Perceived Occupational Stressors and the General Health of Critical Care Nurses During COVID-19 Pandemic

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Abstract
Introduction: The COVID-19 situation is placing nurses under great stress which may negatively influence their health.
Objective: The purpose of this study was to examine the association between occupational stress and general health of critical care nurses during COVID-19 pandemic.
Methods: A descriptive, cross-sectional design was used. A convenience sample of 150 Jordanian critical care nurses completed the study.
Results: Occupational stress was a significant predictor of nurses’ general health. Female gender, young, living with elderly or persons having chronic diseases, and little nursing experience were associated with worse general health, while living with elderly or persons having chronic diseases were associated with more occupational stress.
Conclusion: Providing psychological support services for critical care nurses is required to reduce the impact of occupational stress on nurses’ poor general health.

Keywords
critical care nurses, general health, occupational stress

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Introduction
By the end of 2019, new idiopathic cases of respiratory distress (COVID-19) emerged in Wuhan, China (Huang, Wang, et al., 2020). On March 17, 2020, the first case of this disease emerged in Jordan creating a state of emergency (Human Rights Watch [HRW], 2020). At present, there are more than two million Jordanian people infected and about twelve thousand two hundred and sixty-eight death cases (World meter, 2021).

The COVID-19 situation is placing nurses under tremendous strain, higher occupational stress, and increased physical and psychological stress which may negatively influence nurses’ health (Abu Mansour & Abu Shosha, 2022; Alhalaqi et al., 2021; Dalky et al., 2022; Hassan et al., 2020). The same occurred during the past epidemics (SARS in 2003, H1N1 in 2009, and MERS in 2012) as healthcare workers, including critical care nurses reported high levels of stress (Elshaer et al., 2018; Kibria, 2018; Lee et al., 2018; Tam et al., 2004).

Literature Review
Occupational stress related to COVID-19 can cause anxiety and depression in dealing with countless death, long working shifts, and a variety of unknowns and demands (Neto et al., 2020). Many health care workers working with COVID-19 patients have become infected and many more have been placed in quarantine as a result of their exposure (Neto et al., 2020). Stress has been linked to seven of the ten major causes of death, one of which is cardiovascular.

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diseases that had a distinct association with occupational stress (Schnall et al., 2016).

In Canada, during the COVID-19 pandemic, Crowe et al. (2020) found that 57% of critical care nurses had depression, 67% had anxiety, and 54% had stress. In Jordan, Al-Amer et al. (2020) in their study found that the prevalence of depression, anxiety, and stress among nurses was 57.8%, 42.4%, and 50.1% respectively (Al-Amer et al., 2020). The psychological consequences of the pandemic on critical care nurses must be urgently recognized, understood, and monitored. Understanding these consequences is important to promote and protect critical care nurses’ health, which directly affects the quality of health care services introduced during pandemics such as COVID-19.

One of the most recognized stressful areas for nurses is the critical care units where nurses are exposed to many stressors such as work overload, dealing with dying patients, unpredictable work situations, and sophisticated therapeutic procedures (Al-Ajarmeh et al., 2021; Elshaer et al., 2018; Rayan et al., 2022).

Previous studies identified some factors affect the levels of occupational stress during COVID-19 among nurses. For example, in China, Mo et al. (2020) found that the total number of working hours per week, severity of illness, sleep situation, and adaptation to daily diet were significant factors that could affect nurses’ stress levels during the COVID-19 pandemic. Hoedl et al. (2020) found a significant positive correlation between nurses’ stress and the duration of mask usage (Hoedl et al., 2020). Furthermore, during the peak of COVID-19 spreading in Italy, Babore et al. (2020) found that female health care workers had higher levels of stress than males.

Because nurses have a good background in health issues, it is expected that their health status is better than the health status of the general people, however, a lot of studies showed different results. For example, an American study was conducted in 2016 to assess the impact of stress on the health of nurses. The study found that the majority of nurses were not healthy; whereas 92% of the respondents had a stress level ranging between moderate to very high, 78% slept insufficient hours, 69% did not exercise constantly, 63% ate less than their daily requirement of fruits and vegetables, 70% ate a lot of junked food, and 63% of the nurses reported that they eat more than usual to cope with stress (Jordan et al., 2016).

