

ORIGINAL RESEARCH

CORONA EXPERIENCE

The effects on mental health of nurses during the COVID-19 pandemic: a systematic review and meta-analysis

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Abstract

Background & Objective: The COVID-19 pandemic has widely spread worldwide, and caused mental health problems for healthcare professionals, especially affecting the frontline nurses of the crisis. There is an immediate requirement to determine the frequency of anxiety, insomnia, and many other negative emotions in the staff to allow efficient measures to be taken. We aimed to analyze and document the existing evidence on the prevalence of mental health issues among nurses during the COVID-19.

Methodology: A literature search was conducted through e-databases, including PubMed, Scopus, Google Scholar, and Web of Science up to December 2020. The search procedure based on using key words for "nurses", "mental health", and "COVID-19 pandemic".

Results: A total of 30 studies were included in this systematic review and meta-analysis. There were 57555 samples in total in the studies. According to the random effects model, it was found that the overall effect size of the pandemic on the mental health of nurses caring for patients diagnosed with COVID-19 was statistically significant with a value of 1,964 (G.A; 1,384-2,787; $p < 0.05$).

Conclusion: Serious symptoms of negative emotions such as anxiety and depression have emerged in frontline nurses dealing with COVID-19. Policymakers and managers need to take efficient measures for nurses to preserve their mental health status during COVID-19.

Key words: COVID-19; Nurses; Mental health; Meta-analysis

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1. Introduction

In March 2020, the World Health Organization announced that it recognized COVID-19 as a pandemic. As of January 2, 2022, approximately 290 million cases and more than 5 million deaths have been recorded from almost the entire world.¹

The difference between pandemics and other diseases is that they affect many people from the same illness, regardless of social or economic status, and cause large masses to experience various health problems.² In a pandemic, unlike other occupational groups, healthcare professionals (HCPs) face mental health problems due to heavy workload, disturbed personal lives, lack of social support, fear of contamination, as well as the death of their colleagues and friends.³ Many HCPs, especially nurses, experienced severe mental problems during pandemics such as severe acute respiratory syndrome (SARS) and Ebola, and were vulnerable to many psychological disorders.^{4,5}

Nurses, who are always employed on the front line in any public health condition or crisis, face not only the risk of contamination but also a great psychological effect.⁶ Considering that nurses constitute approximately 59% of the health workforce,⁷ it becomes obvious how important it is to protect nurses' physical and mental health.

In the COVID-19 pandemic, many studies have been conducted on healthcare workers' mental health, especially nurses.^{8–10} Meta-analyses covering the mental health of HCPs and nurses, in particular, were also made, but these studies were mostly aimed at HCPs in China, during the first wave of the pandemic and at the place of origin of the virus. For this reason, a systematic review and meta-analysis study covering more sample groups from different countries was needed. This systematic review and meta-analysis aimed to analyze all available studies on the mental health

status of nurses during the COVID-19 period, including nurses from different regions such as Pakistan, Brazil, Iran, the USA, Turkey, Portugal, and the Philippines.

2. Methodology

2.1. Type and Place of the study

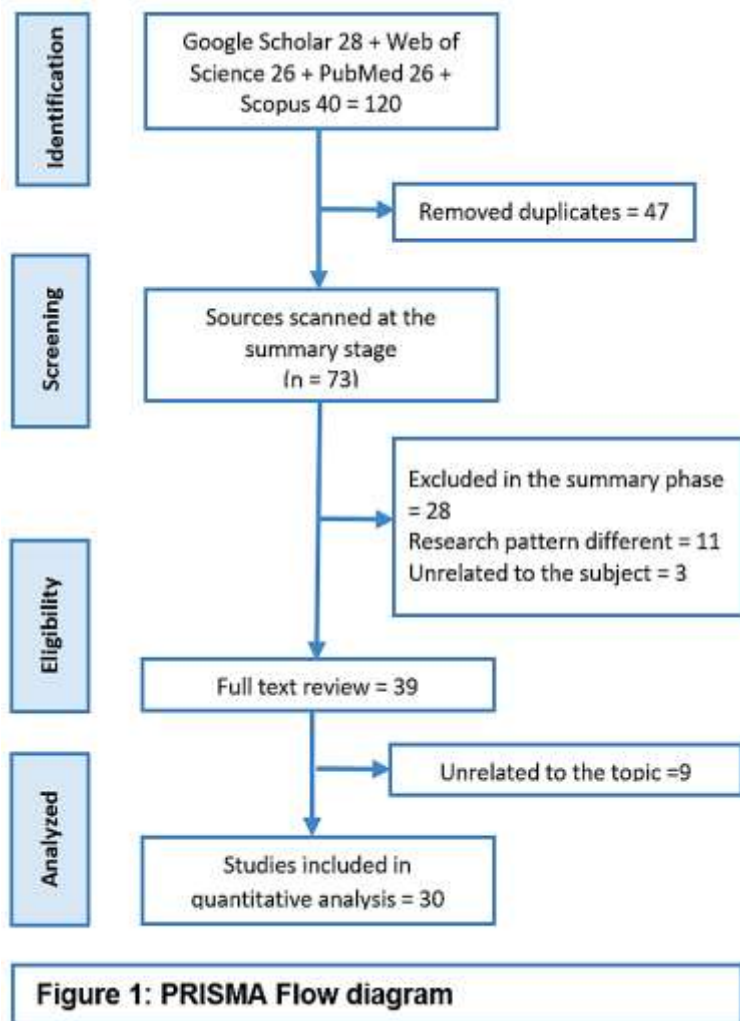
This research was conducted with the meta-analysis method, which is one of the quantitative research methods. The study was conducted over a university's internet access network from January 2020 to December 2020.

