

The Relationship between Physical Activity and Mental Health of Nurses during the COVID-19 Pandemic: A Case Study of Hospitals in Mazandaran Province

Alireza Moradi ^{1*}, Seyed Hossein Hashemi Ramkani ², Seyed Hossein Alavi ³
Fathemeh Zolfalipor ⁴

¹ Corresponding author, PhD in Counseling - Research Assistant Professor of the Social Department of the Police Research Institute of Police Sciences and Social Studies-Tehran-Iran. E-mail: dr.alirezamoradi57@gmail.com

² Bachelor's degree in Psychology, Faculty of Literature and Humanities, Shahid Bahonar University of Kerman, Kerman, Iran. E-mail: hashemiramkani.psychology@gmail.com

³ Physical Education and Sport Sciences, Assistant Professor of Department of Technical and Vocational of Mahmoud Abad Branch of Technical and Vocational University (TVU), Mazandran, Iran. E-mail: shalavi@tvu.ac.ir

⁴ PhD Student in Sports Management, Islamic Azad University, Ayatollah Amoli Amol Branch, Amol, Iran. E-Mail: f.zolfalipor@yahoo.com

ARTICLE INFO

Article type:

Research Article

Article history:

Received: 20 May 2025

Revised: 1 June 2025

Accepted: 6 June 2025

Keywords:

Physical activity
somatic symptoms
anxiety
social functioning
depression

ABSTRACT

The present study aimed to investigate the relationship between physical activity and mental health among nurses during the COVID-19 pandemic in hospitals of Mazandaran Province. This descriptive-applied survey targeted nurses working in these hospitals, using a convenience sampling method. Data were collected through online questionnaires due to the widespread prevalence of COVID-19 and restrictions on hospital visits. A total of 240 male and female nurses completed the mental health and physical activity questionnaires. The reliability of the instruments was confirmed by Cronbach's alpha coefficients ranging from 0.738 to 0.928 across different subscales, and validity was verified by eight experts in psychology and sports management. The results revealed a significant positive relationship between physical activity and overall mental health among nurses during the pandemic. Additionally, physical activity showed significant correlations with specific mental health components, including somatic symptoms, anxiety, social functioning, and depression. These findings suggest that engaging in physical activity may play an important role in supporting nurses' psychological well-being during health crises such as the COVID-19 pandemic.

Introduction

In the final days of 2019, after people began developing pneumonia of unknown cause, a new type of coronavirus was identified (Kim, 2018). Coronaviruses were a large family of viruses that ranged from the common cold virus to those causing more severe diseases such as SARS and MERS. This new virus was later named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and, due to its high transmissibility, quickly spread throughout China and subsequently worldwide (Farnoosh, 2020). As the number of victims of the coronavirus surpassed 1,000, the World Health Organization (WHO) officially named the disease caused by the virus COVID-19, referring to Corona, Virus, Disease, and the year 2019 (World Health Organization, 2020). The rapid and widespread transmission of this disease, coupled with the lack of a definitive treatment, compelled governments in many countries to impose strict regulations to prevent unnecessary outings. These measures led to significant social damages and severe economic losses, including increased unemployment rates and substantial harm to the tourism industry, among



DOI: <https://doi.org/10.22111/ijop.2025.52245.1041>

© The author(s)

Publisher: University of Sistan and Baluchestan

How to Cite: Moradi, A., Hashemi Ramkani, H., Alavi, H., & Zolfalipor, F. (2025). The Relationship between Physical Activity and Mental Health of Nurses during the COVID-19 Pandemic: A Case Study of Hospitals in Mazandaran Province. *Iranian Journal of Organizational Psychology*, 3(1), 49-59. <https://doi.org/10.22111/ijop.2025.52245.1041>

others. Consequently, with the loss of normal living conditions, the social situation became very difficult. Moreover, anxiety and stress caused by the fear of infection or death of oneself or loved ones endangered the mental health of individuals in many countries affected by the COVID-19 outbreak. Reducing these pressures was expected to contribute to economic stabilization and improve quality of life. There was evidence suggesting that improving overall physical and mental health might reduce the incidence of respiratory infections (Jiang, 2019, p. 120). The spread of the coronavirus threatened individuals' mental health, seemingly due to its novelty and unknown nature. Fear of the unknown reduced humans' sense of security and had always been a source of anxiety. Additionally, limited scientific information on how to cope with the virus and the absence of a definitive cure intensified anxiety, especially among vulnerable groups in society (Bajema, Oster, & McGovern, 2020).