Furthermore, in a study conducted in Turkey by Fatemeh et al. (2020) to assess the general health of nurses, 58.5% of nurses had high work-related stress, 69% had job stress related to workload, 78.35% had job stress related to work responsibility, and 62.7% had job stress related to the physical environment. Concerning the nurses’ general health status, 37.58% of them reported a high level of general health problems, 68.6% had physical symptoms on the average level, whereas nurses reported high levels of anxiety (64.5%), decreased social function (22%), and depression (40%) (Fatemeh et al., 2020). There is a lack of studies about the general health of critical care nurses in the Arab world, especially in Jordan. Despite previous studies on occupational stress, no published studies were found on the role of occupational stress in predicting the general health of Jordanian critical care nurses during the COVID-19 pandemic. Thus, a comprehensive understanding of the general health of critical care nurses, particularly its association with occupational stress had not yet been obtained. The current study aims at examining the link between occupational stress and the general health of critical care nurses. To accomplish this aim, the research has the following questions:

1. What are the scores of occupational stress and general health of Jordanian critical care nurses?
2. Is there a difference in occupational stress and general health among Jordanian critical care nurses according to demographic characteristics and clinical variables?
3. Controlling for demographic characteristics and clinical variables; is there a unique relationship between occupational stress and the general health of Jordanian critical care nurses?

Methods

Design

A descriptive, correlational design was used to answer the research questions of the current study.

Sample

The study included the registered nurses working in intensive care units in two selected hospitals. The inclusion criteria were: 1) being a registered nurse 2) having at least six months of clinical experience in critical care units and 3) working with patients diagnosed with COVID-19. All nurses working in the selected hospitals and who met the inclusion criteria were invited to involve in this study. One hundred and fifty nurses met the inclusion criteria and agreed to participate in the study (response rate = 100%).

Ethical Considerations

The ethical approval to conduct this study was obtained from the IRB committee of Al-Zaytoonah University of Jordan and the selected hospitals. A written consent form was signed by all participants. Participation in the study was voluntary and participants were informed about the anonymity and confidentiality of data.

Study Instruments

Demographical data questionnaire. For the purpose of this study, the selected demographical data included: age,
gender, educational level, marital status, having children, number of children, living with old persons, and living with persons having chronic diseases. Additional information were collected about work experience, critical care unit experience, job description, working shifts, income, and working hours per week.

**Nurses’ occupational stressor scale.** Nurses’ Occupational Stressor Scale [NOSS] developed by Dr. Chen et al. (2020), was used to assess the scores of occupational stress among nurses dealing with COVID-19 patients. This questionnaire includes 21 items and nine subscales (job demands, work-family interferences, lack of support from colleagues or caregivers, bullying and violence, organizational problems, occupational risks, difficulties of having vacation, weakness, and inability to achieve the essential physiological needs. Each item was scored based on a four-point Likert scale, the total scores range from 21 to 84, this questionnaire had high construct and concurrent validity, test re-test reliability for subscales ranged from 0.71–0.83 and Cronbach alpha ranged from 0.35–0.77 (Chen et al., 2020).

**The general health questionnaire.** The general health questionnaire was developed by Goldberg in 1978. It includes 28 items divided into four subscales: physical symptoms, anxiety and sleep disturbance, social dysfunction, and depression. Higher scores indicate worse health. Various studies have confirmed the validity and reliability of this tool, with Cronbach’s α more than 0.83 (Ames-Guerreroa, 2021).

**Translation of the questionnaires.** Because the study participants speak Arabic as a mother language, translating the study questionnaires from English into Arabic was necessary. Translation and back-translation were conducted by two competent bilingual professional persons. The questionnaires were given to one translator to translate them from English into Arabic. After that, another translator translated them back into Arabic. A third translator compared the two versions to evaluate the linguistic differences. This process ended with a consensus between all translators on the originality of the final Arabic version.

To test the final version of the questionnaires, a pilot study was conducted on 20 nurses who have similar characteristics to the target population. After collecting the pilot study responses, a few changes were made in terms of formatting features and layout. For the final version of the questionnaires, the Cronbach alpha value was 0.84 for The General Health Questionnaire and 0.89 for the Nurses’ Occupational Stressor Scale.

