Women. Health. Bull. 2024; 11(2)

Published online 2024 April.

Original Article

Associations between Physical Activity and Quality of Life, Happiness, and Depression among Elderly Women

Hassan Shafaei[1*], PhD; Farrokhlegha Najafzadeh[2], PhD; Masoud Shakki[3], PhD Candidate; Saeed Ghorbani[4], PhD

[1]Department of Physical Rehabilitation, Massage and Health-Improving Physical Culture Named after I. M. Sarkizov-Serazini RSUFKSMiT, Moscow, Russia
[2]Department of Sport Management, Malekan Branch, Islamic Azad University, Malekan, Iran
[3]Department of Sport Sciences, Aliabad Katoul Branch, Islamic Azad University, Aliabad Katoul, Iran
[4]Department of Sport Sciences, Islamshahr Branch, Islamic Azad University, Islamshahr, Iran

Corresponding author:* Hassan Shafaei, PhD; Department of Physical Rehabilitation, Massage and Health-Improving Physical Culture Named after I. M. Sarkizov-Serazini RSUFKSMiT, 105122 Moscow, Russia. **Tel: +98 9148177138; **Email:** hassanshafai37@yahoo.com

Received: December 07, 2023; **Revised:** January 29, 2024; **Accepted:** February 10, 2024

Abstract

Background: Engaging in regular exercise is widely recognized as a highly efficient method to mitigate age-related disorders. The present study aimed to investigate the correlations between physical activity and the quality of life, happiness, and depression levels in elderly women.

Methods: In this study, a descriptive-correlational method was employed. The participants were 390 elderly women (aged 65 and above) who were chosen through a convenience sampling procedure in Tehran, Iran, in 2023. The Physical Activity Scale for the Elderly (range of scores from 0 to 793), SF-36 Quality of Life Questionnaire (range of scores from 0 to 100), Oxford Happiness Questionnaire (range of scores from 0 to 87) and Geriatric Depression Scale (range of scores from 0 to 15) were used for measuring exercise activity, quality of life, happiness and depression, respectively. For data analysis, Pearson correlation test and regression analysis in SPSS version 26 and Lisrel 8.1 were applied.

Results: Descriptive results showed that in general the level of physical activity in students was below average (114.09±15.78). Likewise, the quality of life was below average (39.83±7.40). Happiness was also below average (5.97±2.19). Finally, depression was higher than average (53.64±9.90). The findings indicated that physical activity has a direct association with the quality of life (β=0.356, T=5.137). Additionally, physical activity has a direct association with happiness (β=0.448, T=6.556). However, it was observed that physical activity has an indirect association with depression (β=-0.229, T=-3.671).

Conclusions: The study results clearly indicated that engaging in physical activity significantly contributes to improving the overall wellbeing and health-related quality of life among elderly women. Thus, prioritizing the enhancement of physical and exercise routines is strongly advised as a primary approach to enhance wellbeing and health-related quality of life in elderly women.

Keywords: Exercise, Women, Depression, Happiness, Quality of life

How to Cite: Shafaei H, Najafzadeh F, Shakki M, Ghorbani S. Associations between Physical Activity and Quality of Life, Happiness, and Depression among Elderly Women. Women. Health. Bull. 2024;11(2):104-111. doi: 10.30476/WHB.2024.101984.1276.

1. Introduction

Regular physical activity is highly effective in preventing age-related disorders (1, 2). Both exercise and sport can help delay aging. Elderly people who exercise tend to experience better overall health and vitality. It has been reported that more than 60% of the people around the world did not have regular physical activity and 25% did not exercise at all (3, 4). As individuals age, the combination of maintaining good health and managing chronic illnesses can significantly impact their daily activities. For those who have reached retirement age, approximately 25% face limitations in what they can physically and mentally accomplish. Unfortunately, 10% of this group reach a point where they become entirely reliant on others for support and assistance. (5).