At that time, our country, Iran, was experiencing the second wave of the disease, during which the rates of infection and mortality were higher than in the first wave. According to experts, with the onset of cold weather and the spread of influenza, if social distancing, handwashing, and mask-wearing were not observed, the third wave of the disease would have placed the country in a worse situation than the previous two stages. The symptoms of this disease included fever, dry cough, and sometimes respiratory problems such as shortness of breath, rapid breathing, sore throat, and runny nose. The borderless spread of this new and deadly virus led to the closure of public centers, sports facilities, and major events, including various levels of sports competitions and even the 2020 Olympics in different parts of the world. On the other hand, the WHO and the health ministries of countries with high infection rates (such as the United States, China, Germany, Iran, Spain, Italy, etc.) mandated home quarantine for their populations. Considering the COVID-19 pandemic and the healthcare needs of infected individuals, nurses were the first professionals to come into direct contact with these patients. During that period, while everyone in society was focused on protecting themselves and their families, healthcare workers and nurses were on the front lines of the fight against COVID-19, providing care to coronavirus patients. Considering the COVID-19 pandemic and the healthcare needs of infected individuals, nurses were the first professionals to come into direct contact with these patients. During that period, while everyone in society was focused on protecting themselves and their families, healthcare workers and nurses were on the front lines of the fight against COVID-19, providing care to coronavirus patients.

The nursing profession had been greatly influenced by war, and the heroic nature of nursing work in defending patients of all religions and nationalities during wartime had been well recognized (Firoozkouhi et al., 2015). The bravery of nurses on the battlefield and the formation of positive public attitudes toward nursing, related to their unconditional defense of patients' health, had a significant impact on nursing after the war. In fact, after Florence Nightingale's return from the American Civil War, the concept of modern nursing was established in the West (McDonald et al., 2018). Currently, due to the pandemic related to the coronavirus, nurses experienced conditions similar to those during wartime (Farnoosh et al., 2020). In fact, being on the front lines of the healthcare system made nurses the best advocates for patients (Huang et al., 2020). Nurses had various roles, including educational, research, clinical, managerial, counseling, and advocacy roles. However, the advocacy role had been less addressed compared to the other roles (Hanks, 2013). Vaartio and colleagues (2008) also noted that the importance of this role was such that advocacy could be considered an inseparable part of the nursing management process. In multiple studies, the concept of advocacy had been defined as representing others, defending rights, assisting individuals in making informed decisions, and subsequently supporting those decisions (Kalaitzidis, 2015). The term "advocacy" is derived from the word "advocate" in law, meaning a person who helps, supports, and speaks on behalf of others (Paradiz, 2016). These health ambassadors, who were on the front lines of the fight against COVID-19, also experienced difficult psychological conditions. Working conditions, lack of resources, concerns about their families contracting COVID-19 due to their contact with coronavirus patients, and many other factors contributed to mental health disorders among these individuals. The experience of anxiety and stress was highly significant for humans when faced with life-threatening dangers, and in some cases, an individual's survival depended on the presence of this feeling (Polak, 2019). Early humans, when relying on hunting for survival, experienced anxiety manifested as increased heart rate, heightened sweating, and increased environmental sensitivity. This anxiety acted as a warning

signal and a danger alert responsible for ensuring their physical safety. In humans, when confronted with danger, the activity of the sympathetic nervous system and adrenaline secretion increased, triggering anxiety responses in a process known as the "fight-or-flight" response, which prepared the individual to confront or escape any potential threat (Nitschke et al., 2017). In modern humans, the stimuli that evoke anxiety differed from those of early humans, with anxiety-inducing factors revolving more around issues such as occupation, income, family, and individual health (Bloomfield et al., 2019).

Although the presence of anxiety in the current living conditions of humans was somewhat desirable and produced positive and beneficial effects in advancing individuals' life goals, prolonged duration and increased intensity of anxiety could impair normal functioning and threaten a person's mental and emotional health. Considering that the intrinsic function of anxiety was to protect individuals against life-threatening factors, in the event of the emergence of life-threatening diseases such as COVID-19, health-related concerns might manifest as anxiety states (Asmundson et al., 2020). Therefore, under real and life-threatening danger conditions, health anxiety could present with symptoms such as increased heart rate, rapid breathing, chest pain, shortness of breath, feelings of warmth, digestive problems, fatigue, and in some cases, muscle pain (Cheong et al., 2004). For instance, individuals with phobia disorders might have experienced irrational fear and avoidance of certain health-related stimuli and situations that reminded them of the illness or increased the risk of contracting it. In this context, the disorder known as "coronaphobia," characterized by an excessive fear of contracting COVID-19, was identified. Xenophobia, or an irrational fear of strangers, was another disorder noted during the COVID-19 outbreak. Studies showed that the prevalence of xenophobia increased towards the Chinese population during the spread of COVID-19 in China and some other communities. Psychological disorders might have manifested under stressful and acute conditions such as pandemics like COVID-19. The relationship between infectious pandemics and health anxiety had been discussed by researchers since the onset of the 2001 influenza pandemic (Wheaton et al., 2012). According to research conducted on pandemics in recent years, anxiety increased in urban areas with the spread of infectious diseases. For example, during the SARS outbreak in Hong Kong and Canada, the severity of anxiety significantly increased following the heightened likelihood of infection (Cheong & Lee, 2004).

