Exploring the Impact of Non-Pharmaceutical Therapies on Adults with Parkinson's Disease

Jennifer A. Larsen, MS, DHSc Candidate [1]

Author Note

1 Department of Exercise, Health, and Sports Sciences, Pennsylvania Western University

Correspondence concerning this article should be addressed to Jennifer Larsen, Pennsylvania Western University, 250 University Ave. California, PA 15419. Email: lar21004@pennwest.edu

Manuscript Word Count (from introduction to conclusion): 4,363 words

There are no conflicts of interest or financial disclosures related to this manuscript.

This review received no specific grant or funding from any funding agency in the public, commercial, or not-for-profit sectors.

Abstract

Parkinson’s disease is a progressive neurodegenerative disorder that impacts millions globally, with projections indicating a substantial increase in prevalence by 2050. Parkinson's disease is defined by motor impairments, including tremors, rigidity, bradykinesia, and postural instability, as well as non-motor symptoms like autonomic dysfunction, sensory disturbances, and psychological disorders. The symptoms significantly affect health-related quality of life; however, existing healthcare models predominantly focus on pharmaceutical interventions. Medications may alleviate symptoms; however, they do not prevent disease progression, highlighting the necessity for comprehensive non-pharmaceutical interventions. Exercise-based therapies, mindfulness training, and multimodal approaches have shown considerable benefits in improving motor and non-motor symptoms, promoting neuroprotection, and reducing the treatment burden for individuals with Parkinson's disease and their caregivers. However, systemic barriers, such as insufficient referrals and poor integration within healthcare models, restrict access to these beneficial interventions. This literature review analyzes the primary factors influencing health-related quality of life in Parkinson's disease, assesses the impact of non-pharmaceutical therapies, and investigates healthcare frameworks that support their application. Exercise professionals play a crucial role in the management of Parkinson's disease, highlighting the necessity for patient-centered, interdisciplinary care. Addressing these gaps may enhance long-term outcomes and optimize health-related quality of life for individuals with Parkinson’s disease.

Keywords: Parkinson’s disease, non-pharmaceutical therapy, quality of life, PD healthcare

Exploring the Impact of Non-Pharmaceutical Therapies on Adults with Parkinson's Disease

Parkinson's disease (PD) is a chronic, progressive, neurodegenerative disease affecting nearly one million people in the United States and ten million people worldwide (1). A recent modeling study predicts that the global prevalence of PD will rise to twenty-five million cases by 2050, highlighting the growing impact of this disease on public health systems (2). As the second most common neurodegenerative disorder after Alzheimer's disease, PD has no known cure and presents a complex array of motor and non-motor symptoms that significantly impair the health-related quality of life (HRQoL) of those diagnosed (3). Parkinson's disease is characterized by four main symptoms of motor control, including resting tremor, stiffness, bradykinesia (slow movements), and postural instability. These motor symptoms are often accompanied by non-motor symptoms including autonomic dysfunction (constipation, hyperhidrosis), sensory dysfunction (paresthesia, pain), and psychological disorders (depression, major neurocognitive disorder)(4). These symptoms collectively contribute to a progressive decline in functional independence and well-being (3-6).

Although pharmaceutical therapies remain the primary treatment modality for PD, non-pharmaceutical interventions such as rehabilitative treatments, exercise prescriptions, speech therapy, diet modifications, psychotherapy, and mindfulness practices are increasingly recognized for their potential to improve the quality of life (QoL) in people with Parkinson's (PWP) (4, 7-10). However, despite the growing body of evidence supporting these therapies, referrals to and utilization of non-pharmaceutical treatments remain inadequate due to systemic barriers within healthcare models, educational gaps among healthcare providers, and a lack of continuity in care (7, 8, 11). Given the heterogeneity of PD and its individualized progression, treatment plans should be comprehensive and tailored to address both motor and non-motor symptoms, ultimately improving the health-related quality of life (HRQoL) for PWP (12).