As individuals grow older, their physical function tends to decline, leading to a greater reliance on assistance for maintaining independence. This dependency can significantly diminish the quality of life for older adults (6). It has been shown that the elderly who were independent in terms of daily life activities had a better quality of life (7, 8). The increase in the elderly population in Iran, as in other countries, due to the decrease in birth rates, improvement in health status and increase in life expectancy, has highlighted the significance of prioritizing the well-being and comfort of the elderly population. It has become essential to address the specific needs and challenges that the elderly face in order to ensure their overall well-

Copyright© 2024, Women's Health Bulletin. This is an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/) which permits copy and redistribute the material just in noncommercial usages, provided the original work is properly cited.

being and quality of life (9, 10). The majority of studies on elderly population have explored the various facets of their lives in connection to various diseases (11). Only a limited number of studies have explored the impact of sports and physical activity on the mental and psychological well-being of older individuals who do not have any specific illnesses (8, 10). Although increasing the quality of life is one of the goals of health development in the elderly, there is still doubt as to whether engaging in sports and physical activity in the elderly who are physically healthy and do not suffer from a specific disease will improve their quality of life or not. Therefore, the primary aim of this study was to examine the association between participating in physical activity with quality of life among old-aged women.

Furthermore, several studies demonstrated that physical activity not only serves as a valuable asset for maintaining physical well-being but also exhibits a strong correlation with mental health, particularly in the realm of preventing mental disorders (12-14). Physical activity reduces anxiety, increases self-confidence and strengthens self-concept, and all of these factors result in the sense of happiness and pleasure. Numerous studies have shown that physical activity has positive effects on physical and mental health such as relieving anxiety and depression and mental disorders in general (13-15). The researchers examined how engaging in physical activity impacts the physical and mental well-being of individuals. Their findings revealed that involvement in physical activity contributes to cardiovascular fitness, which correlates positively with enhanced mental health and mood. Moreover, they observed that higher levels of physical activity are associated with higher mood scores.

Happiness is the final and common goal of all human beings, which is made up of cognitive, emotional and social components, and it is a process of acceptable progress towards the goal (16). In the definition of happiness, attention is paid to three dimensions: life satisfaction, maximum positive emotion and minimum negative emotion. From the perspective of cognitive theorists, happiness is something that a person experiences on the way to a goal (17, 18). It is believed that positive emotions such as happiness exist to facilitate and maintain purposeful behavior (19-21). Due to the importance of happiness in mental health of the elderly, the second aim of this study was to investigate the association between participating in physical activity with happiness among old-aged women.

Furthermore, depression stands out as a prevalent condition among the elderly, stemming from a multitude of factors associated with this life stage. This includes the emergence of detrimental emotions like sorrow, unease, diminished self-worth, social seclusion, and hopelessness in older individuals. Undoubtedly, it represents a significant psychological challenge and carries grave implications (22-24). It is dangerous, which is directly related to the reduction of the quality of life of the elderly. Due to several reasons, the elderly is very vulnerable in terms of mental health, and about 15 to 25 percent of the elderly have important mental problems so that with each decade the incidence of depression increases (25-28). Thus, finding influential factors on depression among elderly is of great importance. Accordingly, the last aim of this study was to investigate the association between participating in physical activity with happiness among old-aged women. Altogether, the aim of this study was to explore the associations between physical activity with quality of life, happiness, and depression among old-aged women. The conceptual model of this study is illustrated in Figure 1.

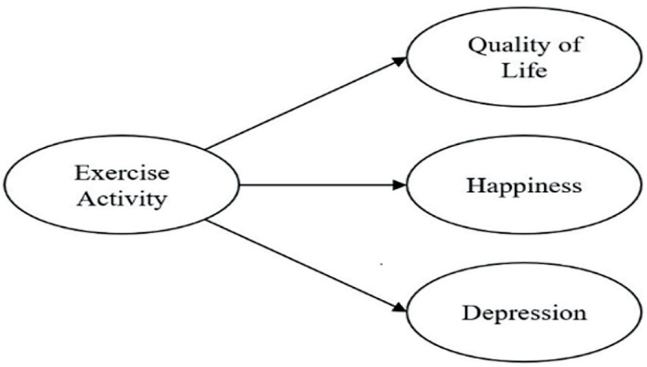

Figure 1: The figure shows the conceptual model of the study.