Based on the results of another study conducted during the outbreak of the contagious Ebola virus, an increase in health anxiety and fear of disease symptoms was observed in affected areas. Healthy individuals reported symptoms such as sore throat, headache, and fever that resembled Ebola symptoms, reflecting heightened health anxiety, fear of illness, and underlying preoccupations. Overall, according to study findings, during the outbreak of infectious pandemics such as COVID-19, the prevalence of a specific type of anxiety known as health anxiety increased among individuals living in infected areas, and a significant proportion of people might have experienced symptoms similar to the infectious disease without actually being infected (Hughes et al., 2015).

Zaeipour et al. (2020), in their study on the role of health ambassadors in COVID-19 self-care in Iran, stated that empowering family health ambassadors, organizations, and councils as representatives of the people for coronavirus self-care led to increased public participation in health system programs, particularly in individual self-care programs. This increase was not merely due to voluntary presence but created active and effective participation in controlling and preventing coronavirus. The study highlighted that investing in community member cooperation could serve as a catalyst and facilitator in improving social participation and, consequently, the quality of life and public health. Mohammadi and Shahyad (2020), in their review study on health anxiety during the spread of viral contagious diseases and COVID-19, reported that health anxiety played a supportive role in the early detection of health damage symptoms and promoted health-enhancing behaviors. When the level of health anxiety in the community exceeded moderate levels—whether increasing too much or decreasing below optimal levels—it could cause different types of harm and problems to individuals. Therefore, an appropriate level of health anxiety was beneficial and could help prevent the spread of COVID-19, which is an extremely contagious disease. Abdulkareem et al. (2020) examined the impact of the coronavirus on stress levels among medical students at a teaching hospital in Saudi Arabia and reported a moderate level of stress. Yong Chang (2020) investigated knowledge, attitudes, anxiety, and concerns regarding the need for mental healthcare in the Indian population during the COVID-19 pandemic. Participants demonstrated a moderate level of

knowledge about COVID-19 infection and sufficient understanding of its preventive aspects. Attitudes toward COVID-19 reflected people's willingness to comply with government guidelines on quarantine and social distancing. The level of anxiety identified in this study was high. More than 80% of participants experienced negative thoughts, and 72% felt the need to use gloves and disinfectants, which increased their anxiety. The study also reported sleep problems, obsession with contracting COVID-19, and social media-related issues in 12.5%, 37.8%, and 36.4% of participants, respectively. The need for mental health care was observed in over 80% of participants, indicating a requirement to raise awareness and address mental health issues during this period. [Filkanberg \(2018\)](#), in a review article, concluded that yoga could have positive effects on individuals suffering from inflammatory diseases. Other evidence suggested that meditation (mind relaxation) could reduce stress and negative emotions. A review of research showed that in recent years, several animal and human studies had been conducted to understand how acute and chronic physical activities affected infectious influenza and influenza vaccination. [Lauder et al. \(2005\)](#), in their animal studies, found that moderate-intensity endurance exercise (30 minutes per day) could protect mice from influenza-related death. However, mice that exercised for longer durations (5.5 hours per day) showed increased symptoms of illness, although no statistically significant difference in mortality rates was observed compared to sedentary mice. Overall, they concluded that moderate exercise could be beneficial, while prolonged exercise might be harmful to influenza-infected mice ([Lowder, Padgett & Woods, 2005](#)). [Woods et al. \(2009\)](#), in a large study to determine the effect of 10 months of regular endurance exercise on improving influenza vaccination response in older adults (a group at risk of infectious diseases due to immune deficiency), found that regular moderate-intensity aerobic exercise could have a protective effect on annual influenza vaccination by maintaining antibody protection levels throughout the influenza season. Emphasizing the importance of annual influenza vaccination for these individuals, they concluded that regular moderate-intensity endurance exercise might be one way to enhance the protective effect of the annual influenza vaccination ([Woods et al., 2009](#)). Engaging in exercise during the coronavirus outbreak was safe for healthy individuals. In fact, the health benefits of daily exercise should never be overlooked, even when a new virus is present in the environment. However, precautions should be taken to reduce the risk of infection. Since it had been established that virus transmission occurred through airborne droplets and direct contact with infected individuals, especially via coughing and sneezing, and the exact survival time of the virus on various surfaces remained unclear, it was advisable to avoid exercising in crowded environments because infected individuals might be contagious before showing symptoms. In some cases, wearing a mask during exercise might have been a way to reduce exposure. Additionally, if gym equipment was used, it should have been disinfected before and after use. The most effective hand-cleaning method during exercise was washing with soap and water for at least 25 seconds, followed by drying with a clean towel. Hand sanitizers with at least 60% alcohol could be used, although the U.S. Centers for Disease Control and Prevention warned that they might not be effective against all germs. Furthermore, if hand disinfection was not possible for a moment, care should have been taken to avoid any contact between hands and the face or neck ([Zhu, 2020](#)).

