage, the mental health symptoms and insomnia levels of the intensive care nurses were examined using the structural equation model (Figures 1–5).

The average age of the nurses constituting the sample of the study was found to be 29.99 ± 7.12, the mean working time in the intensive care unit was 5.54 ± 5.34 (year) and the weekly working time was 49.78 ± 12.05 (hr). 71.1% of the nurses are women and 62.4% are single and 69.6% have no children. It was reported that 62.9% of the participants were undergraduate, 61.3% received training for the care of the patient with COVID-19 infection, 70.1% had any health problem during the pandemic, and 23.7% needed psychological counselling during this period. 78.4% of the nurses stated that they think the measures taken to prevent the spread of COVID-19 are not sufficient (Table 1).

When the depression score averages of the intensive care nurses were examined, it was found that 26.3% of the nurses had a moderate, 12.9% of them had a severe and 26.3% of them had an extremely severe depression level; when the anxiety mean scores were examined, it was found that 12.9% of the nurses had a moderate, 13.4% had a severe and 32% had an extremely severe anxiety level and when the average stress scores were examined, it was found that 45.4% of the nurses had a moderate, 19.1% had a severe and 8.8% had an extremely severe stress level. When the insomnia levels were examined, the rate of those with moderate insomnia was 21.6%; it was determined that the rate of those with severe insomnia was

18.1%. When these findings are considered together, the majority of the intensive care nurses had severe or extremely severe depression (39.2%), anxiety (45.4%), and stress (27.9%) scores; in addition, 39.7% of the nurses experienced moderate or severe insomnia (Table 2).

Confirmatory factor analysis and path analysis results are given in Figures 1–5.

3.1 | Confirmatory factor analysis results

3.1.1 | Stress scale

First level confirmatory factor analysis was applied for the 7-statement stress scale used in the study. According to the results obtained, the construct validity of the scale was provided and the required goodness of fit levels was achieved ($x2/df$ = 20.35/12; RMSEA = 0.054; GFI = 0.97; NFI = 0.99; NNFI = 0.99; CFI = 0.99) (Figure 1).

3.1.2 | Anxiety scale

First-level confirmatory factor analysis was applied for the anxiety scale, which had 7 statements in its original form. The construct validity of the scale was provided with the results obtained ($x2/df$ = 24.52/12; RMSEA = 0.074; GFI = 0.96; NFI = 0.98; NNFI = 0.98; CFI = 0.99) (Figure 2).

3.1.3 | Depression scale

First level confirmatory factor analysis was applied for the depression scale, which had 7 statements in its original form. The construct validity of the scale was provided with the results obtained ($x2/df$ = 19.00/12; RMSEA = 0.055; GFI = 0.97; NFI = 0.99; NNFI = 0.99; CFI = 0.99) (Figure 3).

3.1.4 | Insomnia Severity Index

First-level confirmatory factor analysis was applied for the 7-statement Insomnia Severity Index in its original form. The construct validity of the scale was provided with the results obtained ($x2/df$ = 14.27/11; RMSEA = 0.039; GFI = 0.99; NFI = 0.99; NNFI = 0.99; CFI = 0.99) (Figure 4).

3.2 | Findings regarding structural model and hypothesis tests

In order to test the structural model and hypotheses of the research, path analysis was performed with LISREL statistical software program. The results obtained were interpreted through a single model.

TABLE 2 Depression, anxiety, stress, and insomnia mean scores and levels of nurses (*N* = 194)

	n (%)	Mean ± SD
Depression		
Normal (0–4)	47 (24.2)	9.22 ± 6.06
Mild (5–6)	20 (10.3)	
Moderate (7–10)	51 (26.3)	
Severe (11–13)	25 (12.9)	
Extremely severe (14+)	51 (26.3)	
Anxiety		
Normal (0–3)	48 (24.7)	7.38 ± 5.37
Mild (4–5)	33 (17.0)	
Moderate (6–7)	25 (12.9)	
Severe (8–9)	26 (13.4)	
Extremely severe (10+)	62 (32.0)	
Stress		
Normal (0–7)	22 (11.3)	8.86 ± 5.42
Mild (8–9)	30 (15.5)	
Moderate (10–12)	88 (45.4)	
Severe (13–16)	37 (19.1)	
Extremely severe (17+)	17 (8.8)	
Insomnia		
Absence of insomnia (0–7)	38 (19.6)	13.51 ± 7.18
Sub-threshold insomnia (8–14)	79 (40.7)	
Moderate insomnia (15–21)	42 (21.6)	
Severe insomnia (22–28)	35 (18.1)	

Abbreviation: SD, Standard deviation.