2. Methods

2.1. Design and Participants

A descriptive-correlational approach was used in this study to investigate the connections between physical activity and the quality of life, happiness, and depression among women of old age. The target population for this study comprised all elderly women (aged 65 and above) residing in Tehran, Iran, in 2023. Using a sample

size calculation appropriate for correlational studies (28), with α=0.05, β=0.05, and r=0.20, the appropriate sample size was determined to be 319 individuals. Consequently, a group of 390 old-aged women was selected for this study using a convenience sampling method.

2.2. Procedure

The University Research Ethics Committee approved the study before it began (IR.IAU.AK.REC.1398.002). Next, the participants were selected from public parks in areas 1, 2, 5, and 22 of Tehran, Iran. To do so, four examiners were employed and underwent necessary training. They collected data from March to September 2023. The examiners collected the required data by interviewing elderly people who expressed their willingness to participate in the study. It is important to note that following the initial conversation, a demographic questionnaire was completed. If the participant met the necessary criteria and provided consent to participate, the examiner help them to fill up the questionnaires. Any uncertainties regarding the questions were clarified by the examiner. The inclusion criteria were: 1) 65+ years of age, 2) no mental or physical disabilities. The exclusion criteria were: 1) incomplete questionnaire responses and 2) failure to provide written consent for participation in the study. All the participants submitted a written consent form. Overall, a total of 390 elderly women participated in the study.

2.3. Instruments

2.3.1. Physical activity: The study participants completed the Physical Activity Scale for the Elderly (PASE), a validated self-administered questionnaire comprising of 12 items (29). This tool is specifically developed to assess the level of physical activity in individuals aged 65 years and above. PASE assesses a variety of activities commonly favored by older adults, including walking, recreational activities, exercise, housework, yard work, and caregiving. By taking into account the frequency, duration, and intensity of these activities over the past week, PASE assigns a score that ranges from 0 to 793. Higher PASE scores signify a greater level of physical activity. In the present study, eight experts were tasked with evaluating the validity of the scale, yielding CVI=0.90 and CVR=0.88. Additionally, the Cronbach's alpha of the scale was found to be α=0.79.

2.3.2. Health-related quality of life: The SF-36 Quality of Life Questionnaire, a standardized tool in Iran, was used to evaluate health-related quality of life (30). This questionnaire consists of 36 questions that cover various aspects of personal health. Each domain is scored between 0 and 100, with higher scores indicating better QoL. The validity of the scale was confirmed by eight experts in this study, with a CVI of 0.90 and a CVR of 0.92. Additionally, the Cronbach's alpha of SF-36 was found to be α=0.95 in this study.

2.3.3. Happiness: The Oxford Happiness Questionnaire (OHQ) (31) was employed to evaluate the level of happiness of the participants in this study. It comprised of 29 questions, each scored on a scale from zero to three, leading to a total score between zero and 87. The validity of the questionnaire was determined by experts (CVI=0.90, CVR=0.92), and the Cronbach's alpha coefficient for the scale was calculated to be 0.90.

2.3.4. Depression: The Geriatric Depression Scale (GDS) (32) was used to evaluate the levels of depression among the participants, consisting of 15 questions that necessitate a binary 'Yes' or 'No' response. A score below 5 signifies a normal state, while scores falling between 5 and 9 suggest moderate depression, and scores ranging from 10 to 15 indicate severe depression. The validity of the questionnaire was determined by experts in the present study (CVI=0.88, CVR=0.90). Moreover, the Cronbach's alpha coefficient for this scale was determined to be 0.93.

