Journal of Applied Psychology & Behavioral Science. Vol., 9 (2), 55-62, 2024
Available online at http://www. japbs.com/
ISSN 2536-524X © 2024

The Effects of Participation in Physical Activity and Exercise on Working Memory and Quality of Life of the Elderly with Parkinson

Tayebeh Baniasadi

College of Human Science& Education, School of Kinesiology, Baton Rouge, LA.

Corresponding Author Email: tbania1@lsu.edu

ABSTRACT: Background and Purpose: Given the significant challenges and limitations faced by elderly individuals with Parkinson's disease in terms of functional ability, coupled with the scarcity of research in this particular domain, the primary focus of this study is to investigate whether engaging in physical activity and sports can enhance functional memory and improve the quality of life for elderly individuals with Parkinson's disease.
Methods: The present investigation utilized a descriptive-correlational approach. A total of 69 elderly individuals with Parkinson's disease (34 women) were selected as the statistical population for this study using a convenience sampling method. Data was collected using standard questionnaires. Independent t-test, Pearson correlation test and structural equation modeling were used for data analysis.
Results: The average BMI for participants was 26.8, indicating overweight classification. BMIs varied from 16.3 (underweight) to 42.17 (obese). More than 60% of the participants in this study were either overweight or obese. Results reveled that physical activity significantly affected working memory (T= 4.394) and quality of life (T= 3.964). Results of model fit indicated that the research model has good fit.
Conclusions: The findings of this study have confirmed the positive impact of physical activities on enhancing the functional readiness and overall quality of life for individuals with Parkinson's disease. This suggests that engaging in physical activities can significantly enhance daily performance, leading to increased self-confidence, independence, satisfaction, and overall quality of life for patients with Parkinson's disease.

Keywords: Parkinson, sport, physical activity, quality of life, working memory

INTRODUCTION

In advanced age, numerous illnesses can affect the elderly population. Among these conditions is Parkinson's disease, which not only poses challenges for the elderly individuals themselves but also presents difficulties for their families. Parkinson's disease is categorized as a brain disorder characterized by symptoms like rigidity in the body, tremors in the limbs, difficulty in walking, and lack of balance (Dana et al. 2021, 2023; Sadeghipor et al. 2021). These symptoms tend to develop gradually, and if left untreated, the disease advances, leading to an escalation in symptoms. Consequently, individuals in the later stages of Parkinson's may encounter issues such as sleep disturbances, memory impairment, fatigue, depression, as well as cognitive and behavioral changes. This ailment is prevalent among older adults, with approximately one in every 100 individuals aged 60 and above being affected by Parkinson's. As the disease progresses, elderly individuals with Parkinson's may suffer from tremors, muscle stiffness, balance problems, and more. If left unmanaged, Parkinson's disease will

continue to worsen, resulting in the emergence of additional symptoms (Davidson, 2003; Ellis et al. 2013; Faircloth, 2017; Seyedi Asl et al. 2016, 2021).

Parkinson's disease is characterized by the degeneration of nerves in the specific region of the brain that regulates body movements. In individuals without the condition, nerve cells generate dopamine, a chemical that plays a crucial role in transmitting information and controlling bodily functions (Ghorbani et al. 2020a, 2020b). However, in individuals with Parkinson's, the death or dysfunction of these cells leads to a decrease in dopamine production, resulting in movement difficulties and the manifestation of Parkinson's symptoms in older individuals. Additionally, individuals with Parkinson's disease often experience a loss of norepinephrine terminals, which contributes to a range of non-motor symptoms (American Psychological Association, 2014; Sadeghipor et al. 2021; Vasconcelos et al. 2013). These symptoms encompass irregular blood pressure, fatigue, decreased gastrointestinal motility, sudden drops in blood pressure, and more.