Figure 5 includes findings regarding the path analysis and research hypotheses.

Considering the results in Figure 5; stress has a positive effect on depression (= 0.66). Similarly, the anxiety states of the participants have a positive effect on depression (= 0.17). Finally, insomnia, another independent variable of the study, has a positive effect (= 0.13) on depression. Within the framework of a structural model, the effects of three independent variables on depression, which is the dependent variable, are statistically significant at p < .001. Also, the goodness of fit values of the model were calculated as "perfect fit" ($x2/df$ = 0; df = 0; RMSEA = 0.00). The dependent variables explanation variance (R2) of the independent variables was calculated as 82%. The mathematical representation revealing the effects of independent variables on dependent variables is as follows:

$$\text{DEPRESSION} = 0.66 * \text{STRESS} + 0.17 * \text{ANXIOUS} + 0.13 * \text{INSOMNIA}, \ R^2 = .82.$$

All these results *confirmed* the H1 (Stress affects depression positively), H2 (Anxiety affects depression positively) and H3 (Insomnia positively affects depression) hypotheses.
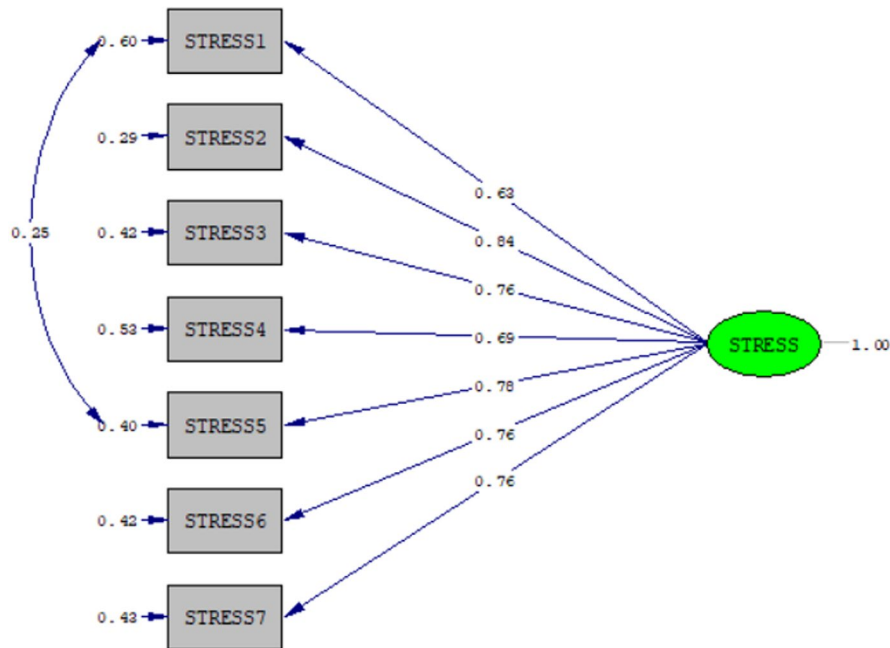
4 | DISCUSSION

This study was conducted to determine the stress, anxiety, depression, and insomnia levels of intensive care nurses who were on the front-line of the COVID-19 pandemic. The findings were that the majority of the intensive care nurses had moderate to extremely severe depression (65.5%), anxiety (58.3%) and stress (72.3%) scores; in addition, 39.7% of the nurses experienced moderate to severe insomnia. These findings are partially similar to the results of some studies examining the levels of stress (Lai et al., 2020), anxiety (AlAteeq et al., 2020; Azoulay et al., 2020), depression (AlAteeq et al., 2020) and insomnia (Azoulay et al., 2020; Qi et al., 2020; Zhan et al., 2020) in healthcare workers during the pandemic. These results, which showed that the intensive care nurses experienced mental health symptoms and insomnia during the pandemic, revealed the importance of authorities to focus on the immediate implementation of measures aimed at improving the mental health of intensive care nurses, who were on the front-line during the pandemic.