2.2. Declaration of ethics

Since the research is a meta-analysis study, a literature review model was used. Ethics committee approval was not obtained for the research, as the literature review excluded any direct effects on animals or humans.

2.3. Application steps of the study

The application steps of the study were classified based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis statement) and MOOSE (Meta-analysis Of Observational Studies in Epidemiology) criteria in the articles to be included in the meta-analysis. Articles meeting these criteria are identified and presented in Figure 1 and Table 1.



2.4. Information sources and search strategy

In the study, the key words were determined by searching in Medical Subject Headings (MeSH Browser), which includes medical topics, after examining Turkish Science Terms. The determined key words were scanned in Prospero (National Institute for Health Research), and it was checked whether the determined research topic had been researched before. Article search was conducted using the key words "nurses," "mental health" and "COVID-19," which were determined for article searches. Relevant research articles published between January 2020 and December 2020 on the subject were included in the evaluation, with searches from Google Scholar, PubMed, Web of Science, and Scopus databases. After the repetitions in the articles downloaded from separate databases were deleted, the title, abstract, and full-text reading stages of the articles were started respectively. In the first stage, 120 publications were reached in the search conducted in four

databases with the determined search strategy. After removing the repetitive and non-compliant titles and abstracts, the remaining articles were evaluated within the scope of title and summary reading. After the title and summary reading, the articles to be included in the full-text reading were determined. Articles found to be irrelevant to the subject were excluded from the study. Thirty studies that met the inclusion criteria were included in the study. The article search and elimination and inclusion of articles in the study is presented in Figure 1.

2.5. Search and meta-analysis criteria for articles

The search criteria included the following types of published matter;

- i. Studies that were original research articles,
- ii. Articles written in English and Turkish to avoid language bias on the relevant subject,
- iii. Articles published in a peer-reviewed journal on the subject with open access,
- iv. Published articles on the impact of the COVID-19 pandemic on the mental health of nurses between January 2020 and December 2020 were included in the study.

2.6. Reviewing, coding, and methodological quality evaluation of articles

Independent and detailed abstract and full-text reading of the articles was completed by two researchers/experts to avoid publication bias. The articles included in the evaluation were coded according to their descriptive features. These descriptive features were;

- i. Name and date of study,
- ii. Type and purpose of the study,
- iii. Sample size of the study,
- iv. Data collection method used in the study,
- v. Main output of the study.

At the end of the examination of the studies, 12 of the criteria for evaluating the quality of the research proposed by Polit and Beck were used for the remaining thirty publications.¹¹ These criteria allow for making a general evaluation based on the aims, sample characteristics, findings, and results of the studies. Each study was evaluated on all criteria and separately by the researchers, and a "zero point" value was given if it fully met each item, and "one point" if not met one criterion. The scores that the study can get according to the criteria range from zero to 12. In the study,

articles belonging to all subgroups were examined independently by two researchers, and articles with a score of 7 and above in the quality evaluation were evaluated as high-quality. Thirty studies in total met this criterion and were included in the meta-analysis. Studies evaluated as strong and moderate quality were included in the meta-analysis.

2.7. Evaluation of key outputs

In the articles included in the study, analyses were conducted by evaluating the risk factors of the COVID-19 pandemic affecting the mental health of nurses. Descriptive statistics were included in the analysis because the studies were randomized controlled trials.

2.8. Analysis of data

“Comprehensive Meta Analysis Academic (CMA)/nonprofit Pricing (Version 3)” licensed software was used in the analysis of the data. The data of all selected articles were entered into the CMA software, and the heterogeneity of the articles was evaluated. In the heterogeneity test, the effect sizes, study weights, 95% confidence intervals, and overall effect size of all studies were calculated under the random-effects model in group analyses with $p \leq 0.05$ and under the fixed effects model in group analyses with $p > 0.05$. In the evaluation of the overall effect, the limit of statistical significance was accepted as $p \leq 0.05$. To test the publication bias, Funnel Plot analysis was performed, and the results of Classic Fail-Safe N and Tau coefficient calculations were used.

3. Results

3.1. Sample Characteristics in Studies

It was determined that the sample size of the studies included in the meta-analysis, was between 86 and 22034. The total sample group in the studies was 57555.