Exercise is a recommended strategy for minimizing the symptoms of Parkinson's disease. Numerous studies have demonstrated that exercise plays a crucial role in managing the symptoms of this condition. Engaging in physical activity triggers two specific neurological changes in the body, which are believed to contribute to the alleviation of Parkinson's symptoms (Hazrati et al. 2022; Herrick & Ainsworth, 2003; Seyyedrezaei et al. 2021). Firstly, exercise leads to an increase in dopamine levels, a neurotransmitter that influences pain perception and mood regulation in patients (Bandura, 1997; Baniasadi, et al. 2018; Chaharbaghi, et al. 2022; Chris, et al. 2010; Conner & Davidson, 2003; Zaborova et al. 2023). Secondly, exercise induces changes in the cortical striatum, a brain region responsible for controlling voluntary movements. These two neurological changes have a positive impact on various aspects of Parkinson's disease, including improved balance, reduced risk of falls, enhanced walking ability, increased cognitive function, decreased sleep disturbances, and overall improvement in quality of life (Letvak et al. 2012; Masten, 2001; Shafaei et al. 2024).

The findings of a study on the impact of walking on Parkinson's disease were recently published in the journal Neurology. The research involved 60 Parkinson's patients who engaged in exercise at least three times a week for 45 minutes over a period of 6 months. These individuals were walking at a pace of 2.9 miles per hour, reaching 47% of their maximum heart rate. The study results suggest that brisk walking enhances movement abilities and mood by 15%, boosts walking speed and overall fitness by 7%, decreases fatigue by 14%, and improves attention by 14% (Hosseini, et al. 2022; Khosravi, et al. 2023; Shafaei et al. 2024).

Numerous studies have indicated that engaging in physical activity can effectively prevent the deterioration of the body and the weakening of muscles, ultimately reducing the mortality rate associated with various diseases (Abdoshahi & Ghorbani 2022; Ohler et al. 2010; Ramachandra et al. 2013; Taghva et al. 2020). Furthermore, a majority of these studies have demonstrated that participating in sports exercises not only enhances the range of motion and strength but also significantly improves the overall quality of life for patients. The evidence gathered also suggests that aerobic exercises and treadmill walking can potentially enhance the quality of life, alleviate the severity of the disease, and boost aerobic capacity (Afsanepurak et al. 2012; Sadeghipor & Aghdam, 2021a, 2021b; Taso et al. 2014). In summary, there is a substantial and growing body of evidence highlighting the crucial role of physical activity and sports in an individual's perception of their quality of life. Consequently, given the significant challenges and limitations faced by elderly individuals with Parkinson's disease in terms of functional ability, coupled with the scarcity of research in this particular domain, the primary focus of this study is to investigate whether engaging in physical activity and sports can enhance functional memory and improve the quality of life for elderly individuals with Parkinson's disease. Thus, the objective of this research is to explore the correlations between participation in physical activity and exercise, working memory, and the quality of life for elderly individuals with Parkinson's disease.

METHODS

The present investigation utilized a descriptive-correlational approach to explore the associations between participation in physical activity and exercise, working memory, and the quality of life among elderly individuals diagnosed with Parkinson's disease. Prior to their inclusion, the participants or their caregivers provided written consent. The study protocol adhered to the principles outlined in the Declaration of Helsinki. A total of 69 elderly individuals with Parkinson's disease (34 women) were selected as the statistical population for this study using a convenience sampling method. The inclusion criteria for the research encompassed individuals in stages 1-3 of Parkinson's disease, who were not involved in sports activities or physiotherapy treatments during the study, and who did not have chronic heart diseases or recent open surgeries. On the other hand, the exclusion criteria included individuals with epilepsy, severe mental disorders, heart diseases, chronic high blood pressure, severe back pain, urinary incontinence, chronic coughs, advanced hemorrhoids, or recent open surgeries.

The demographic questionnaire and the physical activity questionnaire developed by Beck et al. (1982) were utilized to gather information (Chris, et al. 2010). The physical activity questionnaire consists of 25 questions that cover different aspects of physical activity. Extensive testing has confirmed the validity of this

tool. Beck and his team (1982) assessed the reliability of the questionnaire using Cronbach's alpha method and obtained a value of 0.73. Another study conducted by Sanai et al. (2012) reported a reliability coefficient of 0.78 for this questionnaire.