This literature review aims to examine current research on HRQoL in PD and the impact of non-pharmaceutical treatments in mitigating symptom progression and enhancing overall well-being. The review will begin by exploring the concept of QoL in PD, followed by an analysis of key determinants influencing HRQoL. It will then assess the role of non-pharmaceutical interventions, focusing on movement-based therapies, including exercise programs targeting motor and non-motor symptoms, as well as the long-term neuroprotective benefits of structured physical activity. Additionally, this review will explore the effects of mindfulness and cognitive-based therapies, the integration of multimodal treatment approaches, and their collective impact on disease management. The discussion will then shift to healthcare models and the role of referrals in facilitating access to non-pharmaceutical therapies. Specifically, the review will evaluate current healthcare models, barriers to utilization, and the potential of integrated, patient-centered approaches to enhance care delivery. Furthermore, it will highlight the importance of palliative care in PD and emphasize the critical role of exercise professionals in assisting PWP in managing disease progression and improving functional outcomes. By synthesizing existing research, this review seeks to provide insight into how non-pharmaceutical interventions can be effectively integrated into clinical care to optimize QoL for individuals living with Parkinson’s disease.

Quality of Life in Parkinson’s Disease

Parkinson’s disease has a considerable impact on the quality of life. The World Health Organization defines QoL as an individual's perception of their position in life in the context of the culture, value systems, personal goals, expectations, standards, and concerns (13). More specifically, the health-related quality of life (HRQoL), a specific subset of quality of life, includes the physical, mental, and social aspects related to the state of health and care received. HRQoL is the perception and evaluation by the patients themselves of the impact and consequences of the disease on their daily lives (6). Chronic diseases, including PD, affect every aspect of an individual's life, encompassing various elements that influence wellbeing and life satisfaction (4). Since PD has no known cure, the main objective of care is to improve the quality of life for the patient. Given the significant impact of Parkinson’s disease on overall well-being, it is essential to examine the specific factors that influence HRQoL in individuals living with the condition."

Determining Factors of QoL in PD

HRQoL in Parkinson’s disease is shaped by the interplay of motor and non-motor symptoms, as well as the individual’s ability to engage with their environment. Understanding the factors that influence HRQoL in PD patients is important, as certain modifiable factors may respond to a course of treatment, therefore improving a patient’s HRQoL even if the disease itself remains unaltered (5). HRQoL in PD is influenced by both motor and non-motor symptoms and how the PWP interacts in their environment. In a review by Martinez-Martin (5), key factors that determined HRQoL for PD included axial impairments, falls, cardiovascular dysfunction, impulse control behaviors, behavioral disorders linked to nonmotor fluctuations, fatigue, the whole of nonmotor symptoms, and decline in societal participation. Additionally, research by Kozáková and Bužgová (14) indicates patients with a longer duration of the disease have lower quality of life scores due to limitations in performing activities of daily living, cognitive impairment, and increased dependence on others due to the progression of movement symptoms.

Non-Pharmaceutical Therapies and Quality of Life

Pharmaceutical therapies are the most prescribed treatments for managing PD, but non-pharmaceutical therapies offer essential benefits that address both motor and nonmotor symptoms. These include rehabilitative treatments, exercise prescriptions, speech therapy, diet modifications, psychotherapy, and mindfulness (4, 7-10). Integrating these therapies alongside medication can enhance health-related quality of life (HRQoL) by alleviating symptoms and minimizing side effects associated with drug interactions. This review focuses on movement-based therapies, mindfulness practices, and multimodal approaches.

Exercise-Based Therapies

Physical therapy, occupational therapy, and exercise prescriptions use movement as therapy to ease symptoms of PD. Movement therapy aims to have a positive influence on HRQoL in PWP by addressing both motor and non-motor symptoms. The effects of exercise on the motor and non-motor symptoms of PD have been shown to improve function significantly(15-20). As these studies have shown the benefits of exercise on motor function, others have shown how exercise influences non-motor symptoms of PD.

The Effects of Exercise on Motor Symptoms of Parkinson's Disease

A systematic review and meta-analysis by Yong, et al. (21) found nineteen of the twenty-four exercise modalities significantly improved motor symptoms of the participants. Power training yielded the greatest benefits for motor function, bodyweight-supported treadmill training enhanced balance, and robotic-assisted gait training helped with freezing of gait. For non-motor symptoms, yoga significantly relieved anxiety, dance was shown to have the best benefit for depression, and resistance training significantly enhanced sleep quality. Long-term, high-frequency exercise (over 24 weeks and five times per week) was most effective. However, variations in exercise protocols created inconsistencies in outcomes. The results of this study show the importance of integrating different exercises to address the many different symptoms of PD.