FIGURE 3 First level confirmatory factor analysis results related to the Depression Scale [Colour figure can be viewed at wileyonlinelibrary.com]
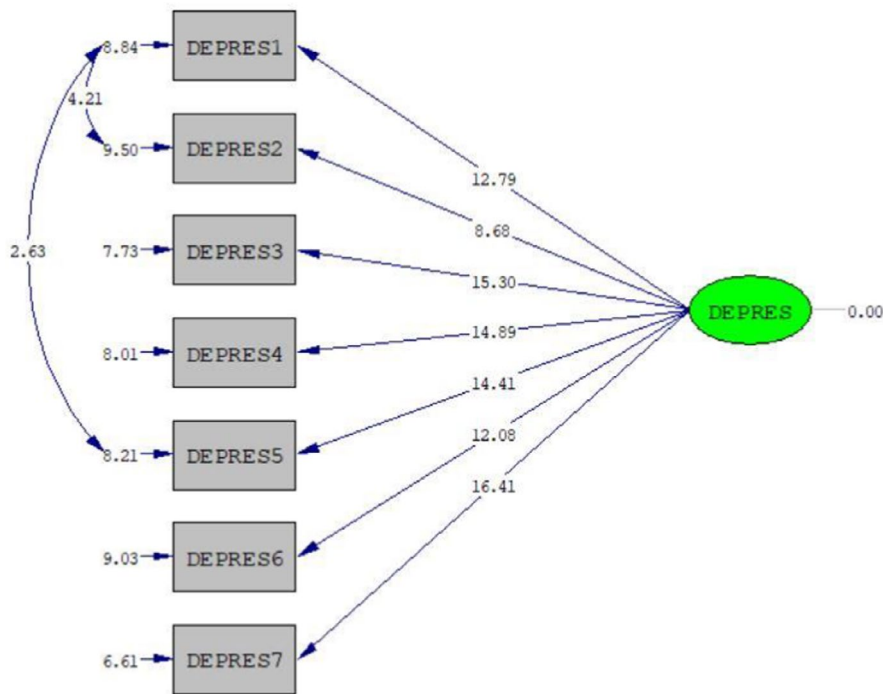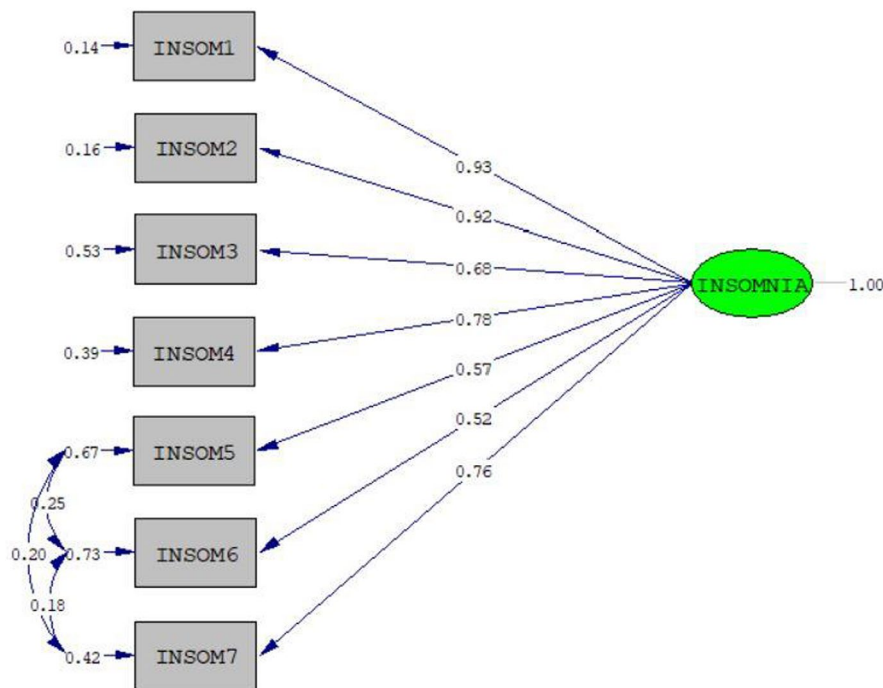

FIGURE 4 First level confirmatory factor analysis results related to The Insomnia Severity Index [Colour figure can be viewed at wileyonlinelibrary.com]

4.1 | Stress, anxiety and depression

The onset of a sudden and immediate life-threatening illness, increased workload, physical fatigue, inadequate personal equipment, nosocomial contamination, and the need to make ethically difficult decisions about the allocation of care can have negative effects on their physical and mental health (Liu et al., 2012; Pappa et al., 2020). Hence, healthcare professionals are particularly vulnerable to mental health problems such as fear, anxiety, depression and insomnia (Pappa et al., 2020).

