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Future Anxiety and Immune Status in Nursing Students During COVID-2019 Pandemic

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Abstract

Coronavirus Disease-2019 (COVID-19) is a frightening global disease, especially because of its high contagiousness. This study aimed to identify the future anxiety regarding immunity status in nursing students who work in hospitals, especially those caring for patients with COVID-19. This study design was cross-sectional with standard translated instruments of the Future Anxiety Scale and Immune Status Questionnaire administered using a Google Form to 102 respondents. Results revealed that among the respondents, 87 experienced severe psychological anxiety (85.3%), 46 experienced moderate social anxiety (45.1%), 42 experienced moderate economic anxiety (41.2%), 38 experienced mild media anxiety (37.3%), 53 experienced mild religious anxiety (52%), 45 experienced moderate general anxiety (44.1%), and 61 had mostly good immunity status (59.8%). The relationship between psychological, social, economic, media, and general anxiety with immunity status was (p = 0.835), (p = 0.052), (p = 0.514), (p = 0.414), (p = 0.160), and (p = 0.123), respectively. In conclusion, a dominant future anxiety rate was found in the respondents but showed no relationship with immunity status. Future studies must include heterogeneous respondents and moderate variables to further improve the accuracy of the findings. The present results serve as justification for a program to address anxiety in nursing students during clinical practice in pandemic times.

Keywords: COVID-19, future anxiety, immunity, nurse

Abstrak

***Kecemasan Masa Depan dan Status Imun pada Mahasiswa Keperawatan Selama Pandemi* COVID-19.** Coronavirus Disease-2019 (COVID-19) *menjadi salah satu penyakit yang menakutkan di masyarakat global, terlebih karena sifat penularannya yang tinggi. Tujuan penelitian ini adalah untuk mengidentifikasi kecemasan masa depan mahasiswa keperawatan yang bekerja di rumah sakit, khususnya yang merawat pasien COVID-19, terhadap status imunitas mahasiswa itu sendiri. Penelitian ini adalah* cross-sectional, *dengan menggunakan terjemahan dari Future* Anxiety Scale (FAS) *dan* Immune Status Questionnaire (ISQ) *dengan yang difasilitasi aplikasi Google Formulir kepada 102 mahasiswa keperawatan. Hasil penelitian menunjukkan sebanyak 87 responden mengalami kecemasan psikologis berat (85,3%), kecemasan sosial sedang 46 (45,1%), kecemasan ekonomi sedang 42 (41,2%), kecemasan media ringan 38 (37,3%), kecemasan religi ringan 53 (52%), kecemasan umum sedang 45 (44,1%), status imunitas sebagian besar baik 61 (59,8%). Hubungan antara kecemasan psikologis, sosial, ekonomi, media, dan kecemasan umum dengan status imunitas yaitu (p = 0,835), (p = 0,052), (p = 0,514), (p = 0,414), (p = 0,160), dan (p = 0,123). Kesimpulan pada penelitian ini adalah terdapat angka kecemasan masa depan yang dominan pada responden tetapi tidak ditemukan hubungannya dengan status imunitas. Pada studi selanjutnya, perlu dilakukan pendekatan penelitian dengan melibatkan responden yang lebih heterogen dengan mempertimbangkan memasukkan variabel moderat untuk lebih meningkatkan akurasi penelitian yang dilakukan. Hasil penelitian ini menjadi suatu justifikasi tentang perlunya sebuah program untuk mengatasi kecemasan pada mahasiswa keperawatan selama praktik klinik di masa pandemi*.