2.4. Data Analysis

Data analysis was performed using SPSS version 26 and Lisrel 8.1. Descriptive measures (mean and standard deviation) were employed. The Kolmogorov-Smirnov test was used to assess the normality of the data. The bidirectional relationships between the variables were evaluated using the Pearson correlation test. Furthermore, the conceptual framework was examined through the structural equation modeling. The significance level was set at $P<0.05$.

3. Results

3.1. Demographic Data

Demographic findings indicated that 58% of the

participants were married, 27% were divorced, and 15% were widowed. Also, 60% of the participants in our study were illiterate, 25% had completed elementary school, 4% had finished secondary school, 3% had graduated from high school, and 8% had a university degree. Finally, 75% were not employed, and 25% were renters. Also, descriptive data are presented in Table 1. Descriptive results showed that in general the level of students' physical activity was below average. Likewise, the quality of life was below average. Happiness was also below average. However, depression was higher than average.

3.2. Bidirectional Associations

The Kolmogorov-Smirnov tests indicated that our data followed a normal distribution (all P>0.05). Additionally, the Pearson correlation tests (Table 2) revealed significant direct and positive relationships between: 1) physical activity and quality of life (r=0.349, P<0.001), 2) physical activity and happiness (r=0.402, P<0.001), and 3) quality of life and happiness (r=0.379, P<0.001). However, we found indirect and negative associations between 1) physical activity and depression (r=-0.257, P<0.001), 2) quality of life and depression (r=-0.581, P<0.001), and 3) happiness and depression (r=-0.417, P<0.001).

3.3. Structural Equation Modelling

The results from the structural equation modelling can be found in Table 3 and Figure 2. The findings indicated that physical activity has a direct association with the quality of life (β=0.356, T=5.137). Additionally, physical activity has a direct association with happiness (β=0.448, T=6.556), and quality of life also has a direct association with happiness (β=0.337, T=4.479). However, it was observed that physical activity has an indirect association with depression (β=-0.229, T=-3.671), along with quality of life (β=-0.559, T=-8.490), and

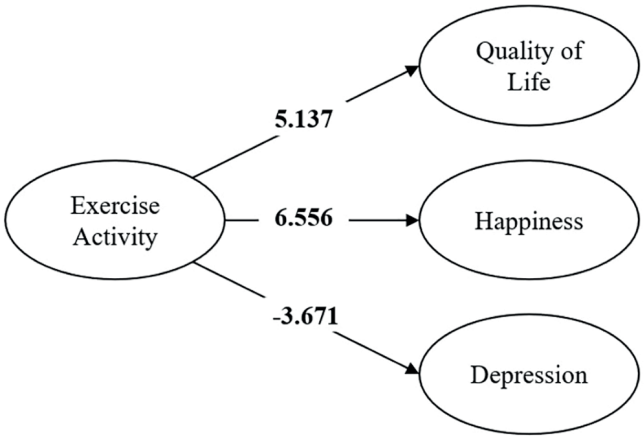

Figure 2: The figure shows the structural equation modelling in the form of T-values.

Table 1: Mean and SD of research variables

Variable	Exercise activity	Quality of life	Happiness	Depression
Mean	114.09	39.83	5.97	53.64
SD	15.78	7.40	2.19	9.90

SD: Standard Deviation

Table 2: Results of associations between research variables

	1	2	3	4
1. Exercise activity	-			
2. Quality of life	r=0.349 P<0.001	-		
3. Happiness	r=0.402 P<0.001	r=0.379 P<0.001	-	
4. Depression	r=-0.257 P<0.001	r=-0.581 P<0.001	r=-0.417 P<0.001	-

Table 3: The results from the structural equation modelling

	Path	β	T-value
1	Exercise activity=> Quality of life	0.356	5.137
2	Exercise activity=> Happiness	0.448	6.556
3	Quality of life=> Happiness	0.337	4.479
4	Exercise activity=> Depression	-0.229	-3.671
5	Quality of life=> Depression	-0.559	-8.490
6	Happiness=> Depression	-0.498	-8.021

