

The Impact of Participation in Physical Activity and Exercise on Mental Health and Resilience in Older Adults with Parkinson

Tayebah Baniyadi 

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

Corresponding Author Email: tbanial@lsu.edu

ABSTRACT: Background and Purpose: As individuals grow older, they become more susceptible to psychological and cognitive challenges. Therefore, it is crucial to identify factors that can help alleviate these problems. The purpose of this study was to investigate the relationship between engaging in physical activity and sports and the mental health and resilience of elderly individuals with Parkinson's disease.

Methods: The current investigation employed a descriptive-correlational approach. A total of 73 elderly individuals with Parkinson's disease (35 women) were chosen as the statistical population for this study using a convenience sampling method. Data was collected using standard questionnaires. T tests and structural equation modeling were used to analyze data.

Results: the results of this study showed that participants exhibit low levels of physical activity, and moderate to low levels of mental health and resilience. Table 1 presents the mean and standard deviation of descriptive results across gender, where males were more physically active than females ($P=0.001$). Results revealed that physical activity significantly affected mental health ($T= 7.674$) and resilience ($T= 5.697$). Results of model fit indicated that the research model has good fit.

Conclusions: It has been extensively documented that engaging in exercise or physical activity plays a crucial role in the healthcare of individuals suffering from Parkinson's disease. The advantages are numerous, with physical activity being proven to boost the physical, emotional, and social well-being of those dealing with this condition.

Keywords: Exercise, mental health, resilience, aging, Parkinson

INTRODUCTION

The advancement of living conditions, healthcare, and medical treatments, as well as the increase in life expectancy, have resulted in the phenomenon of aging within societies. The growing elderly population poses significant economic, social, and health challenges in the 21st century. Aging is a critical stage of life, and it is socially necessary to pay attention to the issues and needs that arise during this period (Dana et al. 2021, 2023; Sadeghipor et al. 2021). Unfortunately, the importance of adopting behaviors that promote health and enhance quality of life has been overlooked. Aging is a natural biological and anatomical process that affects all living organisms. This process gradually diminishes the performance and capabilities of individuals, leading to various social, economic, psychological, and physical changes. As individuals enter old age, they gradually experience a decline in their physiological, psychological, and social functions (Davidson, 2003; Ellis et al. 2013; Faircloth, 2017; Seyedi Asl et al. 2016, 2021).

Psychological disorders are prevalent among the elderly due to a range of factors including social isolation, diminished quality of life, cognitive impairments, disabilities, and heightened susceptibility to physical ailments (Bandura, 1997; Baniasadi, et al. 2018; Chaharbaghi, et al. 2022; Chris, et al. 2010; Conner & Davidson, 2003; Zaborova et al. 2023). Retirement and decreased income sources can expose older individuals to financial difficulties, leading to mental health issues like depression and anxiety. Moreover, as individuals age, the incidence of chronic illnesses and functional limitations rises, resulting in greater reliance on others for daily activities and negatively impacting overall well-being and mental health. Additionally, advancing age brings about various bodily system disorders, compounded by mobility restrictions that further necessitate assistance with daily tasks. Economic hardships, social challenges, and other issues faced by the elderly have contributed to an increased preference for nursing home care (American Psychological Association, 2014; Sadeghipor et al. 2021; Vasconcelos et al. 2013). Research indicates that older adults exhibit suboptimal engagement in health-promoting behaviors, with low levels of physical activity and poor dietary habits. Awareness, attitudes, and adherence to healthy lifestyles among the elderly are generally lacking (Ghorbani et al. 2020a, 2020b).

As individuals age, the likelihood of cognitive disorders in Parkinson's patients increases significantly compared to those who are healthy. Lack of physical activity or inadequate exercise can lead to symptoms affecting the motor and pre-motor regions of the brain, premature aging, and the development of neurological conditions at a young age. Disorders in neuronal destruction result in the progressive decline of neuronal structure or function, as well as mitochondrial defects, oxidative stress, and neuronal cell death. Despite ongoing research, the exact cause of these disorders remains unknown (Hazrati et al. 2022; Herrick & Ainsworth, 2003; Seyyedrezaei et al. 2021). Various studies suggest that genetic abnormalities, combined with environmental factors, play a role in the development of Parkinson's disease. Current treatment approaches aim to enhance the quality of life for patients through different methods, with exercise and physical activity playing a crucial role (Letvak et al. 2012; Masten, 2001; Shafaei et al. 2024). While there is no definitive cure for Parkinson's disease, a combination of medication and complementary therapies, such as exercise, can lead to promising outcomes. Continuous research is essential to establish an exercise regimen that maximizes benefits for patients' quality of life and reduces mortality rates (Afsanepurak et al. 2012; Sadeghipor & Aghdam, 2021a, 2021b; Taso et al. 2014).