The working memory test, developed by Kirchner in 2012 (Taghva et al. 2020), assesses cognitive performance in relation to executive functions. This test involves both the retention and manipulation of cognitive information, making it a valuable tool for measuring performance. With a validity ranging from 0.54 to 0.84, it is considered highly suitable for evaluating working memory. Additionally, Berry, Kalerk, and Johnson (2010) found the test to be a reliable indicator of working memory performance.

The Parkinson's Disease Quality of Life Questionnaire (PDQL) was utilized in this study to assess the quality of life of patients (Chris, et al. 2010). This questionnaire, developed by de Boer and colleagues in 1996, is specifically designed to measure health-related quality of life in 13 Parkinson's patients. It consists of 14 questions out of 37, evaluating quality of life across four dimensions: Parkinson's symptoms, emotional functioning, systemic symptoms, and social functioning. Each question is scored from 1 ("always") to 5 ("never"). The total scores range from 37 to 185, with higher scores indicating better quality of life. The reliability of the questionnaire was confirmed with Cronbach's alpha exceeding 0.7 in all dimensions, demonstrating acceptable internal consistency. Additionally, the questionnaire showed 100% validity in this study.

The analysis of the data was conducted utilizing SPSS software version 26. Descriptive statistics, specifically the mean and standard deviation, were employed to summarize the data. To examine gender differences, an independent t-test was performed. Furthermore, the effects of physical activity on social and adaptive performance were assessed using the Pearson correlation test and structural equation modeling. The significance level was set at $p<0.05$.

RESULTS

The gender distribution among study participants was relatively equal, with 51% being male and 49% female. The average age of participants was 59 years, ranging from 36 to 86. The duration since diagnosis was also calculated based on the date of diagnosis at the time of survey completion. On average, the time since diagnosis was 4.8 years, ranging from newly diagnosed within the past year to 25 years since diagnosis. Body Mass Index (BMI) was computed using height and weight measurements. The average BMI for participants was 26.8, indicating overweight classification. BMIs varied from 16.3 (underweight) to 42.17 (obese). More than 60% of the participants in this study were either overweight or obese.

Regarding descriptive data of the research variables, the results of this study showed that out of the total of 69 individuals included in the research, 7 participants (10%) engaged in physical activity. This data indicates that the majority of the participants examined, specifically 90% of them, did not engage in physical activity throughout the week. In addition, the initial findings of this study indicated that participants exhibit moderate to low levels of working memory, and moderate to low levels of quality of life. Table 1 presents the mean and standard deviation of descriptive results across gender, where no significant differences were observed between male and females regarding all measurements (all $P>0.05$).

Table 1. Descriptive Results Across Gender

Indicator	Group	No.	mean±SD	P
Physical Activity	male	35	1.08±0.64	0.09
	female	34	0.93±0.28	
Working Memory	male	35	26.34±12.05	0.39
	female	34	25.08±10.43	
Quality of Life	male	35	56.94±22.47	0.57
	female	34	55.07±16.67	

The results of Kolmogorov-Smirnov tests (Table 2) showed that all research variables had normal distribution (all $P>0.05$).

Table 2. Results of Normal Distribution

	Chi square	P
1. physical activity	0.051	0.20
2. working memory	0.034	0.20
3. quality of life	0.068	0.20

Then, the correlation test results presented in Table 3 demonstrate the relationship between physical activity and working memory and quality of life. The results reveal a direct and significant correlation between physical activity and working memory, suggesting that working memory increases as physical activity levels increase. Furthermore, the correlation coefficient for physical activity level and quality of life was direct and significant, suggesting that as physical activity increases, quality of life also increases.