3.2. Evaluation of methodological quality

In this meta-analysis, it was found that the agreement between coders was 84%, according to the quality assessment score. In the reliability analysis, Cohen's kappa value was in the 95% confidence interval (CI) of 0.84 (CI: 0.767-0.873)]. Kappa value < 0 fit worse than random fit; 0.01- 0.20 insignificant agreement; 0.21–0.40 poor agreement; 0.41- 0.60 moderate compliance; 0.61- 0.80 good agreement and 0.81- 1.00 excellent agreement or 0.75 and above excellent, 0.40–

0.75 moderate-good and below 0.40 considered as a poor fit. The kappa value (0.84) in this study shows that there is an excellent agreement between encoders.

3.3. Analytical findings

3.3.1. The impact of the COVID-19 pandemic on the mental health of nurses

Because of the heterogeneity test performed to determine the effect of the COVID-19 pandemic on the mental health of the nurses, it was determined that the $p < 0.05$ and $Q (3396.25)$ value was higher than the value corresponding to the df value in the χ^2 table and the I^2 value was 99.14, in a heterogeneous structure¹² (Table 2). Because of the calculations, the distribution of effect sizes was evaluated according to the random-effects model.

According to the analysis made according to the random-effects model, the overall effect size of the effect of the COVID-19 pandemic on the mental health of the nurses was high and positive with a value of 1.964 (CI; 1.384-2.787; $p < 0.05$). It was statistically significant, and nurses experienced intense depression processes with anxiety (Figure 2).

3.3.2. The effect of working in COVID-19 units

In the effect of the COVID-19 pandemic on the mental health of the nurses, $p < 0.05$ was found because of the heterogeneity test performed for the working variable in the units where patients diagnosed with COVID-19 were cared for. Since the $Q (251.416)$ value is higher than the value corresponding to the df value in the χ^2 table and the I^2 value is 96. It was determined to be heterogeneous,¹² (Table 3). Because of the calculations,¹² the distribution of the effect sizes was evaluated according to the random-effects model.

With the analysis made according to the random-effects model, it was found that the overall effect size of working in the COVID-19 unit on the mental health of the nurses was high and positive with a value of 2.679 (CI; 1.940-3.700; $p < 0.05$). The effect of working in these units on mental health was found to be statistically significant (Figure 3).

3.3.4. The effect of the marital status

Because of the heterogeneity test performed for the marital status variable in the effect of the COVID-19 pandemic on the mental health of the nurses, it was determined that the $p < 0.05$ and

Q (248,013) value was higher than the value corresponding to the df value in the χ^2 table and the I^2 statistical value was 94.7 (Table 4). Because of the calculations, the distribution of effect sizes was evaluated according to the random-effects model.

With the analysis made according to the random-effects model, it was determined that the overall effect size of the marital status variable on the mental health of the nurses was high and positive, with a value of 2.193 (C.I; 1.700-2.829; $p < 0.05$). It was found that married nurses experienced more anxiety and depression than the single ones (Figure 4).

3.4. Publication bias

The funnel plot was used to test publication bias (Figure 5). When we analyze the figure, we can say that most of the studies show a homogeneous distribution. Therefore, there is no bias. In the other bias calculation, the Kendall tau coefficient was used and the value was calculated as 1.49 ($p > 0.05$). According to all the bias analysis calculations, it was concluded that there was no bias in this study.

4. Discussion

The first studies on healthcare workers' mental health in the COVID-19 pandemic were conducted in hospitals in China, as it was the center of the pandemic then.¹³ This study was conducted due to the disadvantages, such as limited sample group expressed in systematic reviews and meta-analyses covering these first-period studies,^{3,13,14} the limited number of studies, and lack of studies in different countries. This systematic review and meta-analysis, which included 30 studies from 10 different countries and 57555 nurses, showed that the overall effect size of the COVID-19 pandemic on the mental health of nurses was 1.964 (CI; 1.384-2.787; $p < 0.05$) with a high and positive value. It provides evidence that nurses experience intense depression with anxiety in this period.^{4,5,22-31,6,32-41,15-21}

It was determined that there were severe mental health problems in a sample group made for HCPs, most of whom were married and female nurses.⁸ It has also been stated that employees in hospitals associated with COVID-19 show more symptoms of anxiety and depression than others.⁸ Similarly, our study found that employees in COVID-19 units and married nurses experienced more anxiety and depression. In a study on SARS, one of the other members of the coronavirus

family, it was found that mental health problems such as depression and insomnia in nurses caring for patients with SARS were at a higher level than other nurses.⁴² In a study on the public (n = 214), front-line nurses (n = 234), and other nurses (n = 292), it was determined that the rate of vicarious traumatization was higher in the general population than in the front-line nurses. It was stated that there was no significant difference between other nurses and the public.⁴³ In a study of 374 nurses and 430 nursing students, it was seen that those who were closer to COVID-19 were both stronger and more anxious.⁴⁴

Conclusion

The results of this study establish that the ongoing COVID-19 pandemic has caused mental health problems such as depression and insomnia in nurses caring for patients with COVID-19, especially the married nurses were found more vulnerable. It is essential to periodically evaluate the mental status of nurses during and after the pandemic, especially those dealing with the corona patients. Some mental health services need to be provided, such as setting up intervention teams, preparing brochures on mental health, providing online counseling, and providing psychotherapy. Finally, it is recommended that nurses be aware of the symptoms of mental problems and be supported in stress management, individual self-care, and professional self-care to protect their mental health.

