

# Depression, Anxiety, Stress, and Coping Strategies among Nurses of a National Guard Hospital during the COVID-19 Pandemic: A Cross-Sectional Study

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## Abstract

**Background:** Nurses are well known to suffer from depression, anxiety, and stress due to their profession. Nurses worldwide faced an unusual situation because of the COVID-19 pandemic: they were expected to adopt effective coping strategies.

**Aim:** To examine the hospital-based nurses' coping strategies during the COVID-19 pandemic, as well as their levels of depression, anxiety, and stress symptoms.

**Method:** The study utilized a cross-sectional design to recruit 230 nurses conveniently from Jeddah's National Guard Tertiary Hospital. Nurses working at this hospital were asked to complete an online survey during the COVID-19 pandemic from September 22, 2021, to March 27, 2022. In this study, three tools were used: Brief Coping Orientation to Problems Experienced (COPE) and Depression, Anxiety, and Stress Scale (DASS-21). In order to determine statistical significance, we used a p-value of 0.05 and a 95% confidence interval (95% CI). The Internal Review Board (IRB) approved the study. Participants were informed that no identifier information was required and that their responses would remain anonymous, except for authorized access. Kolmogorov-Smirnov and Shapiro-Wilk tests were used to assess data normality. P 0.0001 for both tests was found for all data.

**Results:** A total of 43.0% of nurses responded to DASS-21, 46.5% reported anxiety, and 25.2% reported stress. Behavioral disengagement was the most commonly used coping mechanism, while self-blame and denial were associated with higher levels of depression, anxiety, and stress symptoms. Acceptance and positive reframing were the most effective protective mechanisms against depression, anxiety, and stress symptoms. Religious nurses experienced milder effects of anxiety symptoms.

**Conclusion:** Nurses working at a Saudi tertiary hospital during the COVID-19 pandemic experienced higher levels of depression, anxiety, and stress symptoms, which correlated with their coping skills. Therefore, it is suggested that healthy coping strategies for maintaining well-being in stressful situations, such as working during pandemics, are essential.

**Keywords:** Anxiety • Adaptation • Cope • COVID-19 • Depression • Nurse • Pandemic • Stress • Saudi Arabia

## Introduction

The COVID-19 pandemic has had a significant impact on medical workers worldwide, including nurses who have been on the front lines of the pandemic response. Studies have shown that nurses are at increased risk of suffering from depression, anxiety and stress during the pandemic [1,2]. Nurses working in National Guard hospitals may face additional challenges due to the high number of COVID-19 patients, the need to manage limited resources, and the high risk of exposure to the virus [3].

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Depression, anxiety, and stress can negatively affect nurses' job performance, patient care, and personal lives. Previous research has shown that healthcare workers who experience high levels of stress and burnout are more likely to make medical errors, experience job dissatisfaction, and leave the profession [4,5]. Coping strategies can play a crucial role in mitigating the impact of these mental health conditions.

Nurses working in National Guard hospitals may face additional challenges due to the nature of their work. National Guard hospitals are often designated to provide care for military personnel and their families, as well as civilians in times of emergency [6]. During the COVID-19 pandemic, National Guard hospitals have played a critical role in managing the influx of COVID-19 patients, often at the expense of routine care and services [3]. The unique challenges faced by nurses working in National Guard hospitals during the pandemic can take a toll on their mental health and well-being. Depression, anxiety, and stress can negatively affect nurses' job performance, patient care, and personal lives [5]. Studies have shown that healthcare workers who experience high levels of stress and burnout are more likely to make medical errors, experience job dissatisfaction, and leave the profession [4,5]. Coping strategies can play a crucial role in mitigating the impact of these mental health conditions.

The COVID-19 pandemic has had a profound impact on the mental health and well-being of healthcare workers worldwide. Nurses have been on the

frontline of the pandemic response, facing significant challenges, such as caring for critically ill patients, managing limited resources, and dealing with the fear of infection and transmission to themselves and their families [7]. As a result, nurses are at increased risk of experiencing depression, anxiety, and stress [1,2].

Depression, anxiety, and stress are all typical mental health issues that impact people all over the world. A variety of variables, including psychological, social, and environmental stressors, might contribute to these illnesses. The COVID-19 pandemic has been a huge source of stress for individuals and communities all across the world, particularly healthcare workers on the front lines of the pandemic response. Nurses, for example, have been subjected to high levels of stress, anxiety, and despair.

Research has shown that healthcare workers who experience high levels of stress and burnout are more likely to be affected by developing mental health problems during the pandemic. A cross-sectional study conducted in China discovered that nurses who cared for COVID-19 patients suffered high levels of anxiety, depression, and stress, with over half of the nurses feeling moderate to severe anxiety and depression [8]. Similarly, a study conducted in Italy found that healthcare workers who worked in COVID-19 wards reported higher levels of psychological distress compared to those who did not work in COVID-19 wards [9].

During the pandemic, healthcare personnel had mental health issues. Individuals can use effective coping skills to handle stress, anxiety, and depression while still maintaining their mental health and well-being. Some coping mechanisms discovered to be beneficial in the management of mental health disorders among healthcare workers throughout the pandemic include social support, mindfulness, self-care, and cognitive-behavioural therapy [10,11].

A study conducted with registered nurses from the Philippines reported that 37.8% of 325 were found to have problematic levels of anxiety and that nurses who were resilient and received support from their social circle and organizations were more likely to report lower levels of anxiety related to the COVID-19 pandemic [12]. The prevalence of generalized anxiety disorder and major depressive disorder among frontline nurses was found in another study to be 47.5% and 56.7%, respectively, suggesting that they would continue to face the deleterious effects of the pandemic three years after it disappeared. COVID-19 stigma, lack of family contact, fear of infecting others, and lack of previous outbreak experiences (e.g., Ebola) were reported to be factors in the development of depression and anxiety [13]. In December 2020, a systematic review and meta-analysis showed that one-third of the nurses working during the COVID-19 pandemic experienced stress (43%), anxiety (37%), depression (35%), and sleep disturbances (43%) [14].

A study of 999 expatriate nurses in Saudi Arabia's Al Qassim province reported that 54.2% had depression, 65% had anxiety, and 38.9% had stress in 2019 [15]. During the pandemic, another nationwide cross-sectional study of nurses in Saudi Arabia found that over 55% of them suffered from depression and 51% from anxiety. Women had significantly higher mean scores on depression and anxiety than men, and nurses aged 30 to 39 were much more likely to be depressed and anxious than younger healthcare professionals [16].

Work-related burnout and emotional exhaustion are more prevalent among nurses, compared to other healthcare professionals. Nurses encounter many stressors from which they acquire a propensity for burnout. The use of effective coping strategies by nurses might lessen the occurrence of burnout among them. Coping strategies refer to cognitive and behavioural strategies that enable nurses to cope with different types of stressors. Coping strategies are usually categorized as emotion-focused and problem-focused coping. Emotion-focused coping helps a person control stressful emotions by applying certain psychotherapy approaches to cope with a stressor, whereas problem-focused coping attempts to solve an underlying problem [17]. Various coping strategies are used to deal with the psychological stress of working during a pandemic. These physical coping strategies used by most nurses during the COVID-19 pandemic included sleeping, increased food intake, and exercise to alleviate negative emotions [18]. Distraction techniques and normalization were common forms of psychological coping. However, strong social support appeared to be the most effective coping mechanism among nurses [19,20]. Therefore, this study investigated the mental health and coping mechanisms of frontline nurses working in the Ministry of National Guard Health Affairs (MNGHA) hospital in Jeddah, Saudi Arabia during the COVID-19 pandemic.