Table 3. Results of Correlations between Research Variables

	1	2	3
1. Physical Activity	-		
2. Working Memory	r=0.429 P<0.001	-	
3. Quality of Life	r=0.351 P<0.001	r=0.663 P<0.001	-

Table 4 and Figure 1 show the results of structural equation modelling. Results reveled that physical activity significantly affected working memory (T= 4.394) and quality of life (T= 3.964). Results of model fit are presented in Table 5 and indicated that the research model has good fit.

Table 4. Results of Structural Equation Modelling

	Path	β	T-value
1	Physical Activity => Working Memory	0.440	4.394
2	Physical Activity => Quality of life	0.401	3.964

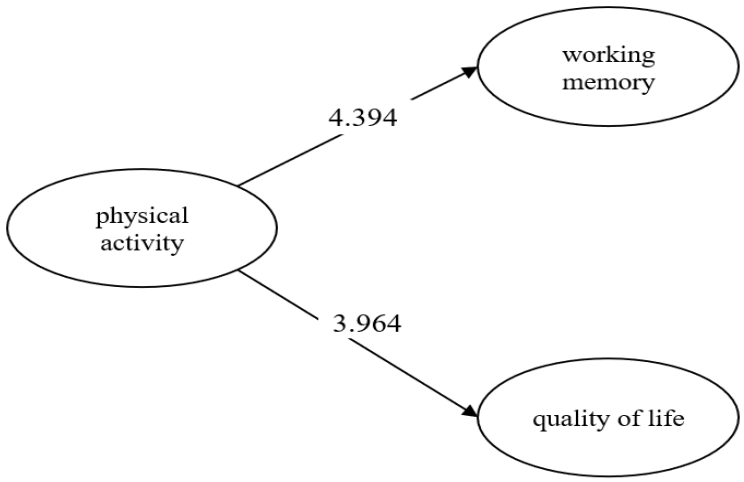

Figure 1. Structural equation modelling in the form of T-values

Table 5. Results of model fit

Index	Optimal Range	Obtained Value	Conclusion
RMSEA	< 0.08	0.05	Good fit
X^2 / df	< 3	2.57	Good fit
RMR	Closer to 0	0.03	Good fit
NFI	> 0.9	0.93	Good fit
CFI	> 0.9	0.91	Good fit

DISCUSSION

Given the significant challenges and limitations faced by elderly individuals with Parkinson's disease in terms of functional ability, coupled with the scarcity of research in this particular domain, the primary focus of this study is to investigate whether engaging in physical activity and sports can enhance functional memory and improve the quality of life for elderly individuals with Parkinson's disease. Thus, the objective of this research is to explore the correlations between participation in physical activity and exercise, working memory, and the quality of life for elderly individuals with Parkinson's disease. The results of this study showed that the majority

of the participants did not engage in physical activity throughout the week. This finding is in line with those of previous studies (Abdoshahi & Ghorbani 2022; Ohler et al. 2010; Ramachandra et al. 2013; Taghva et al. 2020; Afsanepurak et al. 2012; Sadeghipor & Aghdam, 2021a, 2021b; Taso et al. 2014), indicating that children with ADHD have low levels of physical activity. The results clearly indicate that individuals with Parkinson's disease are not in optimal physical condition and require special attention to improve their lifestyle and physical activity. Physical activity plays a crucial role in maintaining the vitality and effectiveness of any system, including the health system, and is considered a fundamental requirement for the well-being of individuals with Parkinson's disease (Bandura, 1997; Baniasadi, et al. 2018; Chaharbaghi, et al. 2022; Chris, et al. 2010; Conner & Davidson, 2003; Zaborova et al. 2023). Encouraging participation in sports activities not only generates vitality but also aligns their behavior, interests, and needs with valuable and defined objectives. Therefore, meticulous and comprehensive planning is essential to ensure physical activity, and the more detailed and precise the planning, the more sustainable the progress and reinforcement of motivation for sports participation will be (Davidson, 2033; Ellis et al. 2013; Faircloth, 2017; Seyedi Asl et al. 2016, 2021).