Exercise, as a phenomenon in the lives of many individuals in society, contributed to the improvement of their health and well-being ([Ansari et al., 2009](#)), and its development was considered essential for every community. Increasing physical activity was one of the most important and effective strategies for reducing the risk of certain diseases, decreasing social deviations, and enhancing vitality and happiness in societies. In fact, exercise, as an important part of education and training, held a fundamental and decisive position, and its various functions in society were well established ([Davoodzadeh et al., 2015](#)). Sports immunologists had recognized that even a single session of physical activity could help improve immune function, but regular and long-term exercise certainly provided greater benefits to the immune system. It was shown that cellular and molecular events began within seconds and minutes of starting an episode of physical activity or a period of exercise. There was a historical notion that exercise induced a stress response similar to the fight-or-flight reaction in the body, mobilizing immune cells for potential infectious and non-infectious challenges associated with physical activity. From an evolutionary perspective, physical activity could lead to injury, such as micro-tissue damage in skeletal muscles, which would trigger inflammatory responses ([Nieman & Wentz, 2019](#)).

Due to ethical considerations, it was very difficult to expose individuals with infectious diseases to high-intensity exercise. Under normal conditions, elite athletes who participated in high levels of competition and training might have tolerated heavy physical stress and, contrary to the general rule, did not exhibit immune suppression or decline (Campbell & Turner, 2018).

Research Method

This cross-sectional study with a descriptive-analytical approach was conducted using convenience sampling from April 2020 to July 2020, involving 315 nurses working in hospitals in Mazandaran Province. Inclusion criteria for the study included written informed consent and not being in a critical condition (such as divorce, death of close relatives, illness, or hospitalization of oneself or first-degree relatives). Due to the COVID-19 conditions and restrictions on physical access, the researcher was forced to distribute the questionnaires online. Among the statistical population of 240 nurses employed in hospitals, all 240 completed and returned the questionnaires. The General Health Questionnaire (GHQ), developed by David Goldberg in 1972 to identify psychological disorders in various centers and environments, was used as the mental health assessment tool. Physical activity was evaluated using the International Physical Activity Questionnaire (IPAQ). The questionnaire items assessed the individual's psychological status over the past four weeks, including symptoms such as abnormal thoughts and feelings as well as observable behavioral aspects. Goldberg (1972) designed the questionnaire to cover four domains: the first domain was depression; the second domain was anxiety and psychological distress; the third domain involved observable objective behaviors related to social dysfunction; and the fourth domain encompassed a wide range of somatic symptoms and self-perceived health complaints measured by the GHQ. After completing the questionnaires, data review, coding, and extraction were performed, and the data were entered into a computer database. Data analysis was conducted using SPSS software. The reliability of the questionnaires was assessed using Cronbach's alpha, yielding coefficients of 0.749 for physical activity, 0.841 for somatic symptoms, 0.738 for anxiety, 0.928 for social functioning, and 0.824 for depression. Validity was confirmed by eight experts in psychology and sports management. Descriptive statistics, including mean and standard deviation, were calculated using SPSS version 22, and charts were drawn using Excel 2010. The Kolmogorov-Smirnov test was used to assess the normality of the distribution curve of the participants. Levene's test was used to evaluate the homogeneity and equality of variances across groups. One-way ANOVA and Tukey's post hoc test were employed to compare the three groups regarding various variables. Pearson's correlation coefficient was used to determine the relationships between variables. The presented results showed that, in terms of gender, there were 124 males and 116 females. Among them, 130 were married and 110 were single. Descriptive statistics were used to explain and describe the general data collected in the study. Regarding education, 139 participants (57.9%) held a bachelor's degree, and 101 participants (42.1%) had a master's degree. The mean values of variables such as age, workplace, and work experience were measured. The mean age of males was 43 years, which was higher than that of females, whose mean age was 38 years. Regarding workplace, 96 participants (40%) worked in the acute respiratory diseases ward, 44 participants (18.3%) in the ICU, and 100 participants (41.7%) in the internal medicine ward. In terms of work experience, 36 participants (15%) had 5 to 10 years of experience, 152 participants (63.3%) had 10 to 15 years, and 73 participants (21.7%) had more than 15 years of experience.