A recent meta-analysis published in 2021 states that the association between burnout and depression among nurses is becoming a greater concern. Indicating that burnout among nursing professionals is growing and is becoming a major cause of shortage in the workforce and poor safety. It also reports that as nurses gain more experience and get older, they are more prone to an increased burnout-depression correlation. Another study linked burnout-related depression to age [21]. Revealing that high levels of burnout were more among younger nurses whose age was less than 30 years, with higher rates of anger, anxiety, and frustration. Anxiety and stress are usually defined as two independent diagnoses. However, they share very similar characteristics and are highly associated with one another. This indicates that getting any of them will result in an increased risk of having another and thus psychological and physiological consequences [22].

## Significance of the study

The significance of this study lies in its potential to improve the health and well-being of National Guard Hospital (NGH) nurses who were on the front lines during the COVID-19 pandemic. Nurses play an important role in the care of COVID-19 patients, and the stress, anxiety, and sadness they feel can have a significant influence on their mental health and job performance. By learning about the elements that contribute to depression, anxiety, and stress in people this study can provide insights into the development of coping strategies to support their mental health. The findings of this study can also inform policies and interventions to address the mental health needs of healthcare workers in similar settings. Overall, this study has the potential to contribute to the improvement of the mental health and well-being of NGH nurses and other healthcare workers, which in turn can improve the quality of care provided to patients during the pandemic and beyond. In addition, this study can provide valuable insights into the mental health and coping strategies of healthcare workers in similar settings. The COVID-19 pandemic has led to significant stress and anxiety among healthcare workers around the world, and many have been struggling to cope with the demands of their job. By examining the mental health and coping techniques of healthcare personnel in similar environments. The COVID-19 epidemic has caused enormous worry and anxiety among healthcare personnel worldwide, and many have been struggling as a result. This understanding can inform the development of evidence-based interventions and policies to support the mental health and well-being of healthcare workers, and to meet the demands of their employment. By investigating the precise causes of sadness, anxiety, and stress which is crucial in ensuring their resilience and capacity to provide quality care during the ongoing pandemic and in future public health emergencies. Finally, this study can contribute to the broader literature on mental health and coping strategies, which is important in addressing the mental health needs of individuals and communities facing various stressors and challenges.

## Aim of the study

The primary goal of this study is to look into the level of depression, anxiety, and stress, as well as the coping mechanisms used by nurses at a National Guard hospital during the COVID-19 epidemic.

## Theoretical framework

The current study was guided by the Transactional Model of Stress and Coping which proposes that stress arises from a transactional process between an individual and the environment [23]. The environment poses a threat or challenge, and the individual evaluates their resources and coping strategies to manage the situation. Coping strategies can be either problem-focused or emotion-focused. Problem-focused coping involves addressing the problem directly, while emotion-focused coping involves managing the emotional consequences of the problem. The conceptual framework for this study guided the data collection, analysis, and interpretation of results. The findings of this study will contribute to the body of knowledge on the mental health of nurses during the COVID-19 pandemic and the coping methods that can be implemented to limit the negative effects of stress, anxiety, and depression (Figure 1).

The study examined various factors that could influence the mental health of nurses working at NGH. The independent variables taken into account included demographic details such as age, gender, marital status, educational level, and work experience, as well as work-related factors like workload, work hours, and work environment. The study aimed to assess the levels of depression, anxiety, and stress (dependent variables) experienced by these nurses, with coping strategies being examined as potential moderating variables.

## Hypotheses

Age, gender, marital status, and educational level will all have a substantial impact on the depression, anxiety, and stress levels of NGH nurses during the COVID-19 pandemic

Workload, work hours, and the work environment will all have a substantial impact on the depression, anxiety, and stress levels of NGH nurses during the COVID-19 pandemic.

During the study period, coping methods will considerably mitigate the association between work-related factors and depression, anxiety, and stress levels among NGH nurses.

Coping strategies will significantly moderate the relationship between work-related factors and depression, anxiety, and stress levels among NGH nurses during the COVID-19 pandemic.

## Materials and Method

This cross-sectional study was conducted at a national guard hospital in Jeddah, Saudi Arabia, and the study participants included both Saudi and non-Saudi nurses working in the hospital. In 2021, the total number of employed nurses was 1300, requiring a sample size of 297. However, we targeted the entire nursing staff because of an expected low response rate among healthcare workers, such as nurses from both genders. A wide range of ages was included, except for nurses who were on leave during the study period, nurses who refused to complete the questionnaire, those with a past psychiatric history, and newly hired nurses (<3 months).

This study used a non-randomized convenience sampling technique for the selection of nurses who were working at the hospital and were willing to participate in the study (N =1300). As a single-institution study, nurses working in all departments, (including the oncology, cardiology, bone marrow, and transplant centres; the emergency, intensive care, and burn units; and the primary healthcare clinic) were invited to complete our online questionnaire via e-mail. The data were collected over a 6-month period, from September 22, 2021, until March 27, 2022.

### Tools of the study

This study's questionnaire was composed of three sections. The first section includes questions about the demographics to identify participants'

characteristics. as the following:

Demographic and personal characteristics form that enquires nurses about their age, marital status, level of education, nationality, years of experience, working department, and residency in addition to the previous diagnosis with depression or anxiety, history of mental illness in the family, and attendance of any training workshop in the management of depression and anxiety.

The Brief COPE contains 14 two-item subscales, each of which is examined separately: self-distraction (cope 1+19), (2) active coping (cope 2+7), (3) denial (cope 3+8), (4) substance use (cope 4 and 1), (5) emotional support (cope 5 +15), and (6) instrumental support. There are 14 two-item subscales within the Brief COPE, and each is analyzed separately: self-distraction which comprised (cope 1+19), (2) active coping (cope 2+7), (3) denial (cope 3+8), (4) substance use (cope 4 and 1), (5) use of emotional support (cope 5+15),(6) use of instrumental support (cover anxious (7) behavioural disengagement (cope 6+16)(8) venting (cope 9+21), (9) positive reframing (cope 12+17), (10) planning (cope 14+25), (11) humour (cope 18+28), (12) acceptance (cope 20+24), (13) religion (cope 22+27), and (14) self-blame (Cope 13+26). Brief COPE Scoring Procedure rate the responses in the following manner across all statements:1= I have not done this at all, 2= I have done it a little bit, 3= I have done it a medium amount, and 4= I have done it a lot. Cronbach's alpha varied from 0.50 (venting) to 0.90 (substance use) for the initial subscales [21]. The Chinese Brief COPE individual item score varied from 1 (not doing it at all) to 4 (doing it a lot) [22].

The Depression, Anxiety, and Stress Scale (DASS-21) is a self-report questionnaire with 21 items, 7 for each subscale: depression, anxiety, and stress. Participants will be asked to rate each item on a scale of 0 (did not apply at all) to 3 (applied a lot). Sum scores were computed by adding up the scores on the items per (sub)scale and multiplying them by a factor of 2. Sum scores for the total DASS-total scale thus range between 0 and 120, and those for each of the subscales may range between 0 and 42. Cut-off scores of 60 and 21 will be used for the total DASS score and for the depression subscale respectively. These cut-off scores are derived from a set of severity ratings, proposed by Lovibond and Lovibond [21]. Scores ≥60 (for DASS-total) and ≥21 (for the depression subscale) are labelled as "high" or "severe". In this study population, the DASS-21's reliability was 0.95 (dass\_T1 =0.91 for the depression subscale) and 0.92 (dass\_T2 =0.86 the for depression subscale) [23].