In the studies (AlAteeq et al., 2020; Azoulay et al., 2020; Pappa et al., 2020; Sanghera et al., 2020; Xiong et al., 2020) in the literature, different results were reported in terms of the incidences of stress, anxiety and depression. From these studies; Xiong et al., (2020) found the prevalence of anxiety and depression symptoms among nurses as 40.8% and 26.4%, respectively. AlAteeq et al., (2020) reported that 55.2% of healthcare workers had mild to severe depression and 51.4% of them also experienced generalised anxiety varying from mild to severe. Azoulay et al., (2020) found the highest rates and the prevalence of anxiety and depression symptoms as 50.4% and 30.4%,
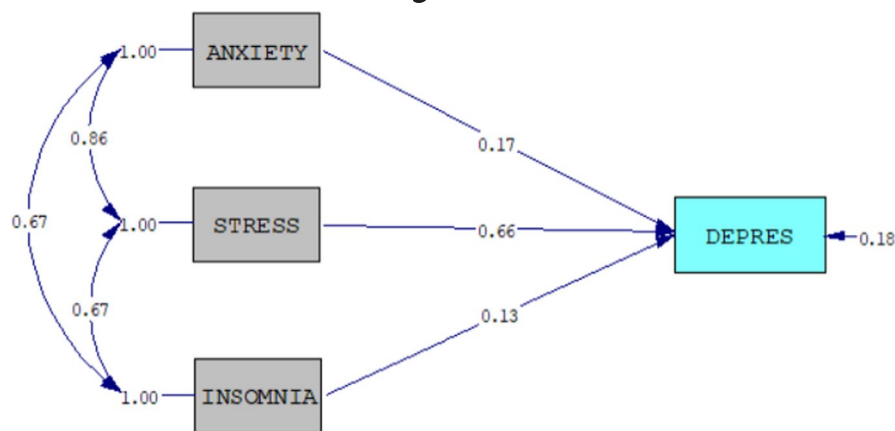
Chi-Square=0.00, df=0, P-value=1.00000, RMSEA=0.000

respectively, in nurses from the intensive care team. Lai et al., (2020) stated that there were high rates of mental health symptoms among healthcare workers on the front-line in China, and 50.4% of all participants had depression, 44.6% anxiety and 71.5% distress symptoms. In a systematic review and meta-analysis study by Pappa et al., (2020), which examined 13 studies, it was reported that the incidence of anxiety was 23.2% and the incidence of depression was 22.8%.

Although the findings obtained from this study are partially similar to the results of the study in the literature; the reason why these findings are higher than other study findings can be explained by the knowledge that being a nurse and a woman (Awano et al., 2020; Lai et al., 2020; Pappa et al., 2020), and working in the front-line (Awano et al., 2020; Lai et al., 2020; Liu et al., 2020) are independent risk factors for poor mental health outcomes. However, in the literature, psychological symptoms such as anxiety depend on the stage of the pandemic; there is the knowledge that healthcare professionals can experience psychological adaptation after gradually learning more and gaining rich clinical experience in the treatment and care of infected patients (Liu et al., 2020). On the other hand, considering that this study was carried out in the later stages of the pandemic; this result may also be an indicator of excessive fatigue and burnout in intensive care nurses. Therefore, it will not be surprising that the negative mental health effects increase as the duration of the pandemic increases.

In addition, this finding is very similar to the results of the other study made in Turkey (Şahin et al., 2020; Sarı et al., 2020). This may be closely related to the nurses' who may be exposed to violence by patients and their relatives, besides the pandemic, fight against the acceptance of COVID-19 as an occupational disease and improvement of the working conditions and professional rights in Turkey.

4.2 | Insomnia

Insomnia is defined as difficulty falling asleep for more than 30 minutes at night, difficulty maintaining sleep after falling asleep, or waking up without the ability to return to sleep early in the morning. Insomnia; it has been reported that it not only triggers physiological diseases such

as hypertension, diabetes mellitus and cardiovascular disease, but also is one of the causes of psychological problems such as anxiety, depression, bilateral emotional disorder and suicidal tendency (Khan, & Aouad, 2017; Pigeon et al., 2017; Zhan et al., 2020). Healthcare professionals are at high risk of sleep disturbance due to excessive workload, high job-related demands, complex work environments (Zhao et al., 2020) and some aspects of work organisation, such as lack of control over work times, insufficient rest between shifts, psychosocial burden and night work or shift work (Garbarino, & Magnavita, 2019; Magnavita, & Garbarino, 2017).