Statistical Description of Research Variables

Table 1; presents descriptive information on the mental health variables and their subscales, including somatic symptoms, anxiety disorder, and social functioning.

Group	Mental Health (Mean $\pm$ SD)	Somatic Symptoms (Mean $\pm$ SD)	Anxiety Disorder (Mean $\pm$ SD)	Social Functioning (Mean $\pm$ SD)	Depression Symptoms (Mean $\pm$ SD)
Male	7.33 $\pm$ 5.68	1.74 $\pm$ 3.03	2.40 $\pm$ 2.30	4.75 $\pm$ 1.97	0.44 $\pm$ 1.46
Female	27.01 $\pm$ 11.50	6.56 $\pm$ 3.70	8.10 $\pm$ 4.25	8.38 $\pm$ 3.29	4.40 $\pm$ 4.27

According to Table 1, the male nurse group had a lower mean mental health score of 7.33 compared to the female nurse group, which had a mean score of 27.01. In the somatic symptoms subscale, the male nurse

group also had a lower mean score of 1.74 compared to the female nurse group's mean of 6.56. Similarly, in the anxiety disorder subscale, the male nurse group had a lower mean score of 2.40 compared to 8.10 in the female nurse group. In the social functioning subscale, the male nurse group had a lower mean score of 4.75 compared to 8.38 in the female nurse group. Additionally, in the depression symptoms subscale, the male nurse group had a lower mean score of 0.44 compared to 4.40 in the female nurse group.

Table 2; presents descriptive information related to physical activity scores in male and female nurses.

Group	Number	Yale Physical Activity Survey (YPAS) Score (Mean $\pm$ SD)
male	124	14.09 $\pm$ 2.14
female	116	4.13 $\pm$ 1.54

According to the results of Table 2, the mean physical activity score in the male nurse group was 14.09, which was higher than that of the female nurse group, with a mean score of 4.13.

Hypothesis Testing

Table 3; shows that there was no significant correlation between physical activity and mental health among male nurses during the COVID-19 pandemic.

Variable	Mean	Standard Deviation	r	p
Mental Health	17.10	10.27	0.782	0.0001
Physical Activity	9.16	9.6		

The data presented in Table 3 indicate that the correlation between physical activity and mental health was significant at the level of $p \leq 0.05$; therefore, the research hypothesis was confirmed. In other words, there was a significant relationship between physical activity and mental health.

Table 4; presents the findings from the Pearson correlation coefficient test to determine the relationship between the subscales of mental health and physical activity among male nurses during the COVID-19 pandemic.

Variable	Somatic Symptoms (r)	Anxiety Disorder (r)	Social Functioning (r)	Depression Symptoms (r)
Correlation Coefficient (r)	0.593	0.319	0.132	0.609
Significance (p)	0.0001	0.0001	0.0001	0.0001

It is significant at the level of $p \leq 0.05$

The results of Table 4 showed that there was a positive and significant correlation between physical activity and the subscales of somatic symptoms and depression symptoms, whereas no significant correlation was found between the subscales of anxiety disorder and social functioning with physical activity during the COVID-19 pandemic ($p \geq 0.05$).

Table 5: shows that there was no significant correlation between physical activity and mental health among female nurses during the COVID-19 pandemic.

Variable	Mean	Standard Deviation	r	p
Mental Health	19.21	10.06	0.821	0.0001
Physical Activity	8.20	3.28		

The results of Table 5 showed that the correlation between physical activity and mental health among female nurses was significant at the level of $p \leq 0.05$; therefore, the research hypothesis was confirmed. In other words, there was a significant relationship between physical activity and mental health.

Table 6: presents the findings from the Pearson correlation coefficient test to determine the relationship between the subscales of mental health and physical activity among female nurses during the COVID-19 pandemic.

Variable	Somatic Symptoms (r)	Anxiety Disorder (r)	Social Functioning (r)	Depression Symptoms (r)
Correlation Coefficient (r)	0.637	0.734	0.381	0.861
Significance (p)	0.0001	0.0001	0.0001	0.0001

It is significant at the level of $p \leq 0.05$

According to the results of Table 6, regarding the mental health subscales of the female nurse group in hypothesis testing, a significant relationship was found between physical activity and somatic symptoms, anxiety disorder, and depression symptoms. However, no significant relationship was observed between the social functioning subscale and physical activity at the level of $p \geq 0.05$. Furthermore, there was a significant difference between mental health and physical activity in male and female nurses during the COVID-19 outbreak.