### Reliability of the tools

Cronbach's alpha was used to examine the reliability of the DASS-21 and COPE scales and subscales, and the results were interpreted as previously

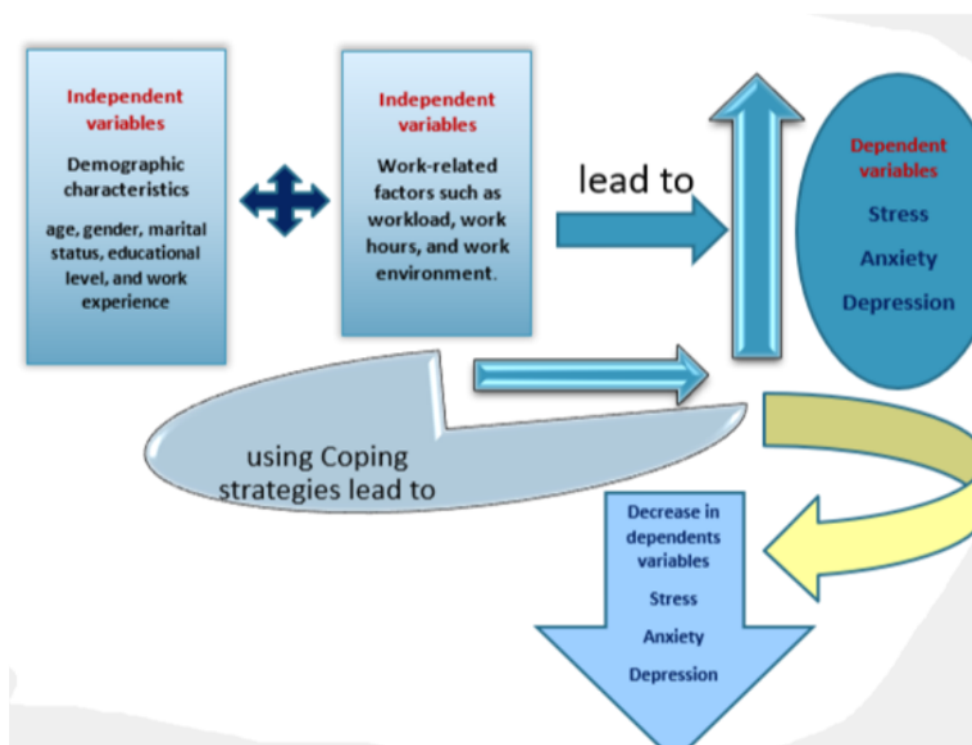


Figure 1. Shows the effect of independent variables on the dependent variables' symptoms of the study group.

stated [23]. Furthermore, the reliability of the tools was tested through a pilot study on 10% of the studied participants to identify the difficulties or ambiguities of the study questionnaire. The correlation coefficient was assessed on that 10% of the participants were included in the subjects of the study sample. Data normality was assessed using a Kolmogorov–Smirnov test and Shapiro–Wilk test, indicating non-normally distributed data ( $p < 0.0001$  for both tests for all data).

### Data collection procedure

Once the official approval to conduct the study was obtained from King Abdullah International Medical Research Centre (KAIMRC), and IRB, the data collection process was started.

All managers of nursing departments in NGH were contacted for easy access to all nurses working in their departments personally or on social networking networks rough leaflet and brief discussion and/or explanation at the time of getting approval from the IRB.

This invitation for the managers was to explain the purpose of the study to the nurses working in their departments and they will be asked to motivate all of them to fill out the survey.

The participants before completing the survey forms were asked to complete an informed consent form.

## Data Management and Analysis Plan

Statistical Software for Social Sciences (SPSS) version 24 was used for the statistical analysis. A measure of association was employed in cross-sectional research to identify the relationship between two or more variables. As a result, numerical variables were expressed as the median. The data was presented in the form of frequencies and percentages. Univariate analysis was used to examine the relationship between depression, anxiety, and stress scores, as well as the demographic feature of anxiety as coping strategy subscales. A Mann-Whitney U test was used for binomial variables, and a Kruskal-Wallis H test was used for variables with more than two categories. The univariate analysis's significantly associated variables were then included in multiple linear regression models to analyse the independently associated factors with depression, anxiety, and stress among the individuals. The technique was used for the analysis, and the results were provided as B and the respective 95% confidence intervals (95% CIs). The threshold for statistical significance was set at  $p < 0.05$ .

## Ethical Considerations

The Institutional Review Board of the King Abdullah International Medical Research Centre (KAIMRC) approved the study (No. NRJ21J/146/06). After they consented to participate in the study, the participants were formally notified that no identifier information was required and that their responses would remain confidential with authorized access only. After that, study subjects were approached for explaining the purposes and the procedure of the study. Subjects were informed that their participation in the study is voluntary, and they can withdraw without any penalty at any time. They were assured that their answers were kept anonymous during the study and that their data were kept confidential. The PI assured all participants that all data both hard and soft copies were stored within MNGHA premises and accessed by the research team only.

## Results

### Demographic characteristics

A total of 230 nurses who worked in the National Guard Hospital responded to the survey. Many of the participants were females (95.7%), non-Saudis (60.9%), and non-smokers (89.6%). Fewer than half of the participants were Saudis (39.1%) and married (47.4%), and the majority had no children (57.4%). The departments in which the participants worked included the oncology centre (15.2%), inpatient surgical wards (13.0%), and cardiology centre (11.3%), and outpatient clinics (11.3%). Further details about the participants' demographic and clinical characteristics are reported in Table 1.

### Clinical history of the participants

Data on the clinical history of the nurses are reported in Table 1. Approximately 14.8% (34) of the nurses had a history of a chronic medical illness and reported 41 illnesses. The most common conditions were hypertension (34.1%), diabetes (14.6%), and asthma (14.6%; Table 1). The majority of nurses underwent COVID-19 testing (84.3%), and 20.9% of them had a confirmed history of infection. Almost one-third of the nurses (30.4%) were working with confirmed COVID-19 patients, while 15.7% of them had lost someone close to them due to COVID-19 (Table 1).

The 230 respondents reported 15 psychiatric illnesses, and 13 nurses

**Table 1.** Demographic characteristics and clinical history of the participants (N = 230).

Parameter	Category	Frequency	Percentage (%)
Gender	Male	10	4.3
	Female	220	95.7
Age	30 and under	79	34.3
	31-40	87	37.8
	41-50	44	19.1
	51 and above	20	8.7
Nationality	Saudi	90	39.1
	Non-Saudi	140	60.9
	Filipino	54	38.6
	Malaysian	44	31.4
	Indian	6	4.3
	South African	2	1.4
	Jordanian	1	0.7
Marital status	Missing	33	23.6
	Single	105	45.7
	Married	109	47.4
	Divorced	15	6.5
Number of Children	Widowed	1	0.4
	None	132	57.4
	1 to 3	86	37.4
Household	>3	12	5.2
	Hospital sharing accommodation	15	6.6
	Living with spouse and/or children	55	24
	Living with parents	64	27.9