***Kata Kunci**:* COVID-19, *imunitas, kecemasan masa depan, perawat*

Introduction

Coronavirus (CoV) is a virus that generally attacks the respiratory systems of animals and humans and has been found decades ago in the body of animals. Most of the members of the CoV family remain in the bodies of bats and mice as natural hosts (Adachi et al., 2020). In the early

21st century, this virus has shown its ability to mutate and successfully live in humans. This zoonic (animal to human) virus transmission was first recognized by the world through the severe acute respiratory syndrome (SARS) outbreak in 2003 th at was centered in Guangdong Province, China (Adachi et al., 2020). At the end of December 2019, the world received sad news regarding a new outbreak of viral infection (Salari et al., 2020). The virus was then named SARS-CoV-2 by world taxonomists and announced by World Health Organization (2020).

Healthcare providers, including nurses, clinicians, and other allied health professionals who deal directly with patients, are part of a sub-group that is extremely vulnerable to contracting the COVID-19 virus (Chughtai et al., 2020). A previous study involving 174 other allied health professionals (pharmacists, hospital administrators, and other occupations that are not related to patients) and 296 healthcare personnel compared their risk of depression, anxiety, and stress disorders and found that 8.1% of clinicians and nurses experience depression, 10.8% experience anxiety disorders, and 6.4% experience psychological stress (Tan et al., 2020). In addition, both types of providers showed a similar prevalence of psychological disorders, and this situation is closely related to the workplace atmosphere that triggered fear of infection (Tan et al., 2020). Fear tends to increase the risk of psychological disorders. Another study found a positive correlation between fear of COVID-19 and depression and anxiety disorders (Ahorsu et al., 2020). Anxiety is of great concern, especially for healthcare providers who care for pa-tients with COVID-19 in the hospital; in particular, a nurse reported a high rate of anxiety (Huang et al., 2020; Milgrom et al., 2020).

Psychological disorders might affect a person's immune system (Huang et al., 2019). In a physically healthy individual, the immune system function could be reduced in the presence of psychological pressure (Ismail et al., 2020). During the COVID-19 pandemic, the psychological stress of nurses must be managed properly. Lowered immune conditions during duty increase the risk of being infected with SARS-CoV2 (Taghizadeh-Hesary & Akbari, 2020). SARS-CoV2 infection massively suppresses the immune cells in the body and the production of interferon-1 (IFN-1), the main alarm that informs the body of the presence of infected cells (Taghizadeh-Hesary & Akbari, 2020). One way to maintain the immune system is to eliminate the risk of mental disorders, such as anxiety. However, Future Anxiety Scale-1 (FAS-1) and non-invasive immune status are unusually used in Indonesia. Knowing the level of future anxiety and immune status of nursing students in the face of a pandemic is important because of their role in hospital services. The pressure of work and responsibilities reduces their immunity, so their immunity status will generally be less than optimal. This measurement tool can be used to provide new information and findings related to the effect of the immune system on future anxiety. Therefore, this study was conducted to determine the effect of the future golden age on the immunity status of student nurses who treat patients with COVID-19. Nurses' concerns and feelings regarding the post-pandemic future while on duty have an influence on their immune system function.

Methods

This cross-sectional study measured several variables, namely, age, gender, recent education, nurse stress, and nurse's immune system. A total of 102 nursing students of a Post Basic Bachelor of Science Nursing Program who had a background as nurse at a COVID-19 ward participated in this study.

FAS-1 was to measure the stress level of nurses, and Immune Status Questionnaire (ISQ) was used to non-invasively measure the strength of their immune system. Both instruments were translated to Bahasa Indonesia. FAS-1 has a satisfying reliability value (Cronbach's α at 0.89) (Al Matarneh & Altrawneh, 2014) and is used to determine a person's tendency to think about the future, his/her anxiety, uncertainty, and re-

luctance, and his/her experience of fearing failure. ISQ also has a satisfying reliability value (Cronbach's α at 0.80) (Versprille et al., 2019) and has been developed to validate and apply a short and cost-effective approach to measure immune status in a variety of settings, including clinical practice, research, and self-assessment. These instruments and informed consent were packaged in a google form and distributed via online to nursing students. The data were subjected to univariate (age, gender, marital status, future anxiety status, and immunity status) and bivariate (the relationship between future anxiety and immune status) analyses. Future anxiety consisted of future social, environmental, economic, media, and religious anxieties and general future anxieties. This study was approved by the Research Ethics Committee of Universitas