In addition, the research findings indicate a direct and significant correlation between physical activity and working memory, suggesting that working memory increases as physical activity levels increase. This outcome aligns with previous research (Davidson, 2003; Jolivet, et al. 2010) and demonstrates the positive impact of sports involvement on working memory of individuals with Parkinson's disease (Hazrati et al. 2022; Herrick & Ainsworth, 2003; Seyyedrezaei et al. 2021). The reason behind these findings can be explained by stating that engaging in physical activity enhances brain metabolism and promotes the process of flexibility, resulting in an increase in synapses across various regions of the brain. This, in turn, improves the efficiency of the nervous system and enhances cognitive functions. Physical activity and sports have the potential to positively impact angiogenesis, as well as the nervous and cognitive functions of the brain, by enhancing neurogenesis processes and increasing blood flow to the brain (Hosseini, et al. 2022; Khosravi, et al. 2023; Shafaei et al. 2024). Additionally, physical activity stimulates the motor areas of the brain, accelerates the conduction of nerve impulses, and boosts the secretion of neuronized hormones, thereby significantly influencing cell excitability. Studies conducted on mice have also demonstrated that physical activity can substantially increase the number of synapses in Purkinje neurons and blood vessels. The inherent cognitive demands of sports and the execution of complex sports tasks may serve as a rationale for the positive correlation between physical activity and cognitive functions, particularly the efficient performance of executive functions such as working memory, which is associated with neural activity in specific regions of the frontal lobes, including the dorsolateral prefrontal cortex and anterior cingulate cortex (Letvak et al. 2012; Masten, 2001; Shafaei et al. 2024). These regions are comprised of various cortical and subcortical structures, such as the thalamus, putamen, and cerebellum. Research indicates that physical activity and sports strengthen the neural structures of the posterior and frontal cortex, as well as the middle temporal areas of the visual cortex and the cerebellum. Since these areas play a crucial role in executive functions, engaging in these exercises can have a positive impact on the components of executive functions, including working memory, in older individuals (American Psychological Association, 2014; Sadeghipor et al. 2021; Vasconcelos et al. 2013).

Furthermore, the correlation coefficient for physical activity level and quality of life was direct and significant, suggesting that as physical activity increases, quality of life also increases. This outcome aligns with previous research and demonstrates the positive impact of sports involvement on quality of life of individuals with Parkinson's disease. As individuals age, they may experience various disorders in their body systems, leading to limitations in movement and an increased reliance on others for daily tasks (Dana et al. 2021, 2023; Sadeghipor et al. 2021). These factors can significantly impact their overall well-being and quality of life. One effective approach to address this issue is engaging in sports and physical activities in suitable environments. Regular participation in such activities can have a significant positive impact on the elderly's quality of life within society. In the case of Parkinson's patients, it can be observed that the decline in functional readiness and ability to perform daily tasks is directly linked to the severity of the disease and its associated symptoms (Sadeghipor & Aghdam, 2021a, 2021b). The loss of independence and constant need for assistance from others have undoubtedly had detrimental effects on both the physical and psychological aspects of their quality of life. Over time, this situation can lead to feelings of depression, social isolation, and detachment. Therefore, it is crucial to consider all the factors that limit movement performance, psychological well-being, and overall quality of life for these patients. Developing sports strategies and programs that enhance functional readiness and promote long-term independence among this growing population is of utmost importance.

CONCLUSION

The findings of this study have confirmed the positive impact of physical activities on enhancing the functional readiness and overall quality of life for individuals with Parkinson's disease. This suggests that engaging in physical activities can significantly enhance daily performance, leading to increased self-confidence, independence, satisfaction, and overall quality of life for patients with Parkinson's disease. The

researcher attributed these positive effects to the exercises performed during the study. Hence, it is strongly recommended that portioners and physiotherapists design physical activity course to be easily performed at home without the need for special equipment or space, and it has no negative side effects, for patients with Parkinson's disease. However, further long-term interventional studies are required to investigate the long-lasting effects and outcomes of exercise training on working memory and quality of life of elderly with Parkinson's disease.