In the literature, there are several studies (Azoulay et al., 2020; Cai et al., 2020; Qi et al., 2020; Wu et al., 2020; Zhan et al., 2020) examining the insomnia levels of healthcare workers during the COVID-19 pandemic. From these studies, Qi et al., (2020) reported the incidence of insomnia was 51.7% in healthcare workers fighting COVID-19 on the front-line in February; Zhan et al., (2020) 52.8% in March and Azoulay et al., (2020) approximately 40% between April and May. Pappa et al., (2020) stated in their systematic review and meta-analysis study that the incidence of insomnia was 38.9% in 5 studies. In this study, it was determined that 40.7% of the intensive care nurses on the front-line were at the lower threshold of insomnia and 39.7% of them were in the range of moderate (21.6%) to severe (18.1%) insomnia. This finding is partially compatible with the results of other studies; considering the fact that nurses encountered an unusual virus during the pandemic, insufficient medical supplies and human resources, heavy workload, and heavy psychological pressure under the risk of being infected, it is an expected result that the severity of insomnia is high (Xiao et al., 2020; Zhan et al., 2020). Considering that the included studies were conducted in different countries and at different time points in relation to the trajectories of pandemic curves, it is quite normal not to reach completely similar conclusions.

4.3 | The relationship between stress, anxiety, insomnia and depression

In general, there is evidence that psychosocial stress is associated with sleep problems, and that both insomnia and low sleep quality

are associated with the stress response (Garbarino, & Magnavita, 2019; Yan et al., 2010). In the study of Garbarino and Magnavita (2019), it was clearly shown that there is a bidirectional relationship between sleep and stress. It has been reported that the prevalence of sleep problems increases in police officers exposed to chronic occupational stress and that individuals who sleep poorly suffer from occupational stress factors more than those who sleep well. Perogamvros et al., (2020) reported that actual or individual perceived stress factor can lead to acute insomnia symptoms through fear induction and stress response. Zhao et al., (2020) stated that subjective psychological stress related to COVID-19 positively correlated between daily dysfunction and total insomnia score. However; in the literature (Alvaro et al., 2013; Zhan et al., 2020) there is information that one of the factors affecting insomnia in any group is psychological diseases (such as depression, anxiety, post-traumatic stress disorder). Sanghera et al., (2020) also reported that a high prevalence of insomnia may be an indicator of mental health deterioration in healthcare workers and supported this situation with a meta-analysis study (Li et al., 2016) that defined chronic insomnia as a risk factor for depression. This probably bidirectional relationship also shows that the mental well-being of healthcare professionals is clearly multifaceted (Sanghera et al., 2020; Zhao et al., 2020).

In this study, the effects of stress, anxiety and insomnia, which are three independent variables, on depression, which is the dependent variable within the framework of a structural model, were statistically significant ($p < .001$). It was determined that stress, anxiety and insomnia positively affect depression. This finding indicates that nurses experience great stress when they are in close contact with the COVID-19 patient and psychological stress. It is in line with the knowledge that it can lead to anxiety, depression, avoidance, insomnia, post-traumatic stress disorder symptoms and other mental problems (Chen et al., 2020; Tan et al., 2020) and is an expected result. However, more research is needed to determine cause-effect relationships.

5 | LIMITATIONS

There were some limitations to this study. First, this study found in Turkey from only 5 in a metropolitan hospital's intensive care nurse in the results due to be implemented, to other cities and its employees are not generalisable to all healthcare workers. In addition, since the sample group consists only of nurses, no comparison can be made among other groups such as physicians, technicians, administrative staff, etc. The descriptive type of the study, the limited sample size and the inability to use random sampling methods may affect the data analysis results and limit the ability to interpret causal relationships between different variables. On the other hand, this study evaluates the prevalence of symptoms at some point in time. These symptoms can be temporary and require long-term follow-up. Conducting surveys online and self-reporting by nurses may cause a false response. Finally, it was not possible for us to recognise whether the mental health outcomes were caused by COVID-19 or they already existed before.

6 | CONCLUSIONS

In this study, it was found that the majority of intensive care nurses fighting COVID-19 on the front-line experienced stress, anxiety, depression and insomnia at levels ranging from moderate to extremely severe; in addition, it was determined that there is a positive relationship between stress, anxiety, insomnia and depression.

7 | RELEVANCE TO CLINICAL PRACTICE

This study, in which we have determined the mental health symptoms and insomnia levels of intensive care nurses, who are in the front-line during the COVID-19 pandemic, constitutes the scientific basis for the effective coping strategies that the authorities will take in this subject.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest/financial disclosure.

AUTHOR CONTRIBUTIONS

Study design: DK; project conduct: YO, HE; data analysis: ZT, YK; and manuscript preparation: DK, ZT, YK. All authors read and approved the final manuscript to be published.

AUTHORSHIP STATEMENT

We confirm that all listed authors meet the authorship criteria, and all authors are in agreement with the content of the manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.