**Data collection procedure.** The head nurses of the ICU units were contacted to explain the purpose and the procedure of the study. The primary investigator met the head nurses of the ICU units to identify nurses who meet the inclusion criteria. Then, the potential participants were invited to take part in the study. All nurses who agreed to participate in the study signed a written consent form. One hundred and fifty questionnaires were distributed and returned. The process of data collection was conducted in the period from 2/2021 to 5/2021.

**Data analysis.** Data were analyzed by the SPSS Program, version 26 to generate descriptive and inferential statistics at the significant level of 0.05. Descriptive and inferential statistics were used to answer the study questions.

**Results**

**Sample Characteristics**

One hundred and fifty critical care nurses completed this study, including 58% females and 42% males. The mean

| Variables                     | Category            | Frequency | Percent |
|-------------------------------|---------------------|-----------|---------|
| Having children               | Yes                 | 76        | 50.7    |
|                               | No                  | 74        | 49.3    |
| Number of children            | 0                   | 73        | 40.7    |
|                               | 1-2                 | 57        | 38.0    |
|                               | 3 Or More           | 20        | 13.3    |
| Children place                | Home                | 41        | 27.3    |
|                               | Nursery             | 19        | 12.7    |
|                               | With Friend Or Neighbor | 17 | 11.3    |
| Living with elderly people    | Yes                 | 80        | 53.3    |
|                               | No                  | 70        | 46.7    |
| Living with persons           | Yes                 | 79        | 52.7    |
|                               | No                  | 71        | 47.3    |
| have chronic disease          | Bachelor Degree     | 139       | 92.7    |
| Educational level             | Master Or Above     | 11        | 7.3     |
| Job situation                 | Department Nurse    | 133       | 88.7    |
|                               | Shift Senior        | 17        | 11.3    |
| Income per month*             | 400–600 JD          | 129       | 86.0    |
|                               | More Than 600 JD    | 21        | 14.0    |
| Working shift                 | 24 Hours Or         | 17        | 11.3    |
|                               | More                |           |         |
|                               | 12 Hours            | 81        | 54.0    |
|                               | 8 Hours             | 52        | 34.7    |
| Staying place after work      | Back To Home Workers| 118       | 78.7    |
|                               | Residence           | 32        | 21.3    |
| Have a chronic disease        | Yes                 | 6         | 4.0     |
|                               | No                  | 144       | 96.0    |
| Are you smoker?               | Yes                 | 50        | 33.3    |
|                               | No                  | 100       | 66.7    |

*Note. In Jordanian dinar or JD (1 Jordanian dinar = 1.41 U.S. dollars).
age for participants was 30.01 years (SD = 5.03). About 61.3% of the participants were married, and 38.7% were single. For the working shift hours, 81 participants (54.0%) worked on the 12-h working system, 52 (34.7%) on the eight-hour working system, and the remaining 17 (11.3%) were on duty 24 h per day. Working 24 h per day was needed in some working areas to reduce contact rates and prevent or limit the spread of COVID-19. For more information see (Table 1).

Scores of General Health and Occupational Stress

The overall mean score of GHQ-28 was 44.39 (SD = 13.10), ranging from 8 to 75, indicating an overall moderate disorder. It was found that about 6.0%, 28.7%, 52.7%, and 12.7% were categorized as having no disorder, low disorder, moderate disorder, and severe disorder, respectively. The overall mean scores of occupational stress were 60.83 (SD = 12.85) ranging from 37.00 to 84.00, indicating an overall high occupational stress scores.

Differences in the Scores of General Health and Occupational Stress According to Categorical Demographics

Table 2 shows the differences in the scores of GHQ-28 according to the demographic variables of the study participants. The results of the independent t-test revealed that participants had a statistically significant difference in the GHQ-28 scores according to living with elderly people (t = 3.912, P < 0.01) where those who lived with elderly people had higher scores in GHQ-28 (M = 48.13, SD = 12.85). In addition, there was a statistically significant difference in general health according to gender (t = -2.524, P = 0.013) where female nurses (M = 46.64, SD = 13.33) had higher scores in GHQ-28 than males (M = 41.27, SD = 12.21). Also, there was a statistically significant difference in general health according to living with persons having chronic diseases (t = 3.957, P < 0.01) where those who live with persons having chronic diseases (M = 48.22, SD = 12.78) had a higher score in general health.