Table 7: presents the results of the one-way analysis of variance (ANOVA) test for comparing mental health and physical activity between male and female nurses during the COVID-19 pandemic.

Group	Variable	Mean	Standard Deviation	df	F	p
male	Mental Health	9.31	5.68	2.317	47.61	0.001
	Physical Activity	11.10	7.31			
Female	Mental Health	21.13	12.42	3.607	51.63	0.001
	Physical Activity	13.06	8.80			

The results of Table 7 show that the p-value is less than 0.001. Therefore, the null hypothesis of no significant difference between the mean scores of mental health and physical activity in the two groups of male and female nurses is rejected. In other words, there is a significant difference between the mental health and physical activity scores of the two groups.

To determine significant differences between the two study groups, an independent t-test was used. The multiple comparisons related to mental health and physical activity are presented in Table 8.

Table 8 Mental Health and Physical Activity in Women and Men: Independent t-test (assuming homogeneity of variances)

t-value	Degrees of Freedom (df)	Significance Level (p)	Mean Difference	Standard Error of Difference	95% Confidence Interval of the Difference
-0.446	239	0.657	-0.89831	2.01554	Lower: -4.89566 Upper: 3.09905

The results of Table 8 show that at the significance level of 0.05, the t-value is 0.446 with 239 degrees of freedom, the mean difference is 0.089, and the standard error of the difference is 2.01554. The significance level (p-value) for mental health and physical activity during the COVID-19 pandemic in the t-test is 0.657, indicating that the null hypothesis is accepted and the research hypothesis is rejected. In other words, there is no significant difference between mental health and physical activity in male and female nurses during the COVID-19 pandemic.

Discussion and Conclusion

The purpose of this study was to examine the impact of physical activity on the mental health of male and female nurses during the early stages of the COVID-19 pandemic, focusing on those who engaged in physical activity before the pandemic and either continued or discontinued it during the outbreak. The results of Pearson correlation analyses (Table 4) indicated that physical activity in male nurses had a significant positive correlation with mental health subscales, including somatic symptoms and depressive symptoms ($p \leq 0.05$). However, no significant correlation was observed between physical activity and anxiety disorders or social functioning ($p \geq 0.05$). Similarly, the results (Table 5) showed a significant correlation between physical activity and mental health in female nurses at the $p \leq 0.05$ level. Further analyses (Table 6) revealed that physical activity was significantly correlated with somatic symptoms, anxiety disorders, and depressive symptoms in female nurses, but not with social functioning ($p \geq 0.05$). These findings were consistent with previous research. For instance, [Schuch et al. \(2016\)](#) demonstrated through a meta-analysis that physical activity had a strong and significant antidepressant effect in individuals with depression, including major depressive disorder, which aligned with the findings of this study regarding the reduction of depressive symptoms in nurses.

The results of this study indicated that physical activity had a significant positive effect on certain aspects of mental health, such as somatic symptoms and depression, in both male and female nurses. These findings were consistent with [Chekroud et al. \(2018\)](#), who reported that physical activity was associated with a reduced mental health burden in large samples, particularly in alleviating depressive symptoms. During the early stages of the COVID-19 pandemic, nurses who engaged in regular physical activity were likely to experience greater vitality and were better equipped to cope with the psychological pressures of caring for patients. Physical activity, due to its dynamic and social nature, could serve as an effective tool for enhancing self-confidence and a sense of empowerment ([Ansari et al., 2009](#)). Additionally, [Lowder et al. \(2005\)](#) reported in animal studies that moderate-intensity physical activity could provide protective effects against infectious diseases, which could help explain the impact of physical activity on nurses' vitality during a crisis. However, the results showed that physical activity did not have a significant effect on anxiety disorders and social functioning in male nurses or social functioning in female nurses. This lack of association could be attributed to other factors, such as family pressures (particularly for female nurses, who often had greater domestic responsibilities) or the stressful working conditions during the pandemic. [Rebar et al. \(2015\)](#) reported in a meta-meta-analysis that physical activity had a small effect on reducing anxiety in non-clinical populations, which could explain the limited impact of physical activity on anxiety in this study. Similarly, [Filkanberg \(2018\)](#) reported that activities such as yoga and meditation could reduce stress and negative emotions, but the present study suggested that physical activity alone was insufficient to improve anxiety or social functioning. This indicated that environmental and social factors played a significant role in nurses' mental health.