REFERENCES

Abdoshahi, M., & Ghorbani, S. (2022). Effects of Playground Availability on Participation of Children in Physical Activity: The Role of Socioeconomic Status. *International Journal of School Health*, 9(3), 186-191. [Google Scholar] [Publisher] doi:10.30476/intjsh.2022.96051.1245

Afsanepurak, S. A., Bahram, A., Dana, A., Abdi. J. (2012). The effect of self-talk and mental imagery on self-efficacy in throwing darts in adolescents. *International Research Journal of Applied & Basic Sciences*, 3(3), 594-600. [Google Scholar] [Publisher]

American Psychological Association. (2014). *The Road to Resilience*. Washington, Dc: American Psychological Association. [Google Scholar] [Publisher]

Bandura, A. (1997). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191–215. [Google Scholar] [Publisher] doi:10.1037/0033-295X.84.2.191

Baniasadi, T., Namazizadeh, M., Sheikh, M. (2018). Attentional focus can affect sway in postural and supra-postural tasks in community-dwelling older adults. *The Annals of Applied Sport Science*, 6, 31–37. [Google Scholar] [Publisher]

Chaharbaghi, Z., Baniasadi, T., & Ghorbani, S. (2022). Effects of Teacher's Teaching Style in Physical Education on Moderate-to-Vigorous Physical Activity of High-School Students: An Accelerometer-based Study. *International Journal of School Health*, 9(3), 143-150. [Google Scholar] [Publisher] doi:10.30476/intjsh.2022.95204.1224

Chris, C., et al. (2010). Effects of yoga versus walking on mood, anxiety, and brain levels: A randomized controlled MRS study. *The Journal of Alternative and Complementary Medicine*, 16(11), 1145-1152. [Google Scholar] [Publisher] doi:10.1089/acm.2010.0007

Conner, K. M., & Davidson, J. R. T. (2003). Development of a new Resilience scale: The Conner – Davidson Resilience Scale (CD-RISC). *Depression & Anxiety*, 18, 76-82. [Google Scholar] [Publisher] doi:10.1002/da.10113

Dana, A., Ranjbari, S., Chaharbaghi, Z., & Ghorbani, S. (2023). Association between Physical Activity and Motor Proficiency among Primary School Children. *International Journal of School Health*, 10(3), 128-135. [Google Scholar] [Publisher] doi:10.30476/intjsh.2023.98237.1295

Dana, A., Ranjbari, S., Salehian, M. H., & Shayan Matin, P. (2021). Effects of Cognitive-Behavioral Therapy on Mental Health of High-School Students during COVID-19 Pandemic. *International Journal of School Health*, 8(4), 201-208. [Google Scholar] [Publisher] doi:10.30476/intjsh.2021.92100.1165

Davidson, C. (2003). Development of a new resilience scale: The Connor Davidson resilience scale (CD-RISC). *Journal of Depression and anxiety*, 18, 76-82. [Google Scholar] [Publisher] doi:10.1002/da.10113

Ellis, N., Randall, J., & Punnett, G. (2013). The effects of a single bout of exercise on mood and self-esteem in clinically diagnosed mental health patients. *Open Journal of Medical Psychology*, 2(3), 81-85. [Google Scholar] [Publisher] doi:10.4236/ojmp.2013.23013

Faircloth, A. L. (2017). Resilience as a mediator of the relationship between negative life events and psychological well-being. *Electronic Theses & Dissertations*, 1373. [Google Scholar] [Publisher]

Ghorbani, S., Ghanati, P., Dana, A., & Salehian, M. H. (2020a). The Effects of Autonomy Support on Observational Motor Learning. *Iranian Journal of Learning and Memory*, 3(11), 77-87. [Google Scholar] [Publisher] doi:10.22034/iepa.2021.242953.1195