The results of the independent t-test revealed a statistically significant difference in occupational stress according to living with elderly people (t = 2.668, P = .008) where those who live with elderly people (M = 62.73, SD = 9.53) had a higher score in occupational stress than those who do not live with elderly people (M = 58.67, SD = 8.99). Also, participants who live with persons having chronic diseases had a significantly higher score in occupational stress (M = 62.44, SD = 9.33) than those who do not live with persons having chronic diseases (M = 59.04, SD = 9.37), (t = 2.224, P = .028).

Relationship Between General Health, Occupational Stress, and the Continuous Demographic and Clinical Variables

Table 3 presents the relationship between general health, occupational stress, and the continuous demographic and clinical variables including income, age, nursing experience, nursing experience in critical care units, and total working hours per week. As seen in the table (3), the general health scores were significantly and negatively correlated with age (r = -.291, p < .05), nursing experience (r = -.231, p < .05), and nursing experience in critical care units (r = -.190, p < .05).

Prediction of General Health Scores Through Occupational Stress, Controlling for Demographics

The regression analysis identifying the unique predictors of general health scores through occupational stress, controlling for demographics is shown in Table 4. Based on the previous analysis, six variables were correlated with general health scores including; age, nursing experience, critical care units’ experience, gender, living with older people, and living with persons who have a chronic disease. Therefore, these variables were entered into the first model of the regression analysis. The first model was statistically significant, F (6, 143) = 6.16, p < 0.001, R = 0.45, R square = 0.21. The model explained 17% of the variance in general health scores. Occupational stress was entered into the second model. The second model was also statistically significant, F (7, 142) = 6.32, p < 0.001, R = 0.49, R square = 0.24, adjusted R square = 0.20. Therefore, occupational stress added a 3% unique variable above and beyond the variance explained by demographics. In addition, it was a significant predictor of general health scores, t = 2.48, P = .015.

Discussion

The present study showed that 94.1% of the participants had health disorders. This percentage is higher than the percentages reported in the literature. For example; Maghsoudi et al. (2015) found that three-quarters of nurses were unhealthy and Khamisa et al. (2017) found that 60% of nurses had poor general health status. During the COVID-19 pandemic, the government established field hospitals and centers to treat COVID-19 patients, which
increases the workload on health care workers due to insufficient manpower. In addition, due to nursing shortage during the pandemic, hospitals have hired retired and newly graduated nurses with less experience in dealing with critical care devices such as ventilators and monitors. This increased the burdens on other nurses. To avoid infection transmission, nurses had to work for two weeks or more without vacations, then take a COVID-19 test, if it was positive, the nurse would be quarantined for additional two weeks. Furthermore, lack of personal protective equipment and unfamiliarity with infection control procedures could negatively impact nurses’ health.

Participants in this study had high occupational stress scores. This outcome is consistent with the findings of various studies conducted during the COVID-19 pandemic (Fatemeh et al., 2020; Hummel et al., 2021; Said & El-Shafei, 2021). These outcomes could be due to the stressors imposed on nurses during the COVID-19 pandemic including the high workload, insufficient knowledge about the pathogen, direct contact with infected patients, and discomfort from prolonged wearing of personal protective equipment (Amro et al., 2022; Hummel et al., 2021; Zhang et al., 2020; Zhou et al., 2020). In addition to the above-mentioned stressors; critical care nurses might have been concerned about the capacity of the health system, especially when the Ministry of Health announced a limitation in the number of ventilators and the majority of hospital beds were occupied. In the current study, the prevalence of health disorders among critical care nurses was high. Nursing managers should be aware of the unusually high rate of health disorders among critical care nurses during the COVID-19 pandemic and provide nurses with psychological support sessions to relieve their stressors.