Table 1. Characteristics of Respondents, Future Anxiety Status, and Immune Status

Variables	Frequency	Percentage
Age		
Adolescents	4	3.9
Adults	93	91.2
Elderly	5	4.9
Gender		
Female	71	69.6
Male	31	30.4
Marital Status		
Married	87	85.3
Single	15	14.7
Future Anxiety		
Psychology Future Anxiety		
Mild Anxiety	1	1.0
Moderate Anxiety	14	13.7
Severe Anxiety	87	85.3
Social Future Anxiety		
Mild Anxiety	29	28.4
Moderate Anxiety	46	45.1
Severe Anxiety	27	26.5
Environmental Future Anxiety		
Mild Anxiety	18	17.6
Moderate Anxiety	54	52.9
Severe Anxiety	30	29.4
Economic Future Anxiety		
Mild Anxiety	37	36.3
Moderate Anxiety	42	41.2
Severe Anxiety	23	22.5
Media Future Anxiety		
Mild Anxiety	38	37.3
Moderate Anxiety	35	34.3
Severe Anxiety	29	28.4
Religion Future Anxiety		
Mild Anxiety	53	52.0
Moderate Anxiety	43	42.2
Severe Anxiety	6	5.9
General Future Anxiety		
Mild Anxiety	27	26.5
Moderate Anxiety	45	44.1
Severe Anxiety	30	29.4
Status Immunity		
Good	61	59.8
Moderate	26	25.5
Poor	15	14.7
Total	102	100

Table 2. Relationship between Future Anxiety and Immunity Status

Variable	Immunity Status			
	Good	Medium	Bad	p
General Future Anxiety				
Mild Anxiety	21 (77.8%)	5 (18.5%)	1 (3.7%)	0.123
Moderate Anxiety	25 (55.6%)	13 (28.9%)	7 (3.7%)	
Severe Anxiety	15 (50%)	8 (26.7%)	7 (23.4%)	
Psychology Future Anxiety				
Mild anxiety	1 (100%)	0 (0%)	0 (0%)	0.835
Moderate anxiety	9 (64.3%)	4 (28.6%)	1 (7.1%)	
Severe anxiety	51 (58.6%)	22 (25.3%)	14 (16.1%)	
Social Future Anxiety				
Mild anxiety	20 (69%)	7 (24.1%)	2 (6.9%)	0.052
Moderate anxiety	29 (63%)	13 (28.3%)	4 (8.7%)	
Severe anxiety	12 (44.4 %)	6 (22.2%)	9 (33.3%)	
Environment Future Anxiety				
Mild anxiety	13 (72.2%)	4 (22.2%)	1 (5.6%)	0.514
Moderate anxiety	30 (55.6%)	16 (29.6%)	8 (14.8%)	
Severe anxiety	18 (60%)	6 (20%)	6 (20%)	
Economy Future Anxiety				
Mild anxiety	26 (70.3%)	8 (21.6%)	3 (8.1%)	0.414
Moderate anxiety	21 (50%)	13 (31%)	8 (19%)	
severe anxiety	14 (60.9%)	5 (21.7%)	4 (17.4%)	
Media Future Anxiety				
Mild anxiety	27 (71.1%)	9 (23.7%)	2 (5.3%)	0.160
Moderate anxiety	21 (60%)	8 (22.9%)	6 (17.1%)	
Severe anxiety	13 (44,8%)	9 (31%)	7 (24.1%)	
Religion Future Anxiety				
Low Anxiety	37 (69.8%)	12 (22.6%)	4 (7.5%)	0.067
Moderate Anxiety	22 (51.2%)	13 (30.2%)	8 (18.6%)	
Severe Anxiety	2 (33.3%)	1 (16.7%)	3 (50%)	

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Results

The respondents were characterized by age, gender, and marital status. Most of them were adults (91.2%), females (69.6%), and married (85.3%). Future psychological, environmental, and religious future anxieties prevailed in more than half of the respondents, with 85.3% for future psychological anxiety, 52.9% for future environmental anxiety, and 52% for future religious anxiety. Meanwhile, the majority of respondents had a good immune system (59.8%). Detailed results are shown in Table 1.