Limitations

There are several limitations in this study. The first is the heterogeneity in the included studies. Although similar evaluation methods were used in the studies, it was a disadvantageous situation that there was a lot of work due to the large variety of scales and that the researchers determined different limit values. The second limitation is that a limited number of databases have been researched. Also, a limited number of key words was searched. It would be better to conduct meta-analyses covering many more countries in the future.

Conflict of interests

The authors report no actual or potential conflicts of interest.

Authors' contribution

FC: Design of the study, analyses, editing

SM: Literature search and manuscript writing

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TABLES

Table 1: Features of the studies examined

Title	Aim	Measurement Tools	Sample	Results
A cross-sectional study of mental health status and self-psychological adjustment in nurses who supported Wuhan for fighting against the COVID-19	To evaluate the mental health status, stressors, and self-adjustment of nurses in isolation wards at different periods.	The Self Reporting Questionnaire-20 (SRQ-20)	Nurses working in China (n ₁ :92, n ₂ :86)	T1 has 92 respondents, and T2 has 86. The positive rates of mental health problems were 26.09% and 9.30%, respectively, showing significantly different in the two periods.
A large-scale survey study was conducted to assess trauma, burnout, posttraumatic growth, and associated factors for nurses in the COVID-19 pandemic	A large-scale survey study was conducted to assess trauma, burnout, post-traumatic growth for nurses in the COVID-19.	The Trauma Screening Questionnaire, Maslach Burnout Inventory, Posttraumatic Growth Inventory-Short Form	Nurses working in China (n:12596)	The study indicates that nurses who identified as women, working in ICUs, COVID-19 designated hospitals, and departments involved with treating COVID-19 patients had higher scores in mental health outcomes.
Acute stress disorder, coping self-efficacy and subsequent psychological distress among nurses amid COVID-19	This study aims to establish the prevalence of acute stress disorder and predictors of psychological distress among nurses.	Stanford Acute Stress Reaction Questionnaire, Trauma Coping Self-Efficacy Scale, The Brief Symptom Inventory-18	Nurses working in Jordan (n:448)	Given that individuals who suffer from ASD are predisposed to PTSD, follow-up with nurses to screen for PTSD and referral to appropriate psychological services is pivotal.
Anxiety and depression and the related factors in nurses of Guilan University of Medical Sciences hospitals during COVID-19: A web-based cross-sectional study	This study aims to assess the psychological impact of this outbreak on nurses that is one of the top provinces of incidence of COVID-19.	Generalized Anxiety Disorder-7, Patient Health Questionnaire-9	Nurses working in Iran (n:441)	The majority were in contact with suspected or confirmed COVID-19 cases (93.4%) and their relatives had been infected with COVID-19 (42%).
Anxiety and Depression of Nurses in a North West Province in China During the Period of Novel Coronavirus Pneumonia Outbreak	To investigate the anxiety and depression levels of frontline clinical nurses working in 14 hospitals in Gansu Province, China, during this period.	Questionnaire Related to Novel Coronavirus-Infected Pneumonia, Self-Rating Anxiety Scale, Self-Rating Depression Scale	Nurses working in China (n:22034)	Results show that nurses faced with the COVID-19 outbreak are at risk for experiencing anxiety and depression.
Anxiety and related factors in frontline clinical nurses fighting COVID-19 in Wuhan	The aim of this study was to examine the anxiety status of the frontline clinical nurses for the treatment of coronavirus disease 2019 (COVID-19).	Hamilton Anxiety Scale	Nurses working in China (n:176)	Sex, age, length of service, and clinical working time against COVID-19 were associated with anxiety in those nurses.

Assessment of Iranian Nurses' Knowledge and Anxiety Toward COVID-19 During the Current Outbreak in Iran	This study aimed to measure the awareness level of nurses in Shiraz, Iran, during the current COVID-19 outbreak.	A Self-Administered Questionnaire	Nurses working in Iran (n:85)	More than half of the nurses (56.5%) had good knowledge about sources, transmission, symptoms, signs, prognosis, treatment, and mortality rate of COVID-19.
COVID-19-Related Anxiety in Nurses Working on Front Lines in Turkey	The aim of this study was to investigate the pandemic related anxiety in nurses working in Turkey.	Spielberg's State-Trait Anxiety Inventory (Form TX-1)	Nurses working in Turkey (n:23)	COVID-19 related anxiety was closely associated with advancing age and years of experience, having a child and working in the wards rather than ICUs.