Similarly, de Oliveira, et al. (22), found aerobic exercise improved gait, mobility, and lower limb strength in individuals with mild to moderate PD. However, no significant improvements were shown in the quality of life due to the practice of aerobic exercise in either the short term (six weeks) or the long term (twenty-four weeks). The study's strengths included adherence to PRISMA guidelines and the Cochrane Collaboration's recommendations, but small sample sizes and data inconsistencies limited its generalizability. When comparing this study to others, it is important to understand the desired outcome. The aerobic activity did improve motor ability but did not statistically improve HRQOL.

In assessing motor function, Zikang, et al. (18) found that various exercises, including dance, walking, virtual reality, cycling, and aquatic therapy, reduced motor scores, as measured by the United Parkinson Disease Rating Score (UPDRS). Zhang, et al. (23) further supported the benefits of dance and Nordic walking, showing that chronic exercise delayed motor decline and improved mobility and balance. Together, these studies suggest aerobic exercise is an effective modality to improve and maintain motor function for PWP.

The Effects of Exercise on Non-Motor Symptoms of Parkinson's

Exercise also influences non-motor symptoms such as depression, cognitive function, and mood. A systematic review by Dauwan, et al. (24) analyzed 122 studies and found that exercise improved the quality of life, depressive symptoms, attention, working memory, executive function, and psychomotor speed. The dose-response effect indicated that more exercise led to greater reductions in depression. Despite methodological limitations—including potential publication bias and variations in study protocols—the findings reinforce exercise as a valuable adjunct therapy for PD.

Feller et al. (16) also found that exercise significantly reduced depressive symptoms and improved HRQoL. Similarly, Timblin, et al. (25) demonstrated that physical activity is linked to the relationship between depression and cognitive decline. Their study of 487 individuals with PD revealed that those who remained physically active experienced slower cognitive deterioration over five years. While the study's reliance on self-reported physical activity is a limitation, its findings align with previous research supporting exercise interventions as a protective factor for cognitive and mental health. Additionally, a network meta-analysis identified dance, LSVT BIG therapy, and cognitive behavioral therapy as the most effective non-pharmaceutical treatments for depression in PD (26). However, inconsistencies in intervention duration, sample sizes, and measurement tools limited the study's generalizability.

Long-term benefits of exercise and neuroprotection

Sustaining engagement in exercise is crucial for long-term benefits. Research suggests that adherence to a regular exercise routine (two and a half hours per week) improves HRQoL for PWP (27). Cleary, et al. (28) identified key factors that encourage participation in group exercise programs, including varied and challenging workouts, social support, professional instruction, and perceived long-term benefits. While the small sample size (n=19) is a limitation, the study underscores the importance of structured exercise environments led by qualified instructors. The results from a closely related mixed methods study by Rossi et al. (29) examined the elements that contribute to sustained exercise participation, finding that program quality, social interactions, and instructor expertise were critical. However, the study may be affected by survivorship bias, as only regular participants were included. Understanding these motivational factors can inform the design of exercise programs that promote long-term adherence and, consequently, better mobility and HRQoL for PWP.

By emphasizing movement-based therapies alongside medical treatment, individuals with PD can experience improved motor and cognitive function, reduced depression, and enhanced overall well-being. Future research should focus on optimizing exercise parameters and addressing barriers to accessibility to ensure that all individuals with PD can benefit from these interventions.

Mindfulness and Cognitive Therapies

Mindfulness exercises and cognitive therapy present valuable nonpharmaceutical approaches for people with Parkinson’s disease. Mindfulness programs have also shown promise in reducing symptoms of PD and improving quality of life (30-32). Depression, 40%-50% of individuals with PD, significantly impacts overall well-being. Cognitive rehabilitation supports autonomy in daily life activities while fostering psychological well-being (30).

A multidisciplinary approach incorporating cognitive behavioral therapy (CBT) has shown promise in improving functional status, self-efficacy, and overall quality of life for people with Parkinson’s. Ritter and Bonsaksen (19) reported positive outcomes; however, their study lacked data on participant engagement and frequency of use. Further research is needed to explore the direct impact of CBT on PD-related quality of life.