Table 2 shows that future psychological, social, environmental, economic, media, and religious anxieties were not related to immunity status with a p-value > α. The same results were obtained from the analysis of future anxiety and immunity status in nursing students during the COVID-19 pandemic.

Discussion

In this study, the respondents were mostly adults, females, and married. These characteristics must be considered as other factors that can trigger future anxiety. Many studies reported that nursing students are mostly females that are currently in adolescence to adulthood (Cheraghi et

al., 2019; Karasu et al., 2022). In addition, the nursing profession in hospitals is dominated by women and married adults (Stevanin et al., 2018) This study also measured the future anxiety status of the respondents using FAS-1.

The results showed that nurses in charge of caring for patients with COVID-19 experienced future psychological, environmental, economic, and media anxieties. Most of the respondents experienced moderate anxiety. For future religious anxiety, most of the respondents experienced a mild level. In general, the respondents experienced moderate future anxiety. This finding is like a previous study in Poland reporting the increase in anxiety during the COVID-19 pandemic. Apart from anxiety, other mental health disorders, such as fear, depressive symptoms, and low sleep quality, have been reported during the pandemic (Duplaga & Grysztar, 2021). Excessive anxiety reduces the quality of nursing service to the patients. The present research also showed that poor mental health decreases cognitive performance, such as an individual's ability to process information, thus leading to poor work performance (Maharaj et al., 2019). Future anxiety that arises in nurses is one of the impacts of COVID-19, which is extremely life-threatening for healthcare providers (Duplaga & Grysztar, 2021).

In contrast to the mild level of future psychological anxiety in the respondents with a good immunity status, no respondent had moderate future psychological anxiety and poor immunity status. Changes in a person's health status greatly affect his/her anxiety level (Bestari & Wati, 2016). This finding suggested that future psychological anxiety had the most influence on a person's immune status. From an immunological perspective, people who experience anxiety generally have increased levels of cytokines in their body. This finding was confirmed in a study that measured the levels of cytokines in the blood serum of respondents who experienced anxiety and compared them with a control group (without anxiety). The results showed that the group experiencing anxiety had substantially higher ratios of TNF-α/IL10, TNF-α/IL4, IFN-γ/IL10, and IFN-γ/IL4 than the control group (Hou et al., 2017).

With regard to future social anxiety, 69% of the respondents with mild anxiety levels had a good immunity status, 7 people had a moderate immunity status, and only two people had a poor immunity status. Meanwhile, for future environmental anxiety, as many as 30 respondents with moderate anxiety levels had a good immunity status, 16 had a moderate immunity status, and 8 had a poor immunity status. This finding showed that the role of the social environment is not entirely a factor in causing future anxiety and immunity disorders in nurses (Sampaio et al., 2021). Another future anxiety subscale included the future economy, media, and religious anxieties as shown in Table 2. Media anxiety during a pandemic also contributes to the increase in future anxiety regarding income and economic well-being. This finding is in line with recent research, which stated that workers in the ward should reduce work activities and are likely to be transferred to other departments. The respondents in the present study experienced negative impacts that also affected their economy (Florin et al., 2020). Fear of recession and financial collapse can also trigger stress and anxiety regarding future sustainability in the community (Maria et al., 2020). The present results also showed the lack of a significant relationship between religiosity and mental health disorders (Saleem & Saleem, 2020). Religiosity is closely related to the interaction of thoughts that affect a person's body so that he/she is considered susceptible to experiencing anxiety disorders. However, researchers have not reached a consensus on how anxiety related to religiosity can affect the vulnerability of a person to having a poor immunity status (Mallorquí-Bagué et al., 2016).