The current study found a significant positive correlation between general health and occupational stress. This finding is congruent with a previous study which concluded that reducing occupational stress could improve the mental

### Table 2. Differences in the Scores of General Health and Occupational Health According to Participants’ Demographics.

| Variable                              | Categories          | N  | General health M | SD  | Occupational health M | SD  |
|---------------------------------------|---------------------|----|------------------|-----|------------------------|-----|
| Gender                                | Male                | 63 | 41.27 *          | 12.21 | 59.21                 | 8.92 |
|                                       | Female              | 87 | 46.64            | 13.33 | 62.01                 | 9.74 |
| Marital status                        | Single              | 58 | 46.10            | 12.48 | 60.64                 | 9.75 |
|                                       | Married             | 92 | 43.30            | 13.43 | 60.96                 | 9.35 |
| Having children                       | Yes                 | 76 | 43.04            | 13.48 | 60.64                 | 9.68 |
|                                       | No                  | 74 | 45.77            | 12.64 | 61.03                 | 9.32 |
| Living with older people              | Yes                 | 80 | 48.13***         | 12.85 | 62.73***               | 9.53 |
|                                       | No                  | 70 | 40.11            | 12.12 | 58.67                 | 8.99 |
| Living with persons have chronic disease | Yes             | 79 | 48.22**          | 12.78 | 62.44*                | 9.33 |
|                                       | No                  | 71 | 40.13            | 12.18 | 59.04                 | 9.37 |
| Educational level                     | bachelor degree     | 139| 44.63            | 13.36 | 60.86                 | 9.63 |
|                                       | Master/above        | 11 | 41.36            | 9.07  | 60.55                 | 7.54 |
| job situation                         | department nurse    | 133| 44.74            | 13.05 | 44.74                 | 13.05 |
|                                       | shift senior        | 17 | 41.65            | 13.59 | 41.65                 | 13.59 |
| place after finishing work            | back home           | 118| 43.59            | 12.58 | 60.40                 | 9.81 |
|                                       | at workers residence| 32 | 47.31            | 14.700| 62.44                 | 8.02 |
| Are you smoker?                       | Yes                 | 50 | 43.18            | 14.59 | 59.94                 | 9.48 |
|                                       | No                  | 100| 44.99            | 12.32 | 61.28                 | 9.48 |
| Having chronic disease                | Yes                 | 6  | 49.00            | 20.73 | 66.67                 | 7.76 |
|                                       | No                  | 144| 44.19            | 12.76 | 60.59                 | 9.48 |
| income per month                      | 400–600             | 129| 44.95            | 13.12 | 61.22                 | 9.42 |
|                                       | ≥600                | 21 | 40.90            | 12.69 | 58.48                 | 9.69 |

*P < 0.05, **P < 0.01.

### Table 3. Relationships Between the General Health, Occupational Stress and the Continuous Demographic and Clinical Variables.

| Variable                              | General health | Occupational stress |
|---------------------------------------|----------------|---------------------|
| Age                                   | $R = -0.291^{**}$ | $R = -0.103$ |
|                                       | p-value .000    | .210               |
| Nursing experience                     | $R = -0.231^{***}$ | $R = -0.010$ |
|                                       | p-value .004    | .901               |
| Critical care units experience        | $R = -0.190^*$  | $R = -0.051$ |
|                                       | p-value .020    | .534               |
|                                       | R 150           | 150                |
| Working hours per week                | $R = -0.153$    | $R = -0.079$ |
|                                       | p-value .061    | .336               |

* P < 0.05, ** P < 0.01.
health of nurses (Fatemeh et al., 2020; Ta’an et al., 2020). Also, it is congruent with the study of Jordan et al. (2016) which found that nurses with high stress had poor health outcomes and high health risk behaviors.

Nurses who live with elderly people and those who live with persons having chronic diseases were more vulnerable to occupational stress and health disorders. High levels of occupational stress among healthcare workers due to fear of infection were documented in the literature (Ayanian, 2020; Cai et al., 2020; Khalid et al., 2016; Nie et al., 2020). Since COVID-19 is a highly infectious disease, nurses were worried about the possibility of transferring this infection to their families’ especially elderly persons and persons with chronic diseases.