Table 4: Results of model fit

Index	Optimal Range	Obtained Value	Conclusion
RMSEA	< 0.08	0.07	Good fit
X^2 / df	< 3	2.69	Good fit
RMR	Closer to 0	0.04	Good fit
NFI	> 0.9	0.97	Good fit
CFI	> 0.9	0.96	Good fit

RMSEA: Root Mean Square Error of Approximation; RMR: Resting Metabolic Rate; NFI: Normed Fit Index; CFI: Comparative Fit Index

happiness (β=-0.498, T=-8.021). Results of model fit are presented in Table 4 and indicated that the research model has good fit.

4. Discussion

Aging is a general process that cannot be stopped or reversed. The elderly face many challenges that cause them many psychological problems such as depression, which can affect their quality of life. Therefore, it is very important to find factors that can improve the quality of life, and as a result reduce the level of depression and increase their happiness. Therefore, the aim of this study was to explore the associations between physical activity with quality of life, happiness, and depression among old-aged women. The descriptive results showed that in general the level of physical activity was below average. Likewise, the quality of life was below average. Happiness was also below average and finally, depression was higher than average. The findings suggested that the psychological well-being of the participants in this study is not optimal. Also, the level of their participation in physical activity is low. These results pointed to a concerning state of health that calls for urgent intervention to enhance both their mental and physical well-being.

Our study indicated that physical activity has a significant association with the health-related quality of life in elderly women. These findings are consistent with the results of previous studies (6-8). The elderly can experience a better quality of life with the help of regular physical activity. This helps the elderly to avoid problems in performing activities such as standing, walking, lifting objects or household chores. Also, physical activity, by increasing the physical ability of people, leads to an increase in the sense of self-efficacy and self-confidence of the elderly, which improves interpersonal relationships and social functions, and will lead to their psychological health (7, 9). Exercise and physical activity can increase motor performance in the elderly and increase the level of satisfaction with life and a good feeling of life. In general, increasing movement ability increases vitality and cheerfulness in the elderly (10, 11).

Furthermore, a noteworthy finding from the present study revealed that physical activity is linked to increased happiness in elderly women. These results aligned with previous studies that have also demonstrated the beneficial impact of physical activity on the mental well-being of older individuals (16-18). It can be said that exercise and physical movements make the elderly behave more socially and morally to have more cheerfulness as compared with other peers by strengthening their nervous system which improves its function, and regular exercise moderates the rate of degeneration of the neurons and dendrites. Research results showed that people experience many emotional benefits by being exposed to multi-sensory stimuli through exploration and interaction, which helps to increase their well-being, communication and improve their interpersonal relationships (19-21). Sports activities are one of the main sources of happiness. Several research studies have indicated that engaging in exercise and physical activity can enhance the production of endorphins in the bloodstream, which in turn, is linked to experiencing feelings of happiness. These endorphins, being natural pain relievers, contribute to generating pleasant sensations. Also, exercise increases the hormone serotonin (hormone effective in mood) (17, 21).

In addition, the study findings indicated a significant and negative relationship between exercise participation and depression. Therefore, exercise is closely associated with life expectancy and depression, and can help reduce depression in elderly individuals. Studies have revealed that individuals with longer life expectancies set long-term goals and work towards achieving them (23, 25). As a result, it can be concluded that exercise has the most crucial connection to life expectancy in older adults. Hence, it is crucial to motivate senior citizens to participate

in physical activities and embrace an active way of life in order to prevent the deterioration of both physical and mental functions. Embracing an active lifestyle can result in a postponement of the aging process (22, 24, 27, 28). Moreover, engaging in regular physical activities during the years leading up to old age can have a more significant impact as compared with engaging in physical activities during earlier years, thus delaying the aging process (24, 25, 28). Public health policies should give importance to encouraging physical activity among the elderly to improve their well-being and overall quality of life. The connection between exercise and reducing depression in the elderly is undeniable. Through the introduction of a sports program and maintaining a routine exercise regimen, different aspects of quality of life can see enhancements. This will result in a slower aging process.