TABLE 1 (Continued)

Title	Aim	Measurement Tools	Sample	Results
Determination of stress, depression and burnout levels of front-line nurses during the COVID-19 pandemic	It was aimed to determine the stress, depression and burnout levels of front-line nurses.	Personal Information Form, the Perceived Stress Scale, Beck Depression Inventory, Maslach Burnout Inventory	Nurses working in Turkey (n:705)	More burnout was detected in nurses who had a positive COVID-19 test and did not want to work voluntarily during the pandemic.
Effect of Emotional Intelligence and Psychosocial Risks on Burnout, Job Satisfaction, and Nurses' Health during the COVID-19 Pandemic	The present study aimed to analyze the effect of psychosocial risks and emotional intelligence on nurses' health, well-being, burnout level, and job satisfaction.	The Trait Meta-Mood Scale, The UNIPSICO Battery, The Frankfurt Emotional Work Scale, The Questionnaire for the Assessment of Workplace Burnout Syndrome	Nurses working in Spain (n:125)	This research data points to a protective effect of emotional intelligence against the adverse effects of psychosocial risks such as burnout, psychosomatic complaints, and a favorable effect on job satisfaction.
Factors associated with insomnia among Chinese front-line nurses fighting against COVID-19 in Wuhan: A cross-sectional survey	To investigate the prevalence of insomnia among front-line nurses fighting against COVID-19 in Wuhan.	Fatigue Scale-14, Chinese Perceived Stress Scale, Athens Insomnia Scale	Nurses working in China (n:1794)	The level of insomnia among participants was higher than the normal level. Interventions based on influencing factors should be implemented to ensure nurses' sleep quality.
State anxiety levels of nurses providing care to patients with COVID-19 in Turkey	This study investigates the state anxiety levels of nurses providing care to patients.	The State-Trait Anxiety Inventory	Nurses working in Turkey (n:1457)	Nurses' state anxiety levels were high (51.51 ± 9.94).

TABLE 1 (Continued)

Title	Aim	Measurement Tools	Sample	Results
Frontline nurses' burnout, anxiety, depression and fear statuses and their associated factors during the COVID-19 outbreak in Wuhan, China: A large-scale cross-sectional study	The aim of this study was to examine mental health and their associated factors among frontline nurses who were caring for COVID-19 patients in Wuhan, China.	Maslach Burnout Inventory: Human Services Survey, Self-Rating Anxiety Scale, Self-Rating Depression Scale etc.	Nurses working in China (n:2014)	The findings showed that 288 (14.3%), 217 (10.7%), and 1,837 (91.2%) nurses reported moderate and high levels of anxiety, depression, and fear, respectively.
How perceived threat of COVID-19 causes turnover intention among Pakistani nurses: A moderation and mediation analysis	This study proposes that the perceived threat of COVID-19 enhances turnover intention among nurses	Perceived threat of COVID-19, Turnover Intentions, Ideological Contract, Psychological Anxiety	Nurses working in Pakistan (n:117)	The results showed that the perceived threat of COVID-19 enhances psychological anxiety (b = 0.30, P<0.001) and turnover intention among nurses (b=0.35, P<0.001).
Immediate psychological impact on nurses working at 42 government-designated hospitals during COVID-19 outbreak in China: A cross-sectional study	This study aimed to assess the immediate psychological impact on frontline nurses in China.	Perceptions and Attitudes Toward COVID-19, COVID-19-Related Experience, Job-Related Stress etc.	Nurses working in China (n:4692)	The study showed that the overall mental health of frontline nurses was generally poor during COVID-19 outbreak, and several impact factors associated with nurses' psychological health were identified.
The Psychological Status and Self-Efficacy of Nurses During COVID-19 Outbreak: A Cross-Sectional Survey	We performed a cross-sectional survey to investigate the psychological status and self-efficacy of nurses in public hospital during COVID-19 outbreak	The Generalized Anxiety Disorder-7, The Chinese Version of the Patient Health Questionnaire, Self-Efficacy Scale	Nurses working in China (n:223)	The prevalence of anxiety and depression symptoms was 40.8% and 26.4%, respectively.

TABLE 1 (Continued)

Title	Aim	Measurement Tools	Sample	Results
Investigation of the Psychological disorders in the healthcare nurses during a coronavirus disease 2019 outbreak in China	This study aimed to determine the levels of stress and psychological disorders of nurses during the COVID-19.	Traumatic Stress Institute Belief Scale, Impact of Event Scale Revised	Nurses working in China (n:159)	The results showed that the nurses who worked in the non-critical care ward scored significantly higher on the traumatization condition and stress level.
Mental distress and influencing factors in nurses caring for patients with COVID-19	To quantify the severity of nurses' post-traumatic stress disorder symptoms when caring for patients with COVID-19.	PTSD Checklist-Civilian, The Perceived Stress Scale	Nurses working in China (n:90)	Nurses' average PTSD score was 24.62 ± 6.68, and five of the nurses reported a clinically significant level of PTSD symptoms. Nurses' perceived stress averaged 19.33 ± 7.
Mental health of nursing in coping with COVID-19 at a regional university	To identify prevalence and factors associated with anxiety and	Hospital Anxiety, Depression Scale	Nurses working in Brazil (n:88)	There was prevalence of anxiety (48.9%) and depression (25%).

hospital	depression in nursing.				
Nurses' Mental Health During the COVID-19 Outbreak A Cross-Sectional Study	To describe nurses' mental health status during the Covid-19 outbreak and to explore the factors on their mental health.	Depression Anxiety Stress Scales—short version (DASS-21)	Nurses working in Portugal (n:767)	Portuguese nurses presented higher depression, anxiety and stress levels, when compared to the Portuguese general population, during the outbreak.	
Post-traumatic growth and influencing factors among frontline nurses fighting against COVID-19	To explore the level of frontline nurses' post-traumatic growth during COVID-19.	Post-traumatic Growth Inventory, Event-Related Rumination Inventory	Nurses working in China (n:167)	The PTG of frontline nurses was at a medium to high level.	