Examining mindfulness meditation, Kwok, et al. (31) investigated its effects during social unrest in Hong Kong at the onset of the COVID-19 pandemic. Their findings revealed mindful meditation was more effective in reducing depressive symptoms than with stretch and resistance training alone. Mindfulness meditation also showed improvements in maintaining emotional non-reactivity twelve weeks after the end of the intervention. Similarly, Reitano, et al. (30)

demonstrated that a mindfulness-based cognitive protocol could enhance residual cognitive functions. Their randomized controlled study implemented an eight-week intervention, structured into three phases: a formal mindfulness practice with body scanning, a life review with reminiscence therapy, and a cognitive exercise component. Results indicated significant improvements in cognitive function, particularly in memory, executive function, attention, and language abilities, reinforcing the potential of mindfulness-based interventions.

A mixed-method study by Advocat, et al. (33) examined the effects of a mindfulness-based lifestyle intervention on HRQoL. Although quantitative data from the PDQ-39 showed no significant improvements at six months post-intervention, secondary outcomes revealed significant enhancements in mindfulness, stress management, and daily health behaviors. Notably, the qualitative findings highlighted increased disease acceptance and self-efficacy among participants. Vandenberg, et al. (34) further emphasized mindfulness as a crucial tool in enhancing mental resilience, enabling individuals with PD to better manage and adapt to their symptoms.

Given that stress and anxiety exacerbate PD's motor symptoms—heightening fall risks and decreasing mobility—mindfulness training emerges as a valuable intervention. By addressing both motor and non-motor symptoms, mindfulness supports long-term mental health and enhances overall well-being in individuals with PD.

Multimodal Therapy Programs for Parkinson's Disease

Effectively managing PD's diverse symptoms requires comprehensive, multimodal therapy programs. Sharma, et al. (35), established an institution-based rehabilitation protocol to improve the quality of life in patients with PD (IRQOL-PD). This protocol was designed to target both the motor and non-motor symptoms of PD. Their five-week non-randomized control pilot study incorporated physical exercise, speech therapy, self-care recommendations, brain training, and counseling. Each week introduced new topics, ensuring a holistic approach to rehabilitation. Findings suggested that IRQOL-PD is an accessible, scalable intervention with global applicability.

Ritter and Bonsaksen (19) examined the benefits of a three-week inpatient rehabilitation program involving occupational and physical therapy, medical care, cognitive behavioral therapy, and disease-specific group exercises. Their study revealed significant improvements in functional status, self-efficacy, and quality of life, though longer-duration studies would better assess sustained benefits.

Choi and Kim (15) implemented a multimodal task-based LSVT-BIG program to evaluate its impact on hand function, daily activities, emotional health, and quality of life. Their randomized controlled trial assigned participants to either an experimental group, which engaged in conventional occupational therapy alongside task-based LSVT-BIG, or a control group, which combined occupational therapy with relaxation and stretching exercises. Both groups underwent the respective interventions once a day five times a week for four weeks. Over four weeks, the experimental group exhibited significant improvements in hand function, mental health, and daily activity engagement, underscoring the program's effectiveness.

Further supporting the multimodal approach, Gandolfi et al., (17)) assessed the impact of a four-week trunk-specific rehabilitation program on postural stability and forward trunk flexion severity. Their randomized controlled study integrated active self-correction techniques, stabilization exercises, and functional tasks. The experimental group demonstrated significant improvements in trunk posture, balance, and quality of life, while both groups showed positive motor function changes. These findings suggest that forward trunk flexion may be modifiable with targeted interventions, enhancing postural control and sensorimotor strategies.

Collectively, these studies reinforce the benefits of integrating multiple therapeutic approaches rather than relying on isolated exercise modalities. While each intervention focused on specific outcomes—such as hand function or trunk stabilization—secondary results indicated broader improvements in motor and non-motor symptoms. Despite the relatively short duration of these studies (three to four weeks), the high frequency of interventions (five to seven days per week) contributed to meaningful gains. Consistent, structured multimodal therapy emerges as a key strategy in optimizing the quality of life for individuals with PD.

Health Care Models and Referrals to Non-Pharmaceutical Treatment for Parkinson's

The care a PD patient receives in the healthcare system influences disease progression and quality of life (7). As previously addressed, treatments beyond pharmaceutical regimes are available to PWP, yet are not maximized. Exercise, despite its documented benefits, is not a standard part of treatment for PD (24). Optimizing care for PD requires understanding current models, their utilization, and potential improvements, including palliative care.