Female nurses had higher scores in GHQ-28 than males. This finding is consistent with previous studies (Al-Amer et al., 2020; AlAteeq et al., 2020; Huang, Lei, et al., 2020; Naser et al., 2020). During the pandemic, female nurses face difficulties related to their roles played in society in addition to the difficulties encountered in their work. For example, when the virus closes schools, and nurseries, females have more to do. Due to high pressure on hospitals, it was difficult for female nurses to take leave to educate and care for their children. Pregnant nurses faced a different challenge, especially the stress of not knowing exactly how the coronavirus affects their babies.

Moreover, this study found an inverse relationship between the general health scores of critical care nurses and their ages. This finding aligned with many studies that found that nurses with high stress had poor health outcomes and high health risk behaviors. This relationship could be explained by age-related physical and psychological alterations; negative emotional events are less likely to be remembered by older adults than positive emotional events. Another explanation could be increased utilizing effective coping strategies with stressors by older adults (Schilling & Diehl, 2015). Also, this study found that the general health of critical care nurses was significantly and negatively correlated with nursing experience and critical care nursing experience. A similar finding was revealed in the study of Elsayed et al. (2018) which found that more nursing experience was associated with less depression symptoms (Elsayed et al., 2018). According to psychological theories, the use of appropriate coping strategies could reduce stress and consequently improve the general health of individuals (Martínez et al., 2020). Thus, the relationship between general health and year of experience could be explained by the fact that experienced nurses have sufficient scientific and practical background in their work that enable them to develop effective coping strategies and raise their stress threshold and therefore minimize psychological distress.

Implications for Practice

The high level of occupational stress and psychological distress among critical care nurses warrants additional efforts from health care systems to present psychological support services for critical care nurses. Policymakers and nursing administrators can play a key role in adopting strategies to manage occupational stress among critical care nurses, such as giving them consecutive rest days, rotating critical cases assignment, and coordinating support services. Also,

Table 4. Prediction of General Health Scores Through Occupational Stress, Controlling for Demographics.

| Model | Unstandardized Coefficients | Standardized Coefficients | t    | P-value |
|-------|-----------------------------|---------------------------|------|---------|
|       | B                  | Std. Error | Beta |       |         |
| 1 (Constant) | 81.825 | 12.446 | 6.575 | .000 |
| Age | -.924 | .419 | -.355 | -2.203 | .029 |
| Nursing experience | .395 | .427 | .148 | .924 | .357 |
| Critical care units experience | -.166 | .317 | -.047 | -.524 | .601 |
| Gender | 1.448 | 2.263 | .055 | .640 | .523 |
| Living with older people | -.587 | 2.320 | -.224 | -.2530 | .012 |
| Living with persons have chronic disease | -.3955 | 2.358 | -.151 | -1.677 | .096 |
| 2 (Constant) | 60.898 | 14.867 | 4.096 | .000 |
it is important to develop interventions to address these factors, for example, coping mechanisms training courses, interventions to improve nursing physical and psychological health, workshops for improving knowledge about COVID-19, and developing clear guidelines to deal with patients infected with COVID-19.

Conclusions
Critical care nurses in this study showed an increase in occupational stress and during the COVID-19 pandemic. Some categories of critical care nurses were associated with lower health levels, such as those who are younger, females, least nursing experience, least experience in critical care units, those who live with elderly persons, and those who live with persons having chronic diseases. Furthermore, the study found a significant relationship between nurses’ health and occupational stress. Therefore, it is crucial to develop stress-reduction strategies in order to improve the health of critical care nurses.

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Contribution of Authors
Suhair Hussni Al-Ghabeesh: taking ethical approvals to conduct the study, participated in data analysis, wrote part of the paper, drafting of paper. Raid Mahmmud Al-Awayssa: collected data, participated in data analysis, wrote part of the paper. Ahmad Hussien Rayan: Conception and design, analysis and interpretation of data, drafting of article. Enas A Assaf: Critical revision for important intellectual content, final approval of the article.

Conflict of Interest
The authors do not have any conflict of interest to declare.

IRB Approval
The study obtained the IRB approval from the Institutional Committee for the Study of Scientific Research/Prince Hamza Hospital (Approval number: MH/research/1747).

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