TABLE 1 (Continued)

Title	Aim	Measurement Tools	Sample	Results
Prevalence and associated factors of depression and anxiety among nurses during the outbreak of COVID-19 in China: A cross-sectional study	To determine the effect of COVID-19 on the mental health of nurses and in China during the outbreak.	Self-rating Depression Scale and Self-rating Anxiety Scale	Nurses working in China (n:3228)	Our study revealed the high prevalence of depression and anxiety among nurses during the outbreak of COVID-19.
Personal Protective Equipment and Mental Health Symptoms Among Nurses During the COVID-19 Pandemic	To determine the association between access to adequate personal protective equipment and mental health outcomes.	Patient Health Questionnaire, Generalized Anxiety Disorder, PTSD Checklist	Nurses working in the USA (n:695)	Nurses lacking access to adequate PPE were more likely to report symptoms of depression, anxiety and post-traumatic stress disorder.
COVID-19 anxiety among front-line nurses: Predictive role of organizational support, personal resilience, and social support	This study examines the relative influence of personal resilience, social support and organizational support in reducing COVID-19 anxiety in front-line nurses.	COVID-19 Anxiety Scale, the Brief Resilient Coping Scale (BRCS), the Perceived Social Support Questionnaire (PSSQ) and the Perceived Organizational Support (POS) questionnaire	Nurses working in the Philippines (n:325)	Resilient nurses and those who perceived higher organizational and social support were more likely to report lower anxiety related to COVID-19.
Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak	This study examined the prevalence of depressive symptoms in Emergency Department nurses during the COVID-19.	Patient Health Questionnaire, and the World Health Organization Quality of Life Questionnaire-Brief Version	Nurses working in China (n:1103)	Depression was common among ED nurses during the COVID-19 pandemic.

TABLE 1 (Continued)

Title	Aim	Measurement Tools	Sample	Results
Predictors of poor mental health among nurses during COVID-19 pandemic	To examine the impact of various factors affecting nurses' mental health during the COVID-19 pandemic.	Perceived Stress Scale, The Connor-Davidson Resilience Scale, The Family APGAR, Spirituality Support Scale, The General Anxiety Disorder-7	Nurses working in the USA (n:320)	Most nurses reported moderate/high stress (80.1%), while 43% and 26% reported moderate/severe anxiety and depression, respectively.
Prevalence and Influencing Factors on Fatigue of First-line Nurses Combating with COVID-19 in China: A Descriptive Cross-Sectional Study	The aim of this study was to assess the prevalence of fatigue among first-line nurses in Wuhan, China.	Fatigue Scale, Generalized Anxiety Disorder, Patient Health Questionnaire, Chinese Perceived Stress Scale	Nurses working in China (n:2667)	Analysis revealed the participants in the risk groups of anxiety, depression and perceived stress had higher scores on physical and mental fatigue.
Psychological impact of COVID-19 outbreak on frontline nurses: A cross-sectional survey study	This study aimed to portray the prevalence and associated factors of psychological distress among frontline nurses during COVID-19 outbreak.	General Health Questionnaire, the Perceived Social Support Scale, the Simplified Coping Style Scale, the Impact of Event Scale-Revised	Nurses working in China (n:263)	Of the 263 frontline nurses, 66 (25.1%) were identified as psychological distress. The study demonstrated that COVID-19 had a significant psychological impact on frontline nurses.
Stress, Burnout, and Coping Strategies of Frontline Nurses During the COVID-19 Epidemic in Wuhan and Shanghai, China	The aim of this study was to identify stressors and burnout among frontline nurses in Wuhan and Shanghai.	A self-administered COVID-19 questionnaire, Maslach Burnout Inventory	Nurses working in China (n:107)	Nurses in this study experienced considerable stress and the most frequently reported stressors were related to families.

TABLE 1 (Continued)

Title	Aim	Measurement Tools	Sample	Results
Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic	To investigate the work stress among Chinese nurses who are supporting Wuhan in fighting against Coronavirus Disease 2019	The Chinese version of the Stress Overload Scale (SOS) and the Self-rating Anxiety Scale (SAS)	Nurses working in China (n:180)	The SOS (39.91 ± 12.92) and SAS (32.19 ± 7.56) scores of this nurse group were positively correlated. Multiple regression analysis showed that only children, working hours per week and anxiety were the main factors affecting nurse stress