4.1. Limitations

It is crucial to take into account the limitations of this study while interpreting and generalizing the results. In the first place, the cross-sectional design of the study may impede the ability to establish causal effects of physical activity on the health-related quality of life and mental health among elderly women. Additionally, employing a questionnaire to assess physical activity may introduce biases in the accuracy of the data. Incorporating contemporary devices for measuring physical activity could provide more accurate information regarding the elderly's level of engagement in physical activity.

5. Conclusions

The present study clearly demonstrated the significant effect of physical activity on the overall wellbeing and health-related quality of life in elderly women. Thus, prioritizing physical activity is crucial for improving their health and quality of life. Moreover, encouraging increased engagement in exercise is recommended as a valuable approach to enhance the wellbeing and health-related quality of life in elderly women. Ultimately, these results have important implications for professionals working in gerontology, sports psychology, physiotherapy, and occupational therapy.

Ethical Approval

The Ethics Review Board of Islamic Azad University of Aliabad Katoul Branch, approved the present study with the code of IR.IAU.AK.REC.1398.002. Also, written informed consent was obtained from the participants.

Acknowledgment

We are grateful to all participants who helped us in this research.

Authors' Contribution

Hassan Shafaei: Substantial contributions to the conception, design of the work, acquisition of data for the work, drafting the work. Farrokhlegha Najafzadeh: Contributions to the design of the work and drafting the work. Masoud Shakki: Substantial contributions to the conception and design of the work, drafting the work and reviewing it critically for important intellectual content. Saeed Ghorbani: Contributions to the design of the work, acquisition, analysis, and interpretation of data for the work, drafting the work. All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work, such as the questions related to the accuracy or integrity of any part of the work.

Conflict of Interest: None declared.

References

1. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Br J Sports Med. 2020;54(24):1451-1462. doi: 10.1136/bjsports-2020-102955. PubMed PMID: 33239350; PubMed Central PMCID: PMC7719906.
2. Agbangla NF, Séba M-P, Bunlon F, Toulotte C, Fraser SA. Effects of Physical Activity on Physical and Mental Health of Older Adults Living in Care Settings: A Systematic Review of Meta-Analyses. Int J Environ Res Public Health. 2023;20(13):6226. doi: 10.3390/ijerph20136226. PubMed PMID: 37444074; PubMed Central PMCID: PMC10341127.
3. Pinheiro MB, Oliveira JS, Baldwin JN, Hassett L, Costa N, Gilchrist H, et al. Impact of physical activity programs and services for older adults: a rapid review. Int J Behav Nutr Phys Act. 2022;19(1):87. doi: 10.1186/s12966-022-01318-