The immune system can be characterized either by examining the biomarkers associated with inflammatory response, such as leukocytes and other inflammatory cytokines (Yuan et al., 2020), or by a non-invasive examination, such as ISQ

(Versprille et al., 2019). A study in 2020 linked the immunity status of patients with COVID-19 with and without anxiety and found a difference in the number of leukocytes between the recovered patients with COVID-19 with and without depression. The results showed that the number of leukocyte cells in the group who experienced depression was higher than in the normal group (without depression) (Yuan et al., 2020). In the present study, the respondent's immune status was measured using the ISQ. The results showed that 59.8% of the respondents were perceived to have a good immunity status, 25.5% had a moderate immunity status, and 14.7% had a poor immunity status. In this case, immune status was not statistically significant because of the p-value > 0.05 (0.123). This result differed from that of previous research that also measured the immunity status of respondents using ISQ for the last 12 months (Versprille et al., 2019). The discrepancy may be because the respondents of the previous study had a coping mechanism and an adequate knowledge of anxiety. Hence, the anxiety that occurs did not interfere with their immunity status. Another study reported that a good coping mechanism has lowered the anxiety and stress levels in nursing students during COVID-19 pandemic (Shdaifat et al., 2018). In addition, COVID-19 infection occurred more in health workers than in non-healthcare providers, but the fatality rate was higher in non-health workers than in health workers; this finding was related to the higher level of knowledge of health workers compared with non-health workers (Zheng et al., 2020). Some previous studies assumed the lack of relationship between the anxiety levels and immunity status of nursing students because they have better coping mechanisms and better levels of health knowledge than non-health students.

This study implied that nursing students are also human beings who are prone to anxiety and fear of diseases, such as COVID-19. This anxiety can hinder their studies, especially during clinical practice. Prior to clinical practice, preparation activity is important to reduce the anxiety of the student (Anim-Boamah et al., 2021). Although no correlation was found between future anxiety and immune status, this study provides an overview of the level of anxiety that has occurred in nursing students during the COVID-19 pandemic.

The limitation of this study was that the respondents were only from one school and had a background as a nurse at a COVID-19 ward. No respondent had directly graduated from high school. In addition, this study did not examine the confounding factors that may influence the immunity status and only used a questionnaire to measure the immunity status. The correlation test showed the lack of a significant relationship between future anxiety and immune status. However, the results might have been affected by using a questionnaire to measure immunity instead of focusing on individual perceptions.

Conclusion

This study explained the level of future anxiety that has occurred in nursing students who worked in hospitals and cared for patients with COVID-19. Results showed the high levels of anxiety felt by the respondents. The worst anxiety felt by the respondents is future anxiety, which is most worrying anxiety. Future studies must employ multivariate analysis to examine the factors influencing immune status.

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References

Adachi, S., Koma, T., Nomaguchi, M., & Adachi, A. (2020). Commentary: Origin and evolution of pathogenic coronaviruses. *Frontiers in Immunology, 11* (20), 1–9. doi: 10.1007/s11469-020-00270-8.

Ahorsu, D.K., Lin, C.Y., Imani, V., Saffari, M., Griffiths, M.D., & Pakpour, A.H. (2020). The fear of COVID-19 scale: Development and

initial validation. *International Journal of Mental Health and Addiction, 11* (20), 1–9. doi: 10.1007/s11469-020-00270-8.

Al Matarneh, A.J., & Altrawneh, A. (2014). Constructing a scale of future anxiety for the students at Public Jordanian Universities. *International Journal of Academic Research, 6* (5), 180–188. doi: 10.7813/2075-4124.20 14/ 6-5/B.27.

Anim-Boamah, O., Christmals, C.D., & Armstrong, S.J. (2021). Nursing students' experiences on clinical competency assessment in Ghana. *Nurse Media Journal of Nursing*, 11 (3), 278-293. doi: 10.14710/nmjn.v11i3.39079.