Engaging in cardiovascular exercises that elevate heart rate and oxygen consumption can be advantageous for enhancing the condition of individuals with Parkinson's disease. Immediate benefits, as well as sustained improvements following exercise sessions, include alleviation of symptoms like tremors, slow movements, and fatigue. Furthermore, individuals who undergo several weeks of treadmill training may experience enhancements in balance, gait, and overall quality of life (Abdoshahi & Ghorbani 2022; Ohler et al. 2010; Ramachandra et al. 2013; Taghva et al. 2020). Parkinson's disease is characterized by a range of biochemical and mitochondrial abnormalities that lead to progressive deterioration and, ultimately, the demise of the patient. While a definitive cure for this condition has yet to be discovered, alternative approaches such as physical activity have shown promise in managing its symptoms. Physical exercise serves as a crucial stimulus for activating mitochondria within cells, offering a potentially effective treatment strategy for conditions associated with mitochondrial dysfunction (Hosseini, et al. 2022; Khosravi, et al. 2023; Shafaei et al. 2024).

As previously stated, as individuals age, they are more prone to experiencing psychological and cognitive issues. Moreover, elderly individuals with Parkinson's disease are particularly susceptible to psychological problems due to their cognitive impairments. Consequently, it is crucial to identify factors that can alleviate these psychological issues. This study aims to examine the correlation between engaging in physical activity and sports and the mental health and resilience of elderly individuals with Parkinson's disease.

METHODS

The current investigation employed a descriptive-correlational approach to examine the relationship between participation in physical activity and sports and the mental health and resilience of elderly individuals diagnosed with Parkinson's disease. Prior to their inclusion, written consent was obtained from the participants or their caregivers. The study protocol followed the principles outlined in the Declaration of Helsinki. A total of 73 elderly individuals with Parkinson's disease (35 women) were chosen as the statistical population for this study using a convenience sampling method. The inclusion criteria for the research included individuals in stages 1-3 of Parkinson's disease who were not engaged in sports activities or physiotherapy treatments during the study, and who did not have chronic heart diseases or recent open surgeries. Conversely, the exclusion criteria consisted of 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 survey and the physical activity assessment created by Beck et al. (1982) were employed for data collection (Hosseini, et al. 2022). The physical activity questionnaire comprises 25 inquiries that address various facets of physical activity. Rigorous testing has substantiated the credibility of this instrument.

Beck and colleagues (1982) evaluated the questionnaire's reliability through Cronbach's alpha technique and achieved a score of 0.73.

The examination of mental health in this study utilized the Najarian and Dawoodi questionnaire (Zaborova et al. 2023), which was created in 2010. This questionnaire consists of 25 questions, each offering 5 response options. The scoring range for this instrument is from 25 to 125. Furthermore, the reliability coefficients for this tool in the present study, the primary research, and the Iranian sample research are 0.821, 0.840, and 0.870, respectively. The validity of this questionnaire has been established through the endorsement of professors specializing in this domain.

The Connor-Davidson Resilience Scale was developed to assess an individual's ability to cope with stress and threats (Sadeghipor et al. 2021). It utilizes a 5-point Likert scale, ranging from completely false (1) to completely true (5), to capture responses. The overall score of the questionnaire is obtained by summing up the scores of all 25 items. This score can range from 0 to 100, with higher scores indicating greater resilience and lower scores indicating lower resilience. In this study, the reliability of the questionnaire was assessed and found to have a Cronbach's alpha of 0.93.

The data analysis was carried out using SPSS software version 26. Descriptive statistics, including the mean and standard deviation, were used to summarize the data. To investigate gender differences, an independent t-test was conducted. Additionally, the impact of physical activity on social and adaptive performance was evaluated using the Pearson correlation test and structural equation modeling. The significance level was established at $p < 0.05$.

RESULTS

The average age of participants was 61.37 years, ranging from 32 to 92. 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 5.3 years, ranging from newly diagnosed within the past year to 22 years since diagnosis. The average BMI for participants was 28.69, indicating overweight classification.