Integrated Models of Care for Parkinson's Disease

In a codesign study working toward the development of a new model of care, PD patients answered surveys and participated in interviews to give feedback on current service delivery (36). This process identified key deficiencies in current care models, citing the lack of structured goal setting, coordinated communication, and holistic resource access. Similarly, Rajan, et al. (8) examined existing integrated care models and their effects on improving the HRQoL in PD patients. Integrated care models were evaluated using the Rainbow Model of Integrated Care, which includes the elements of clinical levels of integration, professional and organizational levels of integration, and system integration. Forty-eight articles identifying thirty-seven individual models met the definition and were included in the review, and eight random control trials were included in the meta-analysis. Results showed PD patients needed better self-management information, interdisciplinary collaboration, and long-term, personal support. Outpatient settings showed the most improvement in health-related quality of life (HRQoL), reinforcing integrated care's role in chronic disease management. This systematic review highlights the importance of considering the heterogeneity in the effects of integrated care on health-related quality of life for patients with PD. Soilemezi, et al. (37) Further highlighted barriers, such as lack of awareness, poor communication, overstretched services, and limited mental health support. This article supports the idea of a multidisciplinary approach to enhance the continuity of care, specialized knowledge, mobilization of resources in the community, personalized support, and improved access to services for PWP.

Current Healthcare Models and Utilization of Services for Parkinson's Disease

PD diagnosis and management typically involve general neurologists or movement disorder specialists. However, diagnostic challenges and inconsistent physician expertise impact treatment (7). A review by Oliver, et al. (11) found that people with disabilities, including PD, often receive inadequate preventive care, emphasizing the need for collaborative provider relationships.

A study by Pearson, et al. (7) examined the utilization of physical, occupational, and speech-language therapy among Medicare beneficiaries living with Parkinson's disease (PD). They found referral patterns for non-pharmaceutical treatments including physical therapy, occupational therapy, speech therapy, and clinical psychology differed among physician types.

Data revealed that 40% of PD patients lacked specialist care, and only 9.1% saw a movement disorder specialist. Utilization of therapy services was low: 20.3% accessed physical therapy, 9.5% occupational therapy, and 7.5% speech therapy. Mental health services were even less utilized, with only 1.8% attending clinical psychology and 3.9% seeing a psychiatrist. These findings underscore the need for early specialized care to ensure comprehensive treatment.

Patient-Centered Models of Care for Parkinson's Disease

Integrated healthcare models show promise in improving PD management. Eggers, et al. (38) conducted a randomized controlled trial assessing a community-based integrated care approach involving general neurologists, movement disorder specialists, and PD-trained nurses. Compared to standard care, patients in the patient-centered, integrated model reported significantly improved HRQoL, particularly in well-being, stigma reduction, communication, and physical discomfort. This article's reporting of significant results indicates the positive effects of an integrated approach to care for a PWP.

The Integrated Parkinson's Disease Care Network (IPCN) program, proposed by Kessler, et al. (39) further supports coordinated care. Four overarching categories with themes emerged during this qualitative analysis revealing the importance of coordinated care intervention (CCI) support, new knowledge, goal identification and achievement, and readiness for self-management. Participants identified CCI support as essential to IPCN success, offering individualized care, confidence, and resource connections. As a bridge to providers and neurologists, it facilitated advocacy and access. This support was vital for managing PD and HRQoL. Participants suggested a more personalized, holistic approach, including mental health education.

The Rainbow Model of Care (8) also emphasizes service coordination, professional collaboration, and patient-centered interventions, demonstrating its effectiveness in outpatient settings. Ongoing multi-sectoral integrated care initiatives should include a Parkinson's care coordinator to enhance communication and provide tailored resource information that adapts to disease progression. These initiatives should be multidisciplinary and designed to support both people with Parkinson's and their caregivers through coordinated cross-sector collaboration (40). Utilizing a patient-centered approach delivers treatment and therapies targeted to the individual's needs. These studies indicate delivering patient-centered integrated care to PWP will improve QoL.