The results of one-way ANOVA (Table 7) showed a significant difference between the mental health and physical activity of male and female nurses ($p < 0.001$), rejecting the null hypothesis of no difference between groups. However, the independent t-test (Table 8) indicated no significant difference between male and female nurses in terms of mental health and physical activity ($t = 0.446$, $df = 239$, $p = 0.657$). These findings suggested that, although male nurses had more time and resources for physical activity due to fewer time constraints and reported better mental health, the psychological impact of the pandemic was profound for all nurses. Factors such as living conditions, job security, and family concerns contributed to the overall stress during the pandemic, but physical activity was identified as a key factor in reducing stress and enhancing vitality (Nieman & Wentz, 2019). Physical activity was recognized as an effective strategy for reducing depressive symptoms and enhancing vitality in nurses but failed to improve all aspects of mental health, such as anxiety or social functioning. This highlighted the complexity of factors influencing mental health during a crisis. For example, a nurse who engaged in regular physical activity might still struggle to manage anxiety caused by critical conditions or to balance work and home responsibilities. These findings were consistent with Schuch et al. (2016), who showed that physical activity was particularly effective for reducing depression, but its effects on anxiety could depend on other factors.

Based on the findings of this study, it was recommended that healthcare authorities provide opportunities for nurses to engage in physical activity in supportive environments, such as designated exercise spaces in hospitals. Such measures could help improve nurses' mental health, particularly during crises like pandemics. Physical activity, due to its positive effects on stress reduction and vitality, could serve as a complementary tool alongside organizational support (Chekroud et al., 2018).

References

- Abdul Karim Al-Rabiaah, M.-H. T., Ayman A. Al-Eyadhya, G. M. H., Fahad Al-Zamila, S. A. S., Fahad Alsohimeia, A. J., Ali Alhabooba, B. A.-S., & Ali Mohammed Somilya. (2020). Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. *Journal of Infection and Public Health*.
- Ali, N., Nitschke, J. P., Cooperman, C., & Pruessner, J. C. (2017). Suppressing the endocrine and autonomic stress systems does not impact the emotional stress experience after psychosocial stress. *Psychoneuroendocrinology*, 78, 125–130. <https://doi.org/10.1016/j.psyneuen.2017.01.015>
- Ansari, M. E., Ostadi, H., & Javari, F. (2009). Investigating the relationship between organizational health on positive attitudes of employees in Isfahan Tax Office. *Journal of Taxation*, 17(6), 41–65.
- Asmundson, G. J., & Taylor, S. (2020). How health anxiety influences responses to viral outbreaks like COVID-19: What all decision-makers, health authorities, and health care professionals need to know. *Journal of Anxiety Disorders*, 71. <https://doi.org/10.1016/j.janxdis.2020.102211>
- Bajema, K. L., Oster, A. M., & McGovern, O. L. (2020). Persons evaluated for 2019 novel coronavirus United States. *MMWR Morb Mortal Wkly Rep*. ePub: February 7, 2020. <https://doi.org/10.15585/mmwr.mm6906e1>
- Bloomfield, M. A., McCutcheon, R. A., Kempton, M., Freeman, T. P., & Howes, O. (2019). The effects of psychosocial stress on dopaminergic function and the acute stress response. *Elife*, 8. <https://doi.org/10.7554/eLife.46797>
- Campbell, J. P., & Turner, J. E. (2018). Debunking the myth of exercise-induced immune suppression: Redefining the impact of exercise on immunological health across the lifespan. *Frontiers in Immunology*, 9, 648. <https://doi.org/10.3389/fimmu.2018.00648>