9. PubMed PMID: 35836187; PubMed Central PMCID: PMC9284866.
4. Wickramarachchi B, Torabi MR, Perera B. Effects of Physical Activity on Physical Fitness and Functional Ability in Older Adults. Gerontol Geriatr Med. 2023;9:23337214231158476. doi: 10.1177/23337214231158476. PubMed PMID: 36860700; PubMed Central PMCID: PMC9969476.
5. Blewitt CL, Chockalingam N. The role of "non-traditional" physical activities in improving balance in older adults: a review. Journal of Human Sport and Exercise. 2017;12(2):446-462. doi: 10.14198/jhse.2017.122.21.
6. Chen S, Ling J, Cheng Y. Physical activity and body mass index were interactively related to health-related quality of life among older adults. Arch Gerontol Geriatr. 2023;104:104833. doi: 10.1016/j.archger.2022.104833. PubMed PMID: 36240587.
7. Nascimento MM, Gouveia ÉR, Gouveia BR, Marques A, França C, Freitas DL, et al. Exploring mediation effects of gait speed, body balance, and falls in the relationship between physical activity and health-related quality of life in vulnerable older adults. Int J Environ Res Public Health. 2022;19(21):14135. doi: 10.3390/ijerph192114135. PubMed PMID: 36361009; PubMed Central PMCID: PMC9655035.
8. Lau JH, Nair A, Abdin E, Kumarasan R, Wang P, Devi F, et al. Prevalence and patterns of physical activity, sedentary behaviour, and their association with health-related quality of life within a multi-ethnic Asian population. BMC Public Health. 2021;21(1):1939. doi: 10.1186/s12889-021-11902-6. PubMed PMID**:** 34696751; PubMed Central PMCID: PMC8544627.
9. Liao YH, Kao TW, Peng TC, Chang YW. Gender differences in the association between physical activity and health-related quality of life among community-dwelling elders. Aging Clin Exp Res. 2021;33(4):901–908. doi: 10.1007/s40520-020-01597-x. PubMed PMID: 32462499.
10. Kim SK, Cho DH, Shim JR, Ha JH. Factors affecting physical activity and health-related quality of life in the Elderl. J Korean Assoc Phys Educ Sport Girls Women. 2019;33:129–141. doi: 10.16915/jkapesgw.2019.9.33.3.129.
11. Lee O, Kim YS. Association between grip strength as diagnostic criteria of sarcopenia and health-related quality of life in Korean elderly. Korean J Sports Med. 2018;36:15–23. doi: 10.5763/kjsm.2018.36.1.15.
12. Dana A, Abdi K, Salehian MH, Mokari Saei S. Psychosocial Distress among Teenage Girls within the Coronavirus Outbreak: The Role of Physical Activity and Sedentary Time. Women Health Bull. 2022;9(3):150-155. doi: 10.30476/WHB.2022.94886.1173.
13. Brett L, Traynor V, Stapley P. Effects of Physical Exercise on Health and Well-Being of Individuals Living With a Dementia in Nursing Homes: A Systematic Review. J Am Med Dir Assoc. 2016;17(2):104-16. doi: 10.1016/j.jamda.2015.08.016. 2015. PubMed PMID: 26432622.
14. Abdi K, Hosseini FB, Chaharbaghi Z, Ghorbani S. Impact of Social Support on Wellbeing and Health-Related Quality of Life among Elderly Women: Mediating Role of Physical Activity. Women Health Bull. 2022;9(2):104-109. doi: 10.30476/WHB.2022.94981.1174.
15. Filges T, Siren A, Fridberg T, Nielsen BCV. Voluntary work for the physical and mental health of older volunteers: A systematic review. Campbell Syst Rev. 2020;16(4):e1124. doi: 10.1002/cl2.1124. PubMed PMID: 37016617; PubMed Central PMCID: PMC8356337.
16. Sossa Rojas A. Physical Exercise and Older People: Always a Happy Relationship? Four Qualitative Reflections to Deepen Understanding. Soc Sci. 2024;13:120. doi: 10.3390/socsci13020120.
17. Khazaee-Pool M, Sadeghi R, Majlessi F, Rahimi Foroushani A. Effects of physical exercise programme on happiness among older people. J Psychiatr Ment Health Nurs. 2015;22(1):47-57. doi: 10.1111/jpm.12168. PubMed PMID: 25492721.
18. Lee J, Kim J, Chow A, Piatt JA. Different Levels of Physical Activity, Physical Health, Happiness, and Depression among Older Adults with Diabetes. Gerontol Geriatr Med. 2021;7:2333721421995623. doi: 10.1177/2333721421995623. PubMed PMID: 33763506; PubMed Central PMCID: PMC7944526.
19. An HY, Chen W, Wang CW, Yang HF, Huang WT, Fan SY. The Relationships between Physical Activity and Life Satisfaction and Happiness among Young, Middle-Aged, and Older Adults. Int J Environ Res Public Health. 2020;17(13):4817. doi: 10.3390/ijerph17134817. PubMed PMID: 32635457; PubMed Central PMCID: PMC7369812.