	Living alone	39	17
	Living with a friend/housemate	54	23.5
	With Sister	2	0.9
Department	Emergency department	8	3.5
	Oncology center	35	15.2
	OB/GYN	13	5.7
	Inpatient medical wards	23	10
	Inpatient surgical wards	30	13
	Critical care unit	24	10.4
	Cardiology center	26	11.3
	Outpatient clinic	26	11.3
	Pediatrics	5	2.2
	Day care unit	4	1.7
	Other	36	15.7
Smoking status	No	206	89.6
	Yes	24	10.4
Have a chronic medical illness	No	196	85.2
	Yes	34	14.8
	Hypertension	67	34.1
	Diabetes	28	14.6
	Asthma	28	14.6
	Migraine	19	9.8
	Dyslipidemia	14	7.3
	Varicose vein	5	2.4
	Iron deficiency anemia	5	2.4
	Patellofemoral syndrome	5	2.4
	Systemic lupus Erythematosus	5	2.4
	Psoriasis	5	2.4
	Bulging disc	5	2.4
	Multiple sclerosis	5	2.4
	Meniere's disease	5	2.4
Have a history of COVID-19	No	182	79.1
	Yes	48	20.9
Currently working with known COVID-19 patients	No	160	69.6
	Yes	70	30.4
Underwent a COVID-19 test before	No	36	15.7
	Yes	194	84.3
Lost someone you care about due to COVID-19	No	194	84.3
	Yes	36	15.7
Have a psychiatric illness	No	217	94.3
	Yes	13	5.7
Have a family member with a psychiatric illness	No	205	89.1
	Yes	25	10.9

(5.7%), reported a positive personal history of a psychiatric illness (Table 1). Depression was the most often reported symptoms (53.3%), among the 15 illnesses recorded, followed by anxiety (20.0%, Figure. 2). There were 25 nurses (10.9%) who had at least one (Table 1). However, only 18 participants provided details about 23 psychiatric conditions. Depression was the most common illness (43.5%), followed by anxiety (17.4%) and schizophrenia (17.4%; Figure. 2).

According to the DASS-21 and COPE scales Table 2 shows the differences in the nurses' DASS-21 and COPE scale scores. The aggregate mean score of participants on the DASS-21 was (28.7, and their mean score on the stress scale was the highest (11.1), followed by depression (9.0) and anxiety (8.6±). Their scores on the use of religion (6.2) and acceptance (5.6) as coping strategies were the highest, while the scores on the other coping subscales were nearly equal among the study participants who used them. The reliability of the responses to the 21 items on the DASS-21 was high (Cronbach's alpha = 0.941), and the depression, anxiety, and stress subscales (7 items each) were consistently reliable (Cronbach's alpha = 0.882, 0.822, and 0.856, respectively). The COPE scale was also found to be extremely reliable (Cronbach's alpha = 0.927) [23]. (Place Table 2 here) Depression, anxiety, and stress are common. Based on the DASS-21 results [23].

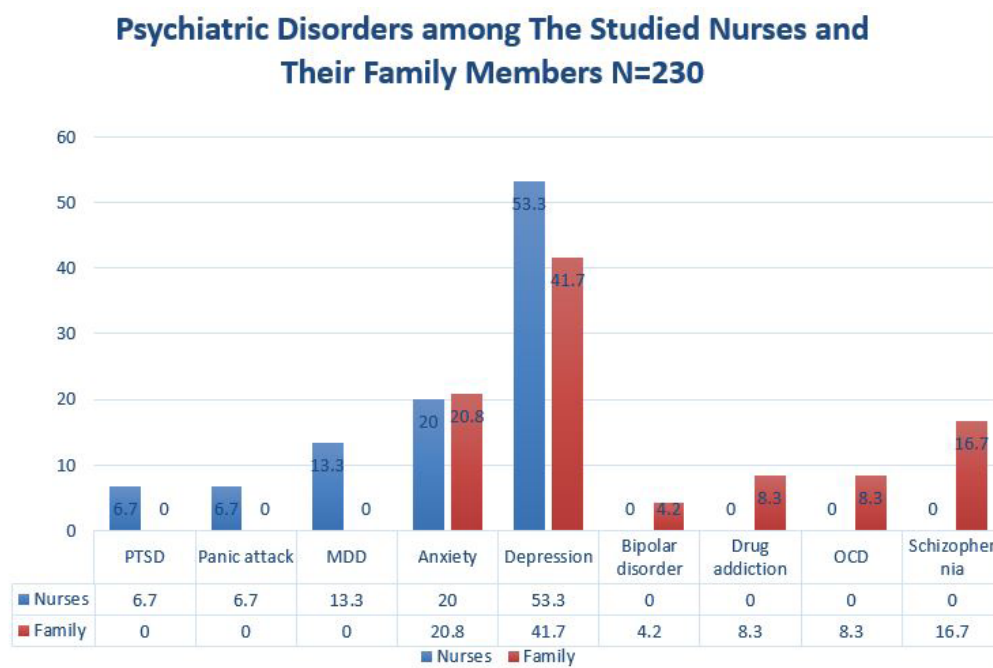
## Prevalence of depression, anxiety, and stress

Based on the findings of the DASS-21, depressive symptoms were prevalent among 99 nurses (43.0%), anxiety symptoms were prevalent among 107 nurses (46.5%), and stress was prevalent among 58 nurses (25.2%). The severity levels of the three psychological conditions are reported in Table 3.

## Associations of demographic characteristics with depression, anxiety, and stress

The results of the univariate analysis (Table 4), showed that depression was significantly higher among Saudi nurses, compared to non-Saudi nurses (median =10.0 vs. median =6.0,  $p = 0.001$ ), among smokers, compared non-smokers (median =13.0 vs. median =8.0  $p = 0.005$ ), participants with a psychiatric illness, compared to their counterparts (median =16.0 vs. median =8.0,  $0.0001$ ), and among nurses with a family history of a psychiatric condition were to their counterparts (median =14.0 vs. median =8.0,  $p < 0.0001$ ). Depression scores differed significantly based on participants' household conditions ( $p = 0.029$ ; Table 4).

Nurses aged 30 or less reported significantly higher anxiety than those nurses 31-40 years of age (median =10.0 vs. median =6.0), those 41-50 years of



**Figure 2.** PTSD = posttraumatic stress disorder; MDD = major depressive disorder; and OCD = obsessive compulsive disorder are the percentages of psychiatric diseases reported among nurses and their family members.

**Table 2.** Results of the nurses' responses to the DASS-21 and COPE scale.

Scale	N of items	Median (Range)	Mean ± SD
<b>DASS-21</b>			
Overall	21	24.0 (0.0-104.0)	28.7 ± 22.4
Depression	7	8.0 (0.0-42.0)	9.0 ± 8.3
Anxiety	7	6.0 (0.0-42.0)	8.6 ± 7.8
Stress	7	10.0 (0.0-42.0)	11.1 ± 8.1
<b>COPE</b>			
Problem-focused	8	5.3 (2.0-8.0)	5.1 ± 1.5
	Active coping	2	5.0 (2.0-8.0)
	Use of informational support	2	4.0 (2.0-8.0)
	Positive reframing	2	5.0 (2.0-8.0)
	Planning	2	5.0 (2.0-8.0)
Emotion-focused	12	5.0 (2.0-8.0)	4.8 ± 1.2
	Emotional support	2	5.0 (2.0-8.0)
	Venting	2	4.0 (2.0-8.0)
	Humor	2	4.0 (2.0-8.0)
	Acceptance	2	6.0 (2.0-8.0)
	Religion	2	7.0 (2.0-8.0)
	Self-blame	2	4.0 (2.0-8.0)
Avoidant coping	8	3.5 (2.0-6.0)	3.6 ± 0.9
	Self-distraction	2	5.0 (2.0-8.0)
	Denial	2	3.0 (1.0-8.0)
	Substance use	2	2.0 (2.0-7.0)
	Behavioral disengagement	2	3.0 (2.0-8.0)

IQR = interquartile range; SD = standard deviation.

age (median =6.0), and older nurses (median =5.0,  $p < 0.0001$ ). They were also significantly higher among Saudi participants compared to non-Saudis (median =10.0 vs. median =6.0,  $p = 0.0001$ ), smokers compared to non-smokers (median =16.0 vs. median =6.0,  $p = 0.018$ ), and those with a psychiatric condition compared to their counterparts (median =20.0 vs. median =6.0,  $p = 0.001$ ) (Table 4).