Palliative Care for Parkinson's Disease

Palliative care is a patient-centered medical specialty that enhances quality of life by addressing physical, psychological, social, financial, and spiritual needs. However, most older PD patients do not receive palliative treatment from certified clinicians until they are admitted to hospice at the end of life. Compared with standard care, implementing palliative care is associated with benefits (41). Prizer, et al. (42) used a mixed methods approach to understand the palliative needs of PWP. Their study identified two main themes: ineffective care coordination and limited provider education. Social support, spirituality, and the neurologist's role were also significant factors affecting patient well-being. Five palliative symptom groups were analyzed: physical, psychological, social, financial, and spiritual. Unmet physical and psychological needs significantly predicted poorer HRQoL. Palliative care supports nonphysical needs, highlighting potential care disparities for those unaware of, unable to access, or not advocating for these resources.

Chen, et al. (43) explored barriers to palliative care implementation across multiple levels. Individual-level barriers included misconceptions about palliative care and financial constraints. Interpersonal challenges involved limited communication and a lack of multidisciplinary collaboration. Organizational barriers included a shortage of specialized nurses and unclear criteria for palliative care eligibility. At the community level, accessibility and service integration were critical facilitators. Cultural and policy-related barriers, such as ethical dilemmas, further hindered implementation. This study highlighted the facilitators and barriers to palliative care for Parkinson’s disease across multiple levels, emphasizing the need for improved awareness, multidisciplinary collaboration, specialized training, resource accessibility, and policy support to enhance comprehensive care delivery.

Current PD care models exhibit significant gaps in coordination, accessibility, and interdisciplinary integration. Evidence supports a shift toward integrated, patient-centered, and palliative care models that emphasize multidisciplinary collaboration, early specialist involvement, and holistic support. Addressing these shortcomings can enhance HRQoL and ensure more comprehensive care for people with Parkinson's.

The Role of Exercise Professionals in Parkinson’s Disease Management

Incorporating exercise professionals into PD management is essential for ensuring that individuals effectively learn, implement, and maintain exercise therapies. Exercise professionals, including personal trainers and movement specialists, provide structured guidance tailored to the unique motor and non-motor symptoms of PD. Their expertise helps bridge the gap between medical recommendations and practical application, ensuring that individuals engage in evidence-based exercise interventions safely and effectively (44).

Supervised exercise sessions led by trained professionals enhance adherence, motivation, and functional outcomes. Ferrusola-Pastrana, et al. (27) emphasized that structured, progressive exercise programs under professional supervision contribute to significant improvements in gait, balance, and overall mobility. Furthermore, Whitsel, et al. (45) highlights the importance of individualized coaching in promoting exercise self-efficacy and long-term adherence supporting the effort to establish a standard of care to include physical activity assessment, prescription, and referrals.

Beyond physical benefits, exercise professionals play a crucial role in addressing psychological barriers to participation. Cleary, et al. (28) found that individuals with PD who engaged in trainer-led exercise programs reported increased confidence in managing their symptoms. Similarly, Jagota, et al. (46) noted that professional guidance fosters social engagement, reducing isolation and enhancing overall well-being.

A key advantage of integrating exercise professionals into the PD healthcare team is the frequency of interaction. Many PWP engage with their exercise professionals more regularly than their neurologists or other health care providers (44, 47). Given the progressive nature of PD, maintaining an active lifestyle is vital for sustaining functional independence. The inclusion of exercise professionals ensures that individuals receive the expertise, encouragement, and modifications necessary to maximize the benefits of exercise therapy. Their role extends beyond training sessions, empowering individuals with PD to integrate movement into their daily lives, ultimately enhancing long-term quality of life.

Conclusion

The role of non-pharmaceutical therapies in Parkinson’s disease (PD) management is increasingly recognized as essential for enhancing health-related quality of life (HRQoL). While medication remains the primary treatment, growing evidence supports the integration of exercise-based interventions, mindfulness practices, and multimodal therapy programs to address both motor and non-motor symptoms. However, systemic barriers, such as inconsistent healthcare models, limited referrals, and a lack of interdisciplinary collaboration, continue to limit their widespread adoption.

Structured exercise programs have emerged as a key strategy in PD symptom management. Movement-based therapies, including power training, treadmill exercises, and aquatic therapy, have demonstrated improvements in motor function, balance, and mobility. Additionally, activities such as dance, yoga, and resistance training offer psychological benefits, reducing anxiety, depression, and cognitive decline. However, variations in exercise protocols, frequency, and duration highlight the need for standardized guidelines to optimize treatment outcomes.