Ghorbani, S., Yadolahzadeh, A., Shakki, M., & Noohpisheh, S. (2020b). Association between Second to Fourth Digit Ratio with Handwriting Quality and Speed among Elementary School Children. *International Journal of Pediatrics*, 8(9), 12053-12060. [Google Scholar] [Publisher] doi:10.22038/ijp.2020.47498.3854

Hazrati, Z., Ranjbari, S., Baniasadi, T., & Khajehaflaton, S. (2022). Effects of Social Support on Participation of Children with ADHD in Physical Activity: Mediating Role of Emotional Wellbeing. *International Journal of Pediatrics*, 10(10), 16880-16886. [Google Scholar] [Publisher] doi:10.22038/ijp.2022.64698.4899

Herrick, C., & Ainsworth, A. (2003). Invest in yourself: Yoga as a self-care strategy. *Nurs-Forum*, 35(2), 32-36. [Google Scholar] [Publisher] doi:10.1111/j.1744-6198.2000.tb00996.x

Hosseini, F. B., Ghorbani, S., & Rezaeeshirazi, R. (2022). Autonomy Support, Needs Satisfaction, Motivation, and Intention to Do Physical Activities in Adolescents: A Validation study. *International Journal of Pediatrics*, 10(2), 15399-15411. [Google Scholar] [Publisher] doi:10.22038/ijp.2021.55491.4370

Khosravi, M., et al. (2023). Parenting styles, maladaptive coping styles, and disturbed eating attitudes and behaviors: a multiple mediation analysis in patients with feeding and eating disorders. *PeerJ*, 11, e14880. [Google Scholar] [Publisher] doi:10.7717/peerj.14880

Letvak, S., Ruhm, C., & Mccoy, T. (2012). Depression in hospital-employed nurses. *Clinical Nurse Specialist*, 26(3), 177-182. [Google Scholar] [Publisher] doi:10.1097/nur.0b013e3182503ef0

Masten, A. (2001). Ordinary Magic: Resilience Processes in Development. *American Psychologist*, 56(3), 227-38. [Google Scholar] [Publisher] doi:10.1037/0003-066X.56.3.227

Mikkelsen, K., Stojanovska, L., Polenakovic, M., Bosevski, M., & Apostolopoulos, V. (2017). Exercise and mental health. *National Library of Medicine*, 106, 48-56. [Google Scholar] [Publisher] doi:10.1016/j.maturitas.2017.09.003

Moradi, J., Bahrami, A., & Dana, A. (2020). Motivation for participation in sports based on athletes in team and individual sports. *Physical Culture and Sport, Studies & Research*, 85(1), 14–21. [Google Scholar] [Pulisher] doi:10.2478/pcssr-2020-0002

Ohler, M., Forbes, D., & Kerr, M. (2010). Depression in nurses. *Canadian Journal of Nursing Research*, 42(3), 66-82. [Google Scholar] [Publisher]

Ramachandra, P. U., Varambally, S., Philip, M., & Gangadhar, B. N. (2013), Effect of yoga therapy on anxiety and depressive symptoms and quality-of-life among caregivers of in-patients with neurological disorders at a tertiary care center in India: A randomized controlled trial. *Indian Journal of Psychiatry*, 55(3), 385-389. [Google Scholar] [Publisher] doi:10.4103/0019-5545.116304

Sadeghipor, N., & Aghdam, B. H. (2021a). Investigating the effect of appropriate personal protective equipment on the stress level of care workers in the Covid19 epidemic. Iran. *Health Science Journal*, 3, 7. [Google Scholar] [Publisher]

Sadeghipor, N., & Aghdam, B. H. (2021b). The effect of pesticides on child gender and the level of sexual activities in people exposed –Iran. *MAR Gynecology*, 1(4). [Google Scholar] [Publisher] doi:10.1027/MARGY.2021.0106