Higher stress levels were found among Saudi nurses when compared to non-Saudis (median =12.0 vs. median =10.0,  $p = 0.001$ , respectively), smokers when compared to non-smokers (median =17.0 vs. median =10.0,  $p = 0.004$ ), nurses with a psychiatric illness when compared to their counterparts (median =20.0 vs. median =10.0,  $p = 0.0001$ ), and those who had a family member with

a psychiatric illness, compared to their counterparts (median =16.0 vs. median =10.0,  $p = 0.003$ ).

Those with more than three children reported considerably greater stress levels than those with one to three children ( $p = 0.025$ ). Participants who shared housing at a hospital showed lower stress levels than those in the other household categories ( $p = 0.048$ ; Table 4).

### Correlations of the COPE subscales with depression, anxiety, and stress

COPE subscale correlations with depression, anxiety, and stress Active

**Table 3.** Categories of depression, anxiety, and stress and the prevalence of each among the nurses (N = 230).

Parameter	Category	Frequency	Percent (%)
Depression	Normal	131	57
	Depressed	99	43
	Mild	46	20
	Moderate	32	13.9
	Severe	10	4.3
Anxiety	Extremely severe	11	4.8
	Normal	123	53.5
	Anxious	107	46.6
	Mild	22	9.6
	Moderate	37	16.1
Stress	Severe	23	10
	Extremely severe	25	10.9
	Normal	172	74.8
	Stressed	58	25.2
	Mild	23	10
	Moderate	21	9.1
	Severe	11	4.8
	Extremely severe	3	1.3

**Table 4.** Factors associated with depression, anxiety, and stress among the nurses in this study.

Variable and category	Depression		Anxiety		Stress	
	Median (IQR)	P	Median (IQR)	P	Median (IQR)	p
<b>Gender</b>						
Male	4.0 (0.0-8.0)	0.198	4.0 (0.0-4.0)	0.053	8.0 (4.0-12.0)	0.251
Female	8.0 (2.0-12.0)		6.0 (2.0-14.0)		10.0 (4.0-16.0)	
<b>Age (years)</b>						
Under 30	10.0 (2.0-14.0)	0.083	10.0 (4.0-18.0)	< 0.0001***	12.0 (6.0-18.0)	0.133
31-40	8.0 (2.0-14.0)		6.0 (2.0-10.0)		10.0 (4.0-14.0)	
41-50	8.0 (4.0-12.0)		6.0 (3.0-10.0)		10.0 (6.0-13.0)	
51 and above	4.0 (2.0-8.0)		5.0 (1.0-7.0)		10.0 (3.0-14.0)	
<b>Nationality</b>						
Saudi	10.0 (4.0-18.0)	0.001**	10.0 (4.0-18.0)	< 0.0001***	12.0 (6.0-20.0)	0.001**
Non-Saudi	6.0 (2.0-12.0)		6.0 (2.0-10.0)		10.0 (4.0-14.0)	
<b>Marital status</b>						
Single	10.0 (4.0-14.0)	0.24	6.0 (2.0-16.0)	0.341	12.0 (6.0-18.0)	0.089
Married	6.0 (2.0-12.0)		6.0 (2.0-10.0)		10.0 (4.0-14.0)	
Divorced	8.0 (2.0-12.0)		8.0 (6.0-14.0)		12.0 (8.0-14.0)	
Widowed	8.0 (8.0-8.0)		8.0 (8.0-8.0)		14.0 (14.0-14.0)	
<b>Number of Children</b>						
None	8.0 (3.0-13.0)	0.055	8.0 (2.0-16.0)	0.108	12.0 (6.0-16.0)	0.025*
1 to 3	6.0 (2.0-12.0)		6.0 (2.0-10.0)		9.0 (2.0-14.0)	
> 3	12.0 (5.0-16.0)		7.0 (3.0-8.0)		12.0 (7.0-18.0)	
<b>Household</b>						
Hospital sharing accommodations	8.0 (2.0-12.0)	0.029*	4.0 (4.0-6.0)	0.135	8.0 (4.0-10.0)	0.048*
Living with spouse and/or children	6.0 (2.0-12.0)		6.0 (4.0-10.0)		10.0 (2.0-14.0)	
Living with parents	10.0 (4.0-16.0)		10.0 (3.0-18.0)		12.0 (7.0-18.0)	
Living alone	8.0 (4.0-14.0)		6.0 (2.0-12.0)		10.0 (4.0-14.0)	
Living with a friend/housemate	8.0 (2.0-12.0)		6.0 (2.0-10.0)		11.0 (4.0-14.0)	
With sister	29.0 (18.0-40.0)		13.0 (8.0-18.0)		22.0 (12.0-32.0)	
<b>Department</b>						
ED	4.0 (0.0-9.0)	0.079	4.0 (0.0-9.0)	0.346	3.0 (0.0-10.0)	0.136
PNOC	8.0 (4.0-12.0)		6.0 (2.0-14.0)		12.0 (6.0-14.0)	
OB GYN	4.0 (0.0-14.0)		6.0 (2.0-8.0)		8.0 (6.0-16.0)	
Inpatient medical wards	8.0 (0.0-12.0)		8.0 (2.0-10.0)		12.0 (2.0-16.0)	
Inpatient surgical wards	10.0 (4.0-12.0)		8.0 (4.0-14.0)		12.0 (10.0-14.0)	
Critical care unit	10.0 (4.0-16.0)		11.0 (3.0-18.0)		12.0 (9.0-18.0)	
Cardiology center	6.0 (0.0-10.0)		5.0 (2.0-8.0)		7.0 (2.0-12.0)	

Maternity	7.0 (2.0-12.0)		14.0 (6.0-22.0)		9.0 (2.0-16.0)	
Daycare unit	6.0 (2.0-13.0)		10.0 (7.0-15.0)		11.0 (5.0-14.0)	
Outpatient clinic	3.0 (0.0-8.0)		4.0 (0.0-10.0)		7.0 (2.0-12.0)	
Cardiac OR	6.0 (6.0-6.0)		8.0 (8.0-8.0)		8.0 (8.0-8.0)	
Pediatrics	10.0 (8.0-14.0)		8.0 (4.0-14.0)		14.0 (12.0-14.0)	
Operating room	2.0 (0.0-6.0)		6.0 (0.0-8.0)		4.0 (4.0-10.0)	
Dialysis clinic	11.0 (5.0-19.0)		17.0 (3.0-30.0)		13.0 (1.0-33.0)	
Pediatric oncology	14.0 (0.0-28.0)		9.0 (2.0-16.0)		13.0 (2.0-24.0)	
Other	12.0 (8.0-16.0)		7.0 (4.0-16.0)		12.0 (8.0-22.0)	
<b>Smoking status</b>						
No	8.0 (2.0-12.0)	<b>0.005**</b>	6.0 (2.0-12.0)	<b>0.018*</b>	10.0 (4.0-14.0)	<b>0.004**</b>
Yes	13.0 (5.0-21.0)		16.0 (3.0-20.0)		17.0 (9.0-24.0)	
<b>Have a chronic medical illness</b>						
No						
	8.0 (2.0-12.0)	0.992	6.0 (2.0-14.0)	0.363	10.0 (4.0-16.0)	0.952
Yes	8.0 (2.0-12.0)		8.0 (4.0-12.0)		10.0 (6.0-14.0)	
<b>Have a history of COVID-19</b>						
No						
	8.0 (2.0-12.0)	0.277	6.0 (2.0-12.0)	0.912	11.0 (6.0-16.0)	0.145
Yes	6.0 (1.0-12.0)		6.0 (2.0-14.0)		9.0 (2.0-15.0)	
<b>Have a psychiatric illness</b>						
No						
	8.0 (2.0-12.0)	<b>&lt;0.0001***</b>	6.0 (2.0-12.0)	<b>0.001**</b>	10.0 (4.0-14.0)	<b>&lt; 0.0001***</b>
Yes	16.0 (12.0-30.0)		20.0 (14.0-28.0)		20.0 (14.0-32.0)	
<b>Have a family member with a psychiatric illness?</b>						
No						
		<b>&lt; 0.0001***</b>				
	8.0 (2.0-12.0)		6.0 (2.0-12.0)	<b>0.008**</b>	10.0 (4.0-14.0)	<b>0.003**</b>
Yes	14.0 (8.0-24.0)		12.0 (6.0-20.0)		16.0 (10.0-26.0)	