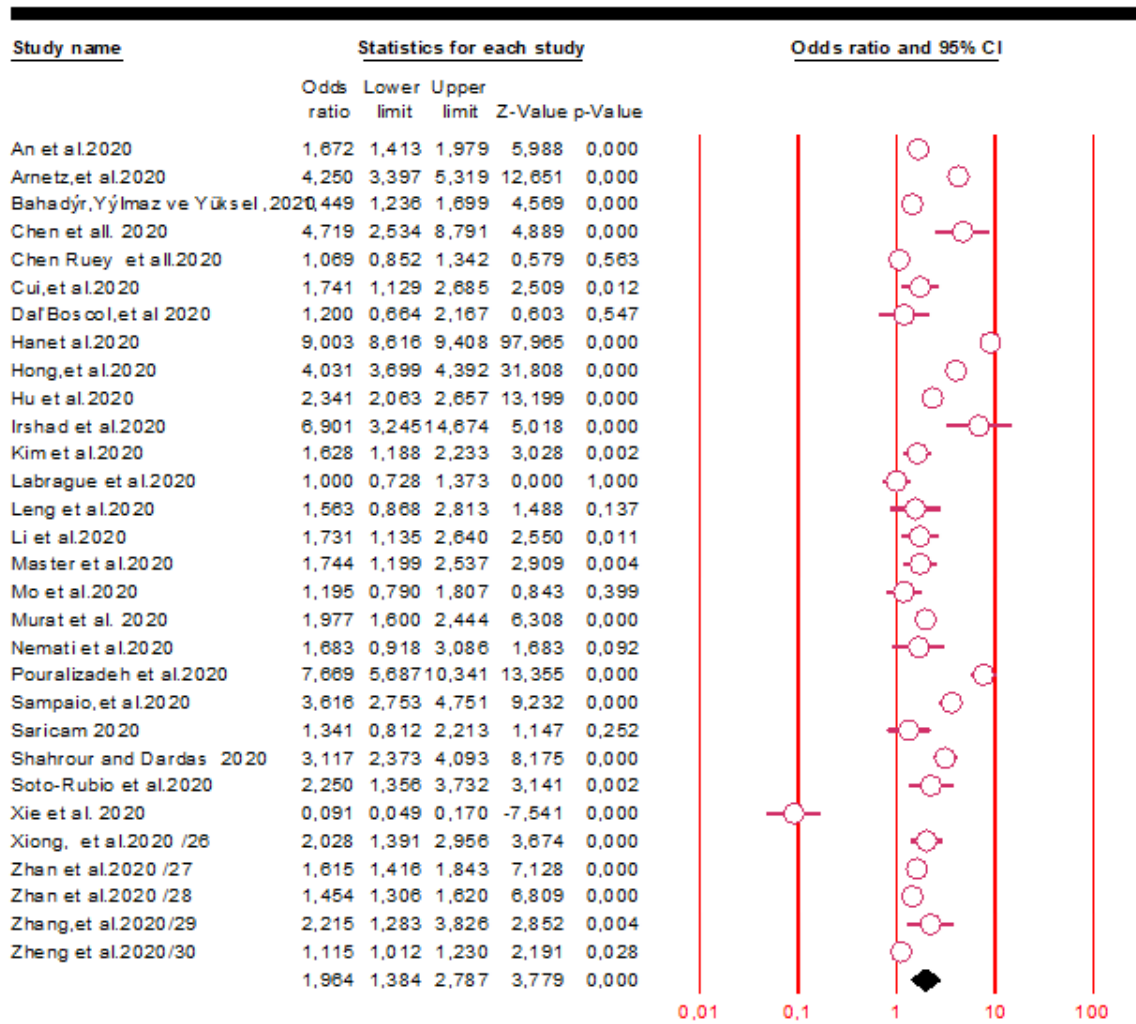


Figure 2: Meta-analysis diagram showing the impact of COVID-19 pandemic on nurses' mental health

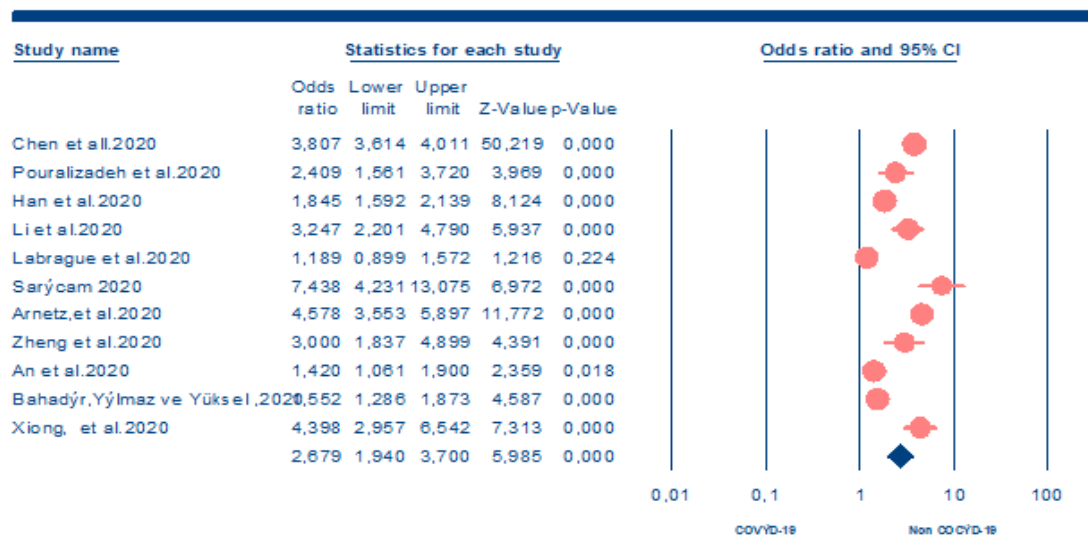


Figure 3: Meta-analysis diagram showing the impact direction of the research for the variable of duty at the COVID-19 unit