Beyond exercise, mindfulness and cognitive therapies present promising avenues for improving emotional well-being and cognitive resilience. Mindfulness-based interventions have demonstrated efficacy in reducing stress, anxiety, and depressive symptoms while enhancing cognitive functions such as memory and executive processing. Similarly, cognitive behavioral therapy (CBT) has shown potential in fostering emotional resilience and self-efficacy, though further research is needed to determine the long-term effects on PD-related HRQoL.

Multimodal therapy programs that integrate physical, cognitive, and psychological interventions present a comprehensive, holistic approach to PD management. Research supports their effectiveness in maximizing therapeutic outcomes, yet challenges related to accessibility and scalability persist, particularly in underserved areas with limited healthcare resources.

Systemic gaps in healthcare models further contribute to the underutilization of non-pharmaceutical therapies. Many individuals with PD do not receive adequate referrals to rehabilitative services despite strong evidence of their benefits. Patient-centered and interdisciplinary models of care, incorporating physiotherapists, exercise specialists, and mental health practitioners, could help bridge this gap. Additionally, integrated care networks and coordinated referral pathways may facilitate earlier intervention and sustained engagement with these therapies.

Palliative care remains an underutilized yet essential component of PD management. Many individuals with PD do not receive specialized palliative care until the advanced stages of the disease, despite its potential to address both physical and psychological challenges associated with PD progression. Increasing awareness, improving accessibility, and incorporating palliative care earlier in the disease trajectory could significantly enhance overall quality of life for individuals with PD and their caregivers.

Moving forward, future research should focus on developing standardized protocols for non-pharmaceutical interventions while exploring innovative methods to improve accessibility and adherence. Longitudinal studies examining the sustained benefits of these therapies across different stages of PD would provide valuable insights into their long-term efficacy. Given the global variation in healthcare resources, the development of adaptable frameworks for non-pharmaceutical PD management will be essential to ensure equitable care delivery across diverse healthcare settings. Additionally, healthcare policies should prioritize interdisciplinary collaboration, provider education, and patient-centered care to ensure seamless integration of these therapies into clinical practice.

In conclusion, non-pharmaceutical therapies hold significant potential to complement traditional pharmacological treatments in PD management. By bridging the gap between research and clinical implementation, healthcare systems can move toward a more holistic, patient-centered approach that prioritizes quality of life, functional independence, and long-term well-being for individuals living with Parkinson's disease.

Acknowledgment

Dr. Brian Oddi reviewed this manuscript and offered advice for editing the literature review. Dr. Marc Federico offered the council to follow submission guidelines.

Author's Role

Jennifer Larsen researched the problem, conceptualized and organized the paper, and wrote all drafts of this manuscript.

Full Financial Disclosure

There are no financial disclosures for the past twelve months.

References

1. Foundation Ps. Statistics: Parkinson’s Foundation; n.d [cited 2023 September 7]. Available from: https://www.parkinson.org/understanding-parkinsons/statistics.

2. Su D, Cui Y, He C, Yin P, Bai R, Zhu J, et al. Projections for prevalence of Parkinson's disease and its driving factors in 195 countries and territories to 2050: Modelling study of Global Burden of Disease Study 2021. BMJ (Online). 2025;388:e080952. doi: 10.1136/bmj-2024-080952.

3. Hoseinipalangi Z, Kan FP, Hosseinifard H, Doustmehraban M, Masoumi M, Rafiei S, et al. Systematic review and meta-analysis of the quality-of-life of patients with Parkinson's disease. Eastern Mediterranean Health Journal. 2023;29(1):63-70. doi: 10.26719/emhj.23.013.

4. Candel-Parra E, Córcoles-Jiménez MP, Delicado-Useros V, Ruiz-Grao MC, Hernández-Martínez A, Molina-Alarcón M. Predictive model of quality of life in patients with Parkinson's disease. International Journal of Environmental Research and Public Health. 2022;19. doi: 10.3390/ijerph19020672.

5. Martinez-Martin P. What is quality of life and how do we measure it? Relevance to Parkinson's disease and movement disorders. Movement Disorders: Official Journal of the Movement Disorder Society. 2017;32:382-92. doi: 10.1002/mds.26885.

6. Balestrino R, Martinez-Martin P. Neuropsychiatric symptoms, behavioural disorders, and quality of life in Parkinson's disease. Journal of the Neurological Sciences. 2017;373:173-8. doi: 10.1016/j.jns.2016.12.060.