Regarding descriptive data of the research variables, the results of this study showed that participants exhibit low levels of physical activity, and moderate to low levels of mental health and resilience. Table 1 presents the mean and standard deviation of descriptive results across gender, where males were more physically active than females ($P=0.001$).

Table 1. Descriptive results across gender

	Group	No.	mean±SD	P
Physical activity	male	38	1.25±0.97	0.001
	female	35	0.85±0.61	
Mental health	male	38	66.48±26.94	0.08
	female	35	64.08±20.43	
Resilience	male	38	47.16±11.34	0.07
	female	35	42.94±16.34	

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. mental health	0.034	0.20
3. resilience	0.068	0.20

Then, the correlation test results presented in Table 3 demonstrate the relationship between physical activity and mental health and resilience. The results revealed a direct and significant correlation between physical activity and mental health, suggesting that mental health increases as physical activity levels increase. Furthermore, the correlation coefficient for physical activity level and resilience was direct and significant, suggesting that as physical activity increases, resilience also increases.

Table 3. Results of correlations between research variables

	1	2	3
1. physical activity	-		
2. mental health	r=0.746 P<0.001	-	
3. resilience	r=0.582 P<0.001	r=0.374 P<0.001	-

Table 4 and Figure 1 show the results of structural equation modelling. Results revealed that physical activity significantly affected mental health (T= 7.674) and resilience (T= 5.697). 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 => mental health	0.724	7.674
2 Physical activity => resilience	0.529	5.697

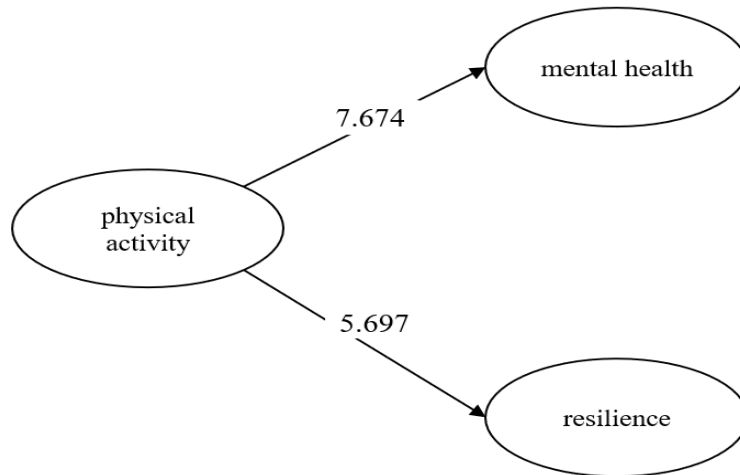


Figure 1. Structural equation modelling in the form of T-values

Table 5. Results of model fit

Index	Optimal Range	Obtained Value	Conclusion
RMSEA	< 0.08	0.07	Good fit
X ² / df	< 3	2.84	Good fit
RMR	Closer to 0	0.03	Good fit
NFI	> 0.9	0.96	Good fit
CFI	> 0.9	0.95	Good fit

DISCUSSION

As individuals grow older, they become more susceptible to psychological and cognitive challenges. This is especially true for elderly individuals with Parkinson's disease, as their cognitive impairments make them particularly vulnerable to psychological issues. Therefore, it is crucial to identify factors that can help alleviate these problems. The purpose of this study is to investigate the relationship between engaging in physical activity and sports and the mental health and resilience of elderly individuals with Parkinson's disease. The findings of this study indicate that the participants have low levels of physical activity, which is consistent with previous research (Sadeghipor & Aghdam, 2021a, 2021b; Taso et al. 2014; Conner & Davidson, 2003; Zaborova et al. 2023). Physical activity plays a vital role in maintaining the overall well-being of individuals with Parkinson's disease, as it contributes to the vitality and effectiveness of various systems, including the healthcare system (Ellis et al. 2013; Faircloth, 2017; Seyedi Asl et al. 2016, 2021). Encouraging participation in sports activities not only enhances vitality but also aligns their behavior, interests, and needs with meaningful and defined objectives. Therefore, meticulous and comprehensive planning is essential to ensure regular physical activity. The more detailed and precise the planning, the more sustainable the progress and motivation for sports participation will be (Herrick & Ainsworth, 2003; Seyyedrezaei et al. 2021).