Bestari, B.K., & Wati, D.N.K. (2016). Penyakit kronis lebih dari satu menimbulkan pening-katan perasaan cemas pada lansia di Kecama-tan Cibinong. *Jurnal Keperawatan Indone-sia*, *19* (1), 49–54. doi: 10.7454/jki.v19i1.433.

Cheraghi, F., Oshvandi, K., Ahmadi, F., Selsele, O.S., Majedi, M.A., Mohammadi, H., Gholi Mezerji, N.M., & Vatandost, S. (2019). Comparison of nurses' and nursing students' attitudes toward care provision to opposite-gender patients. *Nurs Midwifery Stud*, 8, 104–111.

Chughtai, A.A., Seale, H., Islam, M.S., Owais, M., & Macintyre, C.R. (2020). Policies on the use of respiratory protection for hospital health workers to protect from coronavirus disease (COVID-19). *International Journal of Nursing Studies*, *105*, 103567. doi: 10.1016/j.ijnur stu.2020.103567.

Duplaga, M., & Grysztar, M. (2021). The Association between future anxiety, health literacy and the perception of the COVID-19 pandemic: A cross-sectional study. *Health-care*, *9* (43), 1–18. doi: 10.3390/healthcare901 0043.

Florin, M., Pinar, U., Chavigny, E., Bouaboula, M., Jarboui, L., Coulibaly, A., Lemogne, C., & Fournier, L. (2020). Socio-economic and psychological impact of the COVID-19 outbreak on private practice and public hospital radiologists. *European Journal of Radiology*, *132*, e0224322. doi: 10.1016/j.ejrad.2020. 109285.

Hou, R., Garner, M., Holmes, C., Osmond, C., Teeling, J., Lau, L., & Baldwin, D.S. (2017). Peripheral inflammatory cytokines and immune balance in generalised anxiety disorder: Case-controlled study. *Brain, Behavior, and Immunity*, *62* (21), 212–218. doi: 10.1016/j.bbi. 2017.01.021.

Huang, L., Lei, W., Xu, F., Liu, H., & Yu, L. (2020). Emotional responses and coping strategies in nurses and nursing students during Covid-19 outbreak: A comparative study. *PLoS ONE*, *15* (8), e0237303. doi: 10.1371/journal.pone. 023 7303.

Huang, Y., Luo, D., Chen, X., Zhang, D., Huang, Z., & Xiao, S. (2019). Role of psychosocial status in predicting health-related quality of life at 1-year follow-up among newly diag-nosed people living with HIV. *PLoS One*, *14* (10), e0224322. doi: 10.1371/journal.pone.02 24322.

Ismail, S., Ahmad, S., & Azam, S.S. (2020). Immunoinformatics characterization of SARS-CoV-2 spike glycoprotein for prioritization of epitope based multivalent peptide vaccine. *Journal of Molecular Liquids*, *314*, 113612. doi: 10.1016/j.molliq.2020.113612.

Karasu, F., Polat, F., & Okuyan, C.B. (2022). The determination of intercultural sensitivity and ethnocentrism levels among nurses and nursing students: A border of city, Turkey. *Perspectives in Psychiatric Care*, *58* (1), 314–322. doi: 10.1111/ppc.12788.

Maharaj, S., Lees, T., & Lal, S. (2019). Prevalence and risk factors of depression, anxiety, and stress in a cohort of Australian nurses. *International Journal of Environmental Research and Public Health*, *16* (1), 61. doi: 10.3390/ ijerph16010061.

Mallorquí-Bagué, N., Bulbena, A., Pailhez, G., Garfinkel, S.N., & Critchley, H.D. (2016). Mind-body interactions in anxiety and soma-tic symptoms. *Harvard Review of Psychiatry*, *24* (1), 53–60. doi: 10.1097/HRP.00000000 00000085.