- Cheng, S.-C., Chang, Y.-C., Fan Chiang, Y.-L., Chien, Y.-C., Cheng, M., Yang, C.-H., et al. (2020). First case of Coronavirus Disease 2019 (COVID-19) pneumonia in Taiwan. *Journal of the Formosan Medical Association*. S0929-6646(20)30044-9.
- Cheong, D., & Lee, C. (2004). Impact of severe acute respiratory syndrome on anxiety levels of front-line health care workers. *Hong Kong Medical Journal*, 10(5), 325–330.
- Davoudzadeh, K., Borjalilu, S., & Safania, A. M. (2015). The priority of internet usage components for the development of academic sport. *Journal of School of Public Health and Institute of Public Health Research*, 13(4), 51–64.
- Débora da Luz Scheffer, & Alexandra Latini. (2020). Exercise-induced immune system response: Anti-inflammatory status on peripheral and central organs. *Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease*, 165823. <https://doi.org/10.1016/j.bbadis.2020.165823>
- Farnoosh, G., Ghanei, M., Khorramdelazad, H., Alishiri, G., Farahani, A. J., Shahriary, A., et al. (2020). Are Iranian sulfur mustard-exposed survivors more vulnerable to SARS-CoV-2: Some similarity in their pathogenesis. *Disaster Medicine and Public Health Preparedness*, 1–2. <https://doi.org/10.1017/dmp.2020.156>
- Firouzkouhi, M., Zargham-Boroujeni, A., Nouraei, M., Rahnama, M., & Babaiepur, M. (2015). The effects of imposed war on Iran's nursing: A historical research. *Journal of Military Medicine*, 17(3), 127–136.
- Huang, L., & Liu, H. (2020). Emotional responses and coping strategies of nurses and nursing college students during COVID-19 outbreak. *medRxiv*. <https://doi.org/10.1101/2020.03.05.20031898>
- Kalaitzidis, E., & Jewell, P. (2015). The concept of advocacy in nursing: A critical analysis. *The Health Care Manager*, 34(4), 308–315. <https://doi.org/10.1097/HCM.0000000000000079>
- Kim, Y. (2018). Nurses' experiences of care for patients with Middle East respiratory syndrome-coronavirus in South Korea. *American Journal of Infection Control*, 46(7), 781–787. <https://doi.org/10.1016/j.ajic.2018.01.012>
- Lowder, T., Padgett, D. A., & Woods, J. A. (2005). Moderate exercise protects mice from death due to influenza virus. *Brain, Behavior, and Immunity*, 19(5), 377–380.
- MacDonald, K., De Zylva, J., McAllister, M., & Brien, D. L. (2018). Heroism and nursing: A thematic review of the literature. *Nurse Education Today*, 68, 134–140. <https://doi.org/10.1016/j.nedt.2018.06.004>
- Nieman, D. C., & Wentz, L. M. (2019). The compelling link between physical activity and the body's defense system. *Journal of Sport and Health Science*, 8(3), 201–217. <https://doi.org/10.1016/j.jshs.2018.09.009>
- Paradiz, V., Kelso, S., Nelson, A., & Earl, A. (2018). Essential self-advocacy and transition. *Pediatrics*, 141, S373–S377. <https://doi.org/10.1542/peds.2016-4300P>
- Pollak, K. M., Shao, S., Knutson, J. M., Gill, H., Lee, Y.-V., McKay, S. L., et al. (2019). Adolescent psychological and physiological responses to frustration-and anxiety-provoking stressors. *Current Psychology*, 1–11. <https://doi.org/10.1007/s12144-019-00582-6>
- Vaartio, H., Leino-Kilpi, H., Suominen, T., & Puukka, P. (2008). The content of advocacy in procedural pain care-patients' and nurses' perspectives. *Journal of Advanced Nursing*, 64(5), 504–513. <https://doi.org/10.1111/j.1365-2648.2008.04817.x>
- Wheaton, M. G., Abramowitz, J. S., Berman, N. C., Fabricant, L. E., & Olatunji, B. O. (2012). Psychological predictors of anxiety in response to the H1N1 (swine flu) pandemic. *Cognitive Therapy and Research*, 36(3), 210–218. <https://doi.org/10.1007/s10608-011-9353-3>
- WHO. (2020). Laboratory testing of human suspected cases of novel coronavirus (nCoV) infection: Interim guidance, 10 January 2020. World Health Organization.
- Woods, J. A., Keylock, K. T., Lowder, T., Vieira, V. J., Zelkovich, W., Dumich, S., et al. (2009). Cardiovascular exercise training extends influenza vaccine seroprotection in sedentary older adults: The immune function intervention trial. *Journal of the American Geriatrics Society*, 57(12), 2183–2191.
- Yeen Huang, & Ning Zhao. (2020). Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: A web-based cross-sectional survey. *Psychiatry Research*. <https://doi.org/10.1016/j.psychres.2020.112954>

- Zhu, W. (2020). Should, and how can, exercise be done during a coronavirus outbreak? An interview with Dr. Jeffrey A. Woods. *Journal of Sport and Health Science*, 9(2), 105.
<https://doi.org/10.1016/j.jshs.2020.01.005>
- Schuch, F. B., Vancampfort, D., Richards, J., Rosenbaum, S., Ward, P. B., & Stubbs, B. (2016). Exercise as a treatment for depression: a meta-analysis adjusting for publication bias. *Journal of psychiatric research*, 77, 42-51. <https://doi.org/10.1016/j.jpsychires.2016.02.023>
- Rebar, A. L., Stanton, R., Geard, D., Short, C., Duncan, M. J., & Vandelanotte, C. (2015). A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. *Health psychology review*, 9(3), 366-378. <http://dx.doi.org/10.1080/17437199.2015.1022901>
- Chekroud, S. R., Gueorguieva, R., Zheutlin, A. B., Paulus, M., Krumholz, H. M., Krystal, J. H., & Chekroud, A. M. (2018). Association between physical exercise and mental health in 1·2 million individuals in the USA between 2011 and 2015: a cross-sectional study. *The lancet psychiatry*, 5(9), 739-746.
<http://dx.doi.org/10.1016/>