P values are statistically significant at \* <0.05, \*\* <0.01, or \*\*\* <0.0001; PNOG = Princess Norah Oncology Center; OB-GYN = obstetrics and gynecology; ED = Emergency department.

**Table 5.** Correlations of depression, anxiety, and stress with scores on the COPE subscales.

Parameter	Depression		Anxiety		Stress	
	Rho	P	Rho	P	Rho	p
Problem Focused - Active coping	0.13	0.058	0.28	< 0.0001***	0.17	0.011*
Problem Focused - Use of informational support	0.18	0.007**	0.28	< 0.0001	0.17	0.009**
Problem Focused - Positive reframing	0.09	0.188	0.19	0.005**	0.12	0.068
Problem Focused - Planning	0.11	0.085	0.19	0.005**	0.14	0.035*
Emotion Focused - Emotional support	0.12	0.063	0.23	< 0.0001***	0.13	0.052
Emotion Focused - Venting	0.31	< 0.0001***	0.34	< 0.0001***	0.32	< 0.0001***
Emotion Focused - Humor	0.2	0.002**	0.23	0.001**	0.23	0.001**
Emotion Focused - Acceptance	0.02	0.743	0.08	0.257	0.05	0.493
Emotion Focused - Religion	0.02	0.809	0.13	0.054	0.03	0.652
Emotion Focused - Self-blame	0.54	< 0.0001***	0.49	< 0.0001	0.51	< 0.0001***
Avoidant - Self-distraction	0.18	0.006**	0.23	< 0.0001***	0.21	0.002**
Avoidant - Denial	0.41	< 0.0001***	0.42	< 0.0001***	0.41	< 0.0001***
Avoidant - Substance use	0.29	< 0.0001***	0.31	< 0.0001***	0.25	< 0.0001***
Avoidant - Behavioral disengagement	0.55	< 0.0001***	0.55	< 0.0001***	0.54	< 0.0001***

P values are statistically significant at \* <0.05, \*\* <0.01, or \*\*\* <0.0001.

coping (Rho =0.28, p 0.0001), positive reframing (Rho =0.19, p =0.005), and planning (Rho =0.19, p =0.005) were found to be substantially connected with greater anxiety ratings. Higher scores for depression (Rho =0.18, p =0.007), anxiety (Rho =0.28, p 0.0001), and stress (Rho =0.17, p =0.009) were positively connected with the use of informational assistance.

The depression, anxiety, and stress scores showed significant positive correlations with higher scores on emotion-focused strategies, such as venting (Rho =0.31, p 0.0001; Rho =0.34, p 0.0001; and Rho =0.32, p 0.0001; respectively), humor (Rho =0.20, p =0.002; Rho =0.23, p =0.001; and Rho =0.23 p =0.001; respectively), and self-blame (Rho =0.54, p 0.0001; Rho =0.49, p 0.0001; and Rho =0.51, p 0.0001; respectively). The three psychological DASS-

21 conditions (depression, anxiety, and stress) were consistently correlated with all avoidant strategies, including self-distraction (Rho =0.18, p =0.006; Rho =0.23, p 0.0001; and Rho =0.21, p =0.002; respectively), denial (Rho =0.41, p 0.0001; Rho =0.42, p 0.0001, and Rho =0.41, p 0.0001 ; Rho =0.42, p 0.0001, and Rho =0.41, p 0.0001, respectively), substance use (Rho =0.29, p 0.0001; Rho =0.31, p 0.0001; and Rho =0.25, p 0.0001; respectively), and behaviour disengagement (Rho =0.55, p 0.0001; Rho =0.55, p 0.0001; and o =0.54 were 0.0001; respectively).

**Factors independently associated with depression, anxiety, and stress**

The linear regression model showed an independent association of



**Table 6.** Results of the linear regression analysis for the assessment of the independent variables associated with depression.

Parameter	Category	B	95%CI		P
<b>Depression</b>					
Nationality (ref: non-Saudi)	Saudi	0.96	3.7	-1.78	0.489
Smoking (ref: no)	Yes	1.68	-1.17	4.53	0.247
Have a psychiatric illness (ref: no)	Yes	6.93	3.05	10.82	0.001**
Have a family member with a psychiatric illness (ref: no)	Yes	4.6	1.69	7.52	0.002**
Household (ref: hospital sharing accommodations)	Living with a spouse and/or children	-1.83	-5.45	1.78	0.318
	Living with parents	-2.18	-6.29	1.94	0.298
	Living alone	-0.48	-4.19	3.24	0.8
	Living with a friend/housemate	0.65	-2.86	4.15	0.716
	With sister	17.02	7.52	26.52	0.001**
Use of informational support	Maximum 8	-0.26	-0.92	0.4	0.443
Venting	Maximum 8	0.12	-0.66	0.9	0.765
Humor	Maximum 8	-0.63	-1.19	-0.06	0.030*
Self-blame	Maximum 8	1.21	0.59	1.82	< 0.0001***
Self-distraction	Maximum 8	0.2	-0.44	0.84	0.541
Denial	Maximum 8	0.75	0.07	1.44	0.032
Substance use	Maximum 8	1.3	0.24	2.37	0.017*
Behavioral disengagement	Maximum 8	1.3	0.6	2.01	<0.0001***
<b>Anxiety</b>					
Age (ref: under 30)	31-40	-2.43	-4.54	-0.33	0.024*
	41-50	-2.74	-5.21	-0.28	0.029*
	51 and above	-3.07	-6.31	0.17	0.063
Nationality (ref: non-Saudi)	Saudi	-0.59	-2.71	1.54	0.589
Smoking (ref: no)	Yes	1.63	-1.09	4.35	0.238
Have a psychiatric illness (ref: no)	Yes	8.22	4.54	11.89	< 0.0001***
Have a family member with a psychiatric illness (ref: no)	Yes	0.64	-2.17	3.45	0.655
Active coping	Maximum 8	0.77	0.06	1.49	0.035*
Use of informational support	Maximum 8	-0.02	-0.78	0.75	0.97
Positive reframing	Maximum 8	-0.32	-1.05	0.41	0.382
Planning	Maximum 8	-0.24	-1.01	0.52	0.531
Emotional support	Maximum 8	-0.1	-0.84	0.64	0.79
Venting	Maximum 8	0.12	-0.63	0.87	0.748
Humor	Maximum 8	-0.34	-0.89	0.2	0.214
Self-blame	Maximum 8	0.77	0.16	1.38	0.014*
Self-distraction	Maximum 8	0.49	-0.16	1.15	0.137
Denial	Maximum 8	0.53	-0.13	1.19	0.116
Substance use	Maximum 8	1.77	0.73	2.81	0.001**
Behavioral disengagement	Maximum 8	1.24	0.55	1.93	< 0.0001***
<b>Stress</b>					
Nationality (ref: non-Saudi)	Saudi	0.33	-2.49	3.14	0.82
Household (ref: hospital sharing accommodations)	Living with a spouse and/or children	1.81	-1.87	5.5	0.333
	Living with parents	1.1	-3.1	5.3	0.605
	Living alone	2.22	-1.55	5.99	0.247
	Living with a friend/housemate	3.6	0.06	7.14	0.046*
	With sister	9.1	-0.47	18.66	0.062
Number of children (ref: none)	1 to 3	-1.13	-3.26	0.99	0.295
	> 3	1.12	-2.83	5.06	0.577
Smoking (ref: no)	Yes	2.73	-0.15	5.61	0.063
Have a psychiatric illness	Yes	6.8	2.86	10.74	0.001**
Have a family member with a psychiatric illness	Yes	2.11	-0.85	5.06	0.161
Active coping	Maximum 8	0.25	-0.48	0.97	0.504
Use of informational support	Maximum 8	-0.43	-1.16	0.31	0.256
Planning	Maximum 8	-0.38	-1.13	0.37	0.323
Venting	Maximum 8	0.22	-0.57	1.01	0.583
Humor	Maximum 8	-0.35	-0.92	0.22	0.226
Self-blame	Maximum 8	1.1	0.46	1.73	0.001**
Self-distraction	Maximum 8	0.59	-0.09	1.27	0.09
Denial	Maximum 8	0.87	0.18	1.56	0.014*
Substance use	Maximum 8	0.81	-0.28	1.9	0.144
Behavioral disengagement	Maximum 8	1.37	0.66	2.09	< 0.0001***