Maria, N., Zaid, A., Catrin, S., Ahmed, K., Ahmed, A.J., Christos, I., Maliha, A., & Riaz, A.

(2020). The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery, 78* (18), 185–193. doi: 10.1016/j.ijsu.2020.04.018.

Milgrom, Y., Tal, Y., & Finestone, A.S. (2020). Comparison of hospital worker anxiety in COVID-19 treating and non-treating hospitals in the same city during the COVID-19 pandemic. *Israel Journal of Health Policy Research, 9,* 55. doi: 10.1186/s13584-020-00413-1.

Salari, N., Khazaie, H., Hosseinian-Far, A., Ghasemi, H., Mohammadi, M., Shohaimi, S., Daneshkhah, A., Khaledi-Paveh, B., & Hosseinian-Far, M. (2020). The prevalence of sleep disturbances among physicians and nurses facing the COVID-19 patients: a systematic review and meta-analysis. *Globalization and Health, 16* (1), 92. doi: 10.1186/s12992-020-00620-0.

Saleem, T., & Saleem, S. (2020). Religiosity and death anxiety: A study of Muslim Dars attendees. *Journal of Religion and Health, 59* (1), 309–317. doi: 10.1007/s10943-019-00783-0.

Sampaio, F., Sequeira, C., & Teixeira, L. (2021). Impact of COVID-19 outbreak on nurses' mental health: A prospective cohort study. *Environmental Research, 194,* 110620. doi: 10.1016/j.envres.2020.110620.

Shdaifat, E., Jamama, A., & AlAmer, M. (2018). Stress and coping strategies among nursing students. *Global Journal of Health Science, 10* (5), 33. doi: 10.5539/gjhs.v10n5p33.

Stevanin, S., Palese, A., Bressan, V., Vehviläinen-Julkunen, K., & Kvist, T. (2018). Workplace-related generational characteristics of nurses: A mixed-method systematic review. *Journal of Advanced Nursing, 74* (6), 1245–1263. doi: 10.1111/jan.13538.

Taghizadeh-Hesary, F., & Akbari, H. (2020). The powerful immune system against powerful COVID-19: A hypothesis. *Medical Hypotheses, 140,* 109762. doi: 10.1016/j.mehy.2020.109762.

Tan, B.Y.Q., Chew, N.W.S., Lee, G.K.H., Jing, M., Goh, Y., Yeo, L.L.L., Zhang, K., Chin, H.K., Ahmad, A., & Khan, F.A. (2020). Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Annals of Internal Medicine, 173* (4), 317–320. doi: 10.7326/M20-1083.

Versprille, L.J.F.W., van de Loo, A.J.A.E., Mackus, M., Arnoldy, L., Sulzer, T.A.L., Vermeulen, S.A., Abdulahad, S., Huls, H., Baars, T., & Scholey, A. (2019). Development and validation of the Immune Status Questionnaire (ISQ). *International Journal of Environmental Research and Public Health, 16* (23), 4743. doi: 10.3390/ijerph16234743.

World Health Organization (2020). *Coronavirus disease 2019 (COVID-19): Situation report, 73*. World Health Organization. Retrieved from https://apps.who.int/iris/handle/10665/331686

Yuan, B., Li, W., Liu, H., Cai, X., Song, S., Zhao, J., Hu, X., Li, Z., Chen, Y., & Zhang, K. (2020). Correlation between immune response and self-reported depression during convalescence from COVID-19. *Brain, Behavior, and Immunity, 88* (62), 39–43. doi: 10.1016/j.bbi.2020.05.062.

Zheng, L., Wang, X., Zhou, C., Liu, Q., Li, S., Sun, Q., Wang, M., Zhou, Q., & Wang, W. (2020). Analysis of the infection status of healthcare workers in Wuhan during the COVID-19 outbreak: A cross-sectional study. *Clinical Infectious Diseases, 71* (16), 2109–2113. doi: 10.1093/cid/ciaa588.