Sadeghipor, N., Aghdam, B. H., & Kabiri, S. (2021). Evaluation of burnout and job stress in care worker and comparison between front-line and second line in care worker during coronavirus epidemic. *Health Science Journal*, 3, 8. [Google Scholar] [Publisher]

Sadeghipor, N., Kabiri, S., & Aghdam, B. H. (2021). Investigating the pesticides impact on mental health of exposed workers – Iran. *MAR Case Reports*, 2(6). [Google Scholar] [Publisher] doi:10.1027/MARCR.2021.0164

Seyedi Asl, S. T., Rahnejat, A. M., Elikaee, M. M., Khademi, M., Shahed-HaghGhadam, H., & Taghva, A. (2021). The role of resilience, positive/negative emotions, and character strengths in predicting burnout of military personnel. *EBNESINA*, 22(4), 4-13. [Google Scholar] [Publisher]

Seyedi-Asl, S. T., Sadeghi, K., Bakhtiari, M., Ahmadi, S. M., Nazari-Anamagh, A., & Khayatan, T. (2016). Effect of group positive psychotherapy on improvement of life satisfaction and the quality of life in infertile woman. *International Journal of Fertility & Sterility*, 10(1), 105–112. [Google Scholar] [Publisher] doi:10.22074%2Fijfs.2016.4775

Seyyedrezaei, S. H., Khajeaflaton, S., Ghorbani, S., & Dana, A. (2021). Relative Age Effects on Children's Handwriting: Role of Visual-Motor Integration. *International Journal of Pediatrics*, 9(1), 12775-12783. [Google Scholar] [Publisher] doi:10.22038/IJP.2020.52763.4179

Shafaei, H., Najafzadeh, F., Shakki, M., & Ghorbani, S. (2024). Associations between Physical Activity and Quality of Life, Happiness, and Depression among Elderly Women. *Women's Health Bulletin*, 11(2), 104-111. [Google Scholar] [Publisher] doi:10.30476/whb.2024.101984.1276

Shafaei, H., Rezaei, N., Mohammadi, S., & Ghorbani, S. (2024). Correlations between Physical Activity and Social Health, Moral Development and Physical Fitness among Middle School Students. *International Journal of School Health*, 11(2), 97-104. [Google Scholar] [Publisher] doi:10.30476/intjsh.2024.101704.1388

Sharma, M. (2014). Yoga as an alternative and complementary approach for stress management: a systematic review. *Evidence-Based Complementary & Alternative Medicine*, 19(1), 59-67. [Google Scholar] [Publisher] doi:10.1177/2156587213503344

Taghva, A., Seyedi Asl, S. T., Rahnejat, A. M., & Elikaee, M. M. (2020). Resilience, emotions, and character strengths as predictors of job stress in military personnel. *Iranian Journal of Psychiatry & Behavioral Sciences*, 14(2), e86477. [Google Scholar] [Publisher] doi:10.5812/ijpbs.86477

Taso, C. J., Lin, H. S., Lin, W. L., Chen, S. M., Huang, W. T., & Chen, S. W. (2014). The effect of yoga exercise on improving depression, anxiety, and fatigue in woman with breast cancer: a randomized

controlled trial. *The Journal of Nursing Research*, 22(3), 155-164. [Google Scholar] [Publisher] doi:10.1097/jnr.0000000000000044

Vasconcelos, A., França, I; Coura, A., Enders, B., Cartaxo, H., & Sousa, F. (2013). Self-care in neurogenic intestine in subjects with spinal cord injury: An integrative review. *Online Brazilian Journal of Nursing*, 12(4), 998-1010. [Google Scholar] [Publisher] doi:10.5935/1676-4285.20133692

Zaborova, V., et al (2023). Associations between Physical Activity and Kyphosis and Lumbar Lordosis Abnormalities, Pain, and Quality of Life in Healthy Older Adults: A Cross-Sectional Study. *Healthcare (Basel)*, 29, 11(19), 2651. [Google Scholar] [Publisher] doi:10.3390/healthcare11192651