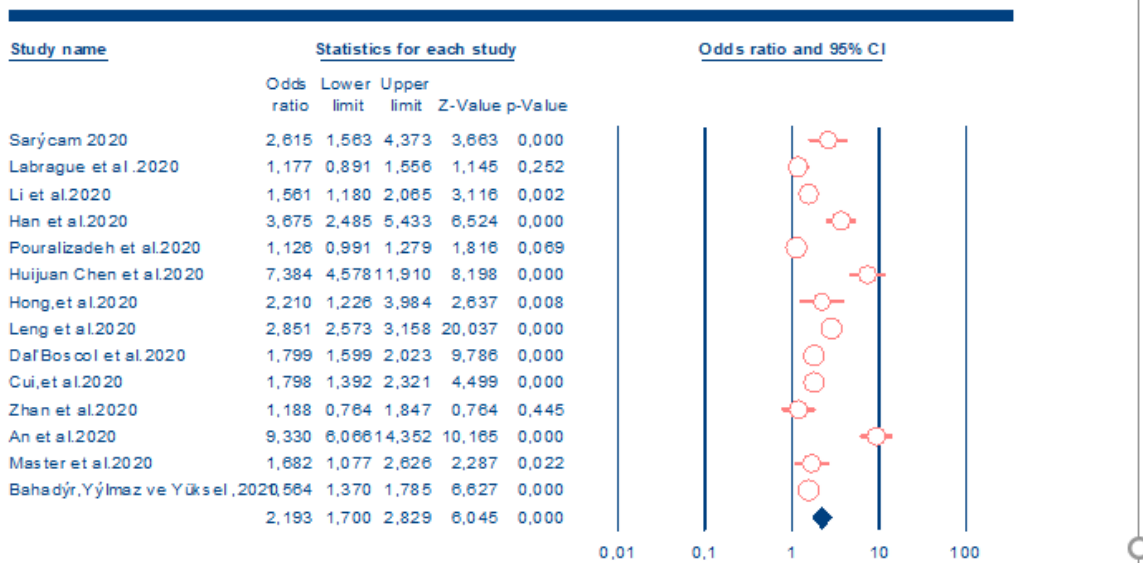


Figure 4: Meta-analysis diagram showing the impact direction of the research for the marital status variable

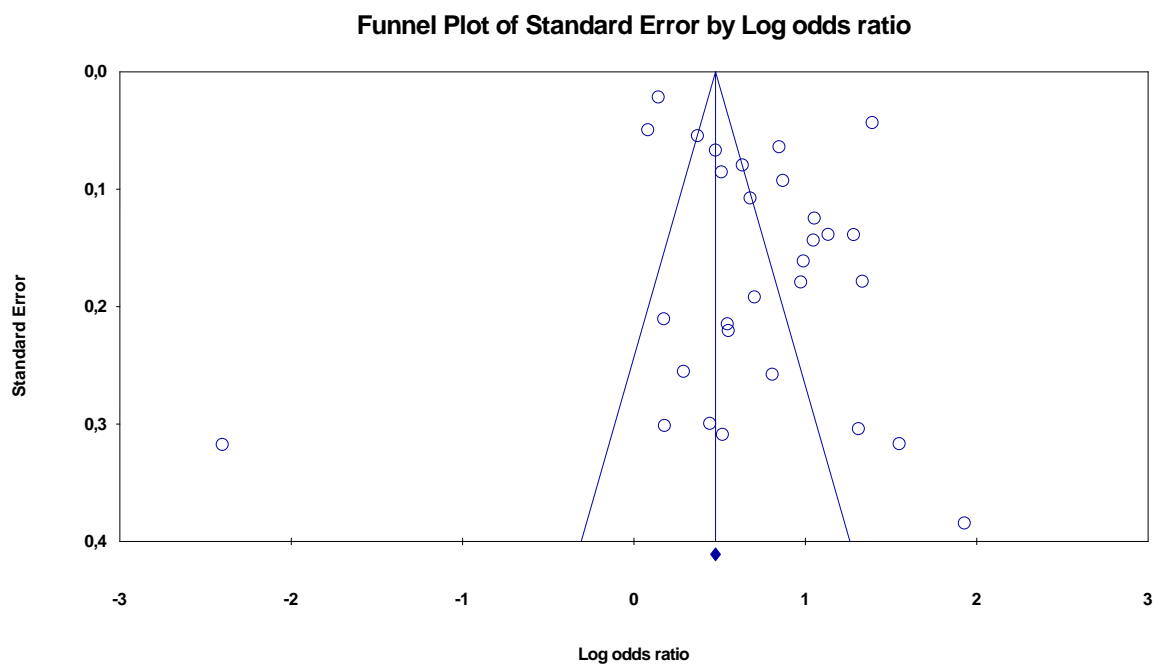


Figure 5: Funnel plot