P values are statistically significant at \* &lt;0.05, \*\* &lt;0.01, or \*\*\* &lt;0.0001.

depression with having a personal history ( $B = 6.93, p = 0.001$ ) a psychiatric disorder in the family ( $B = 4.60, p = 0.002$ ) (See Supplementary Materials for Table 6). Depression was negatively associated with humor ( $B = -0.63, p = 0.030$ ) and positively associated with self-blame ( $B = 1.21, p = 0.0001$ ), denial ( $B = 0.75, p = 0.032$ ), substance use ( $B = 1.30, p = 0.017$ ), and behavioral disengagement ( $B = 1.30, p = 0.0001$ ). (Additionally, Table 6 should be included in the Supplementary Materials.) In comparison to nurses 30 years old, those 31-40 years old and 41-50 years old exhibited lower anxiety levels ( $B = -2.43, p = 0.024$  and  $B = -2.74, p = 0.029$ , respectively).

Nurses who had a psychiatric disorder had higher anxiety levels than those who did not ( $B = 8.22, p = 0.0001$ ) Active coping ( $B = 0.77, p = 0.035$ ), self-blame ( $B = 0.77, p = 0.014$ ), substance use ( $B = 1.77, p = 0.001$ ), and behavioral disengagement ( $B = 1.24, p = 0.0001$ ) were all independently linked with anxiety. According to the stress scores, living with a friend/housemate was related with more stress than living in a hospital sharing accommodations ( $B = 3.60, p = 0.046$ ). Being diagnosed with a psychiatric disease was connected with greater levels of stress ( $B = 6.80, p = 0.001$ ). Stress was also found to be linearly related to self-blame ( $B = 1.10, p = 0.01$ ).

The stress scores showed that living with a friend/housemate was associated with higher stress compared to residing in a hospital sharing accommodations ( $B = 3.60, p = 0.046$ ). Being diagnosed with a psychiatric illness was independently associated with higher stress levels ( $B = 6.80, p = 0.001$ ). Stress was also linearly associated with self-blame ( $B = 1.10, p = 0.001$ ), denial ( $B = 0.87, p = 0.014$ ), and behavioral disengagement ( $B = 1.37, p < 0.0001$ ) as coping strategies.

## Discussion

Many factors affect the personal and professional lives of nurses, including SARS-CoV-2 infection, worries about exposing loved ones, emotional and physical exhaustion, and feeling overwhelmed, anxious, and depressed. The current study's main objectives were to assess the depression, anxiety, stress, and coping strategies of nurses working at a national guard hospital in King Abdulaziz Medical City, Jeddah, Saudi Arabia. The findings of the DASS-21 showed that depression was prevalent among 99 (43.0%) nurses, anxiety among 107 (46.5%) nurses, and stress among 58 (25.2%) nurses (Table 2). These results are similar to those of the studies by Pouralizadeh et al., Braquehais et al., Krishnamoorthy et al., and Sheikhbardsiri et al. [25-28]. The nurses in the current study experienced the negative effects of the COVID-19 pandemic on their mental health as well as their physical health. Despite the possible health consequences, many nurses chose to care for patients infected with COVID-19.

COVID-19 has had a negative impact on their mental and physical health. Despite possible health effects, many nurses chose to take care of patients infected with COVID-19. During the COVID-19 outbreak, medical workers reported mental health problems such as depression, anxiety, stress, traumatic stress disorders, and poor sleep quality. All of these are closely related to physical symptoms, such as headaches, lethargy and fatigue [29]. Therefore, hospitals should provide nurses with psychological support, teach them how to deal with stress, and improve their ability to control and regulate emotions in order to understand the epidemic of COVID-19 [29]. Therefore, hospitals must provide nurses with psychological support, teach them to use coping methods, and enhance their ability to control and regulate their emotions to understand that the COVID-19 pandemic will eventually end for nurses and other healthcare providers [30]. Another study found that frontline nurses who were not trained to work in a COVID-19 environment or who worked part-time reported a higher level of fear of COVID-19 infection than their counterparts, which, in turn, was associated with psychological distress, decreased job satisfaction, and intentions to leave their organizations that were more serious than their counterparts [31]. The study's participants who resigned from their nursing positions reported that it was because of their fears and psychological stress related to COVID-19 infection and transmitting it to their families.

The current study found that melancholy, anxiety, and stress levels were considerably greater among Saudi nurses than non-Saudi nurses, and smokers than non-smokers. Participants with psychiatric disorders scored much higher than their peers.

Participants with a psychiatric illness reported significantly higher scores, compared to their counterparts, as well as those with a family history of a psychiatric condition, compared to their counterparts. Depression, stress, and anxiety scores differed significantly based on participants' household conditions,

which is consistent with the results of a study comparable to this one that was carried out during the COVID-19 outbreak [32-34]. The majority of the nurses' coping techniques were substantially associated with higher anxiety levels and the use of to cope with their suffering. Nursing staff in clinical settings were significantly more likely to plan, a problem-focused, adaptive strategy derived from the need to reduce perceived stress, than nurses in outpatient healthcare facilities, who were significantly more likely to use behavioral disengagement as a coping strategy [35]. In the same vein, a study of Croatian nurses discovered that the avoidance coping style and positive reappraisal style was substantially more prevalent among nurses than among physicians during the COVID-19 pandemic.