20. Bae W, Ik Suh Y, Ryu J, Heo J. Physical Activity Levels and Well-Being in Older Adults. Psychol Rep. 2017;120(2):192-205. doi: 10.1177/0033294116688892. PubMed PMID: 28558621.
21. Ravari A, Mirzaei T, Bahremand R, Raeisi M, Kamiab Z. The effect of Pilates exercise on the happiness and depression of elderly women: a clinical trial study. J Sports Med Phys Fitness. 2021;61(1):131-139. doi: 10.23736/S0022-4707.20.10730-8. PubMed PMID: 32734750.
22. Leite B, de Bem Fretta T, Boing L, Coutinho de Azevedo Guimarães A. Can belly dance and mat Pilates be effective for range of motion, self-esteem, and depressive symptoms of breast cancer women? Complement Ther Clin Pract. 2021;45:101483. doi: 10.1016/j.ctcp.2021.101483. PubMed PMID: 34517217.
23. Penseyres I, Martin JL. [Improving understanding of the physiological mechanisms of exercise to better treat depression]. Rev Med Suisse. 2018;14(605):950-952. PubMed PMID: 29722503. French.
24. Baniasadi T, Ranjbari S, Khajeaflatoon Mofrad S, Ghorbani S. Correlations Between Social Support and Physical Activity with Depression and Happiness in Elderly Women with Memory Impairment. Women Health Bull. 2023;10(3):165-172. doi: 10.30476/WHB.2023.98614.1230.
25. Chang PS, Knobf T, Oh B, Funk M. Physical and Psychological Health Outcomes of Qigong Exercise in Older Adults: A Systematic Review and Meta-Analysis. Am J Chin Med. 2019;47(2):301-322. doi: 10.1142/S0192415X19500149. PubMed PMID: 30827152.
26. Wang R, Feng Z, Liu Y, Lu Y. Relationship between neighbourhood social participation and depression among older adults: A longitudinal study in China. Health Soc Care Community. 2020;28(1):247-259. doi: 10.1111/hsc.12859. PubMed PMID: 31595604.
27. Baniasadi T, Ranjbari S, Abedini A, Dana A, Ghorbani S. Investigation the Association of Internet Addiction with Mental Health and Physical Activity in Teenage Girls: The Mediating Role of Parental Attitude. Women Health Bull. 2022;9(4):243-250. doi: 10.30476/WHB.2022.96915.1197.
28. Kandola A, Ashdown-Franks G, Hendrikse J, Sabiston CM, Stubbs B. Physical activity and depression: Towards understanding the antidepressant mechanisms of physical activity. Neurosci Biobehav Rev. 2019;107:525-539. doi: 10.1016/j.neubiorev.2019.09.040. PubMed PMID: 31586447.
29. Logan SL, Gottlieb BH, Maitland SB, Meegan D, Spriet LL. The Physical Activity Scale for the Elderly (PASE) questionnaire; does it predict physical health? Int J Environ Res Public Health. 2013;10(9):3967-86. doi: 10.3390/ijerph10093967. PubMed PMID: 23999546; PubMed Central PMCID: PMC3799529.
30. Brazier JE, Harper R, Jones NM, O'Cathain A, Thomas KJ, Usherwood T, et al. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. BMJ. 1992;305(6846):160-4. doi: 10.1136/bmj.305.6846.160. PubMed PMID: 1285753; PubMed Central PMCID: PMC1883187.
31. Hills P, Argyle M. The Oxford Happiness Questionnaire: A compact scale for the measurement of psychological well-being. Personality and Individual Differences. 2002;33(7):1071–1082. doi: 10.1016/S0191-8869(01)00213-6.
32. Sheikh JI, Yesavage JA. Geriatric Depression Scale (GDS). Recent evidence and development of a shorter version. In: Brink TL, editor. Clinical Gerontology: A Guide to Assessment and Intervention. New York: The Haworth Press; 1986. pp. 165–173.