Moreover, the research findings suggest a clear and substantial link between physical activity and mental well-being. It indicates that as physical activity levels increase, mental health also improves. This finding is consistent with previous studies (Abdoshahi & Ghorbani 2022; Ohler et al. 2010; Ramachandra et al. 2013; Taghva et al. 2020), highlighting the positive impact of sports involvement on the mental health of individuals with Parkinson's disease. Engaging in regular physical activity stimulates the release of serotonin in the body, which is crucial for maintaining good health. Conversely, a decrease in serotonin levels can negatively affect cognitive function and overall mental well-being (Chaharbaghi, et al. 2022; Chris, et al. 2010). As a result, it is

uncommon to find mentally ill elderly individuals who actively participate in regular exercise. On the other hand, exercise promotes the production of endorphins, epinephrine, and cytokines, which enhance alertness, mood, energy levels, and vitality in older adults. Additionally, the physiological benefits of exercise contribute to a heightened sense of inner satisfaction, fostering a feeling of accomplishment and boosting self-confidence. Sports medicine research has demonstrated that engaging in regular running and walking has a positive impact on the body's ability to transfer oxygen from the lungs to the lower parts of the body. Furthermore, it has been observed from a physiological standpoint that doctors have successfully treated certain heart conditions through the implementation of slow and light walking as well as slow and long runs (Davidson, 2033; Ellis et al. 2013). These types of exercise programs, when performed consistently and continuously, have been found to enhance the functioning of the cardiovascular system. They promote the physiological strengthening of the heart muscles and blood vessels, resulting in increased blood flow through powerful contractions. As a result of exercise, the heart rate decreases and reaches the optimal range of 64 to 68 beats per minute for a healthy body. Additionally, exercise has proven to be effective in reducing blood concentration. Overall, engaging in endurance sports activities among older individuals leads to an increase in muscle capillaries and the activity of oxidative enzymes, ultimately contributing to significant improvements in max2vo. These improvements directly correlate with overall health, physical well-being, and a sense of improved vitality (Hazrati et al. 2022).

Furthermore, the correlation coefficient for physical activity level and resilience was direct and significant, suggesting that as physical activity increases, resilience also increases. This finding is consistent with previous studies (Masten, 2001; Shafaei et al. 2024), highlighting the positive impact of sports involvement on the resilience of individuals with Parkinson's disease. Regular physical activity is the most effective method to bolster the resilience of individuals with Parkinson's disease. Resilience is fortified by various factors, including social support and mental fortitude, which are closely linked to exercise. Furthermore, engaging in sports and maintaining physical fitness directly contributes to the brain's adaptability throughout one's lifespan. Exercise promotes neural plasticity, enabling the brain to adjust and transform in response to novel experiences (Ohler et al. 2010; Ramachandra et al. 2013; Taghva et al. 2020). This is accomplished through the proliferation of brain cells and blood vessels, resulting in improved cognitive flexibility and problem-solving skills. By cultivating these abilities, resilience training programs can further augment an individual's resilience. Consistent exercise also mitigates the adverse physiological and psychological effects of stress. It aids in regulating physiological indicators such as heart rate, blood pressure, and cortisol levels, thereby fostering a more positive emotional response to stressors. In essence, exercise acts as a stress reliever. Moreover, exercise facilitates the development of self-awareness and coping strategies, which are integral components of resilience. This empowers individuals to effectively manage stress and devise strategies to overcome challenges, which are fundamental aspects of resilience (Faircloth, 2017; Seyedi Asl et al. 2016).

CONCLUSION

It has been extensively documented that engaging in exercise or physical activity plays a crucial role in the healthcare of individuals suffering from Parkinson's disease. The advantages are numerous, with physical activity being proven to boost the physical, emotional, and social well-being of those dealing with this condition. This research underscores the significance of taking part in physical activity and exercise as a key factor in the mental health and resilience of individuals with Parkinson's disease. Therefore, engaging in physical activity and exercise, particularly those that can be performed at home, can be viewed as a practical approach to enhancing the quality of life for individuals with Parkinson's disease. Further studies with a larger sample size are necessary. It is essential to continue promoting self-efficacy, self-management, and physical activity among elderly individuals with Parkinson's disease, as well as identifying interventions that address the obstacles to participating in physical activity. Promoting health-enhancing behaviors will ultimately lead to improved health outcomes among individuals with Parkinson's disease.

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