Additionally, the current study discovered that people under the age of 40 were more likely than those beyond the age of 40 to utilize avoidance coping mechanisms [36]. These findings are supported by a qualitative descriptive study conducted at a hospital in Wuhan, China (where the COVID-19 pandemic emerged), which reported specific psychological effects on individuals, showing that nurse managers play a crucial role in supporting nurses and providing them with psychological assistance to cope with such crises [37]. Similarly, Ripp and Trockel reported that workers want to feel supported by their employers through open communication, transparency, thorough evaluations of organizational risk, sufficient and appropriate staffing, and access to personal protective equipment, training, and continuous psychological assistance [38].

Our results showed significantly higher mean anxiety, depression, and stress scores related to nationality, smoking behavior, household conditions, number of children, and the presence of a psychiatric illness in the nurses or their families. on the nurses' levels of melancholy, anxiety, or stress. The interpretations beyond these results might be due to the participants' increased vulnerability to infection with COVID-19, which was reported to have an association with smoking behavior, the presence of a psychiatric illness in either the nurses or their families, and the presence of a chronic medical condition, such as diabetes, hypertension, dyslipidemia, or cardiac disease (Figure 1).

On the other hand, marital status had no significant correlation with depression, anxiety, or stress. These findings are inconsistent with the studies conducted by Nemati et al., Poursadeghiyan et al., and Sheikhbardsiri et al., who found that single nurses had more anxiety and depression in comparison to married nurses [28,39,40]. However, based on our multiple regression analysis, marital status had no impact on participants' levels of anxiety or stress.

The rapid spread of COVID-19 has led to severe pressure on nurses working in national guard hospitals. Relationships that provide support, such as family relationships, are inversely related to anxiety and depression, and married nurses report experiencing less depression as their families provide them with more support, compared to their unmarried colleagues [28].

A systematic review found that depression and anxiety were dominant among divorced, widowed, and single healthcare workers due to a lack of social support. The presence of active social support provided by families, peers, and supervisors promoted better coping with work-related stress and improved healthcare workers' self-confidence. Nonetheless, living with a family was a risk factor for unfavourable mental health outcomes due to a fear of transmitting the disease [14]. A negative correlation between self-efficacy and anxiety level was found, indicating that a low level of self-confidence reflected a severe level of anxiety [10]. Another cross-sectional study conducted in China found that, during the COVID-19 outbreak, the incidence of depression was 34.3%, and the incidence of anxiety was 18.1%. This study observed an association between perceived health status and the presence of depression and anxiety with social and demographic factors, such as relationships with family members, the extent of exposure to infection, and social support. To clarify, poor relationships with family members increased the likelihood of having depressive symptoms, and excessive exposure to infection and poor social support were associated with anxiety symptoms [15].

A correlation was observed between demographic background and mean anxiety, stress, and depression scores by gender. No significant differences were found between the mean anxiety, stress, and depression scores. These results contradict the findings of the studies by Ali et al., Cao et al., and Wu et al.; however, the results related to gender are consistent with the study by Rathnayake et al. [41-44]. Based on the multiple regression analysis, gender had no impact on participants' depression levels. A study conducted by Sheikhbardsiri et al., found that women were more likely to have anxiety, depression, and stress than men [28]. However, some of the results might be confounded by the fact that the nurses in this study were mostly (95.7 %)

females, compared to the 4.3 % of participants who were males, but in fact, females spent more time on wards and were more likely to be exposed to COVID-19 patients when they provided direct care and collected samples from suspected patients for virus detection.

Failing to address and respond to mental health conditions will result in related stress and social detachment. There is evidence that the incidence of infection, depression, and perceived mortality from the pandemic are predictors of job resignations, or even worse, suicide and psychiatric disorders among healthcare workers, which could seriously undermine the entire healthcare system. During the pandemic, administrative and psychological efforts and emotional support could have been available to nurses working at National Guard hospitals, along with stress management programs and training. In the future, a wellness program could be developed with the aim of early detection of depressed, anxious, and stressed nurses in order to ensure patient safety [45,46].

## Conclusion

In conclusion, different levels of depression, anxiety, and stress, ranging from mild to significantly severe, were found among the nurses in this study. Most of the coping mechanisms used by nurses were significantly correlated with higher anxiety scores. The use of informational support was positively correlated with higher scores on depression and anxiety, while stress was linearly associated with self-blame, denial, and behavioral disengagement as coping strategies. Furthermore, significantly higher anxiety, depression, and stress scores were found to be related to participants' nationality, smoking behavior, household living, number of children, and presence of a psychiatric illness among nurses or their families. Gender and marital status had no impact on the level of depression, anxiety, or stress among the nurses. Our data also revealed that nurses under the age of 30 had considerably greater total anxiety levels, leading us to conclude that older nurses have a lower anxiety level.

## Recommendations

Individuals have varying degrees of depression, anxiety, and stress., it is important to note that seeking professional help from a licensed mental health provider is highly recommended for individuals experiencing severe symptoms.

For mild symptoms, self-care activities such as exercise, healthy eating, and relaxation techniques such as meditation or deep breathing can be helpful. It may also be beneficial to engage in activities that bring pleasure or a sense of accomplishment, such as hobbies or volunteering. Connecting with supportive friends and family members can also be helpful.

For moderate symptoms, seeking professional help from a licensed mental health provider may be beneficial. This may involve therapy, medication, or a combination of both. It is also important to continue engaging in self-care activities and seeking social support.

For severe symptoms, it is recommended to seek immediate professional help from a licensed mental health provider or emergency medical services. In some cases, hospitalization may be necessary for safety and stabilization.

As for coping mechanisms used by nurses, it is important to note that not all coping mechanisms are healthy or effective. It may be helpful for nurses to seek support from mental health professionals or employee assistance programs to develop healthy coping strategies.

It is important for nurses to recognize the signs and symptoms of mental health issues in themselves and seek help when needed. This may involve talking to a trusted colleague or they can learn Some healthy coping mechanisms that can use to manage stress, anxiety, and depression including:

**Mindfulness and relaxation techniques:** This can involve deep breathing, meditation, or yoga. These techniques can help to reduce anxiety and improve overall well-being.

**Exercise:** Physical activity can help to reduce stress and improve mood. This can include activities such as running, walking, or swimming.

**Social support:** Talking to friends, family members, or colleagues about stressors or concerns can be helpful in reducing stress and improving overall mental health.

**Time management:** Prioritizing tasks and setting realistic goals can help to reduce stress and improve productivity.

**Self-care:** Engaging in activities that bring pleasure or a sense of accomplishment, such as hobbies or volunteering, can improve overall well-being.

## Limitations

Although this research was the first regional study in Saudi Arabia to assess nurses' mental well-being during the COVID-19 pandemic, it has some limitations. First, female nurses were the predominant respondents (95.7%) in this study. Second, as a Single-Centre study, the findings cannot be generalized to other settings. Third, the study might have introduced a response bias due to the nature of the sampling technique. Fourth, due to time and funding constraints, this study employed a cross-sectional design, which cannot establish causality among the variables. Moreover, the paucity of research related to nurses' mental health before the pandemic, made it difficult to link these alarmingly high levels of depression, anxiety, and stress to a specific source, although the nurses encountered numerous stressors daily. Hence, these limitations highlight the need for future studies to scrutinize the mental health status of nurses working in national guard hospitals and provide more detailed information about their coping mechanisms. examine the mental health status of nurses working in national guard hospitals and provide more thorough information about their familial psychiatric history and coping techniques.

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## Conflict of interest

The authors declared that they have no conflict of interest.

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