7. Pearson C, Hartzman A, Munevar D, Feeney M, Dolhun R, Todaro V, et al. Care access and utilization among medicare beneficiaries living with Parkinson’s disease. npj Parkinson's Disease. 2023;9:1-7. doi: 10.1038/s41531-023-00523-y.

8. Rajan R, Brennan L, Bloem BR, Dahodwala N, Gardner J, Goldman JG, et al. Integrated care in Parkinson's disease: A systematic review and meta-analysis. Movement Disorders. 2020;35(9):1509-31. doi: 10.1002/mds.28097.

9. Mischley L, K. , Farahnik J, Mantay L, Punzi J, Szampruch K, Ferguson T, et al. Parkinson symptom severity and use of nutraceuticals. Nutrients. 2023;15:802-. doi: 10.3390/nu15040802.

10. Fox D, J. , Park SJ, Mischley L, K. . Comparison of associations between MIND and Mediterranean diet scores with Patient-Reported Outcomes in Parkinson's Disease (PRO-PD). Nutrients. 2022;14:5185-. doi: 10.3390/nu14235185.

11. Oliver S, Douglas J, Winkler D, Pearce C, Minter ER, Jarman HK, et al. The healthcare needs and general practice utilization of people with acquired neurological disability and complex needs: A scoping review. Health Expectations. 2022;25(6):2726-45. doi: 10.1111/hex.13640.

12. Song Y, E JY, Guo T, Sasane R, Arcona S, Keshava N, et al. Treatment patterns and healthcare resource use in Medicare beneficiaries with Parkinson's disease. Clinical Economics and Outcomes Research. 2023;ume 15:631-43. doi: 10.2147/CEOR.S422023.

13. Whoqol Group WHODoMHG. The World Health Organization Quality of Life Assessment (WHOQOL): Position paper from the World Health Organization. Social Science & Medicine. 1995;41(10):1403-9. doi: 10.1016/0277-9536(95)00112-K.

14. Kozáková R, Bužgová R. Quality of life of patients with Parkinson's disease and their families. Nursing in the 21st Century. 2023;22(1):1-7. doi: 10.2478/pielxxiw-2023-0001.

15. Choi Y, Kim D. Effects of task-based LSVT-BIG intervention on hand function, activity of daily living, psychological function, and quality of life in Parkinson's disease: A randomized

control trial. Occupational Therapy International. 2022:1-13. doi: 10.1155/2022/1700306. PubMed PMID: 159024682.

16. Feller D, Fox I, Gozzer P, Trentin F, Papola D. Exercise for depressive symptoms in Parkinson's disease: A systematic review and meta–analysis of randomized controlled trials. Archives of Physical Medicine and Rehabilitation. 2023;104(2):331-9. doi: 10.1016/j.apmr.2022.07.021. PubMed PMID: S0003999322005949.

17. Gandolfi M, Tinazzi M, Magrinelli F, Busselli G, Dimitrova E, Polo N, et al. Four-week trunk-specific exercise program decreases forward trunk flexion in Parkinson's disease: A single-blinded, randomized controlled trial. Parkinsonism Related Disorder. 2019;64:268-74. Epub 20190503. doi: 10.1016/j.parkreldis.2019.05.006. PubMed PMID: 31097299.

18. Zikang H, Zhang X, Chen P. Effects of ten different exercise interventions on motor function in Parkinson’s disease patients—A network meta-analysis of randomized controlled trials. Brain Sciences. 2022;12(698):698-. doi: 10.3390/brainsci12060698. PubMed PMID: edsdoj.44dcbc147f25460784e1a06a01f6e44d.

19. Ritter VC, Bonsaksen T. Improvement in quality of life following a multidisciplinary rehabilitation program for patients with Parkinson's disease. Journal of Multidisciplinary Healthcare. 2019;12:219-27. doi: 10.2147/JMDH.S202827.

20. Wu P-L, Lee M, Wu S-L, Ho H-H, Chang M-H, Lin H-S, et al. Effects of home-based exercise on motor, non-motor symptoms and health-related quality of life in Parkinson's disease patients: A randomized controlled trial. Japan Journal of Nursing Science. 2021:e12418. doi: 10.1111/jjns.12418. PubMed PMID: 33876562.

21. Yong Y, Guotuan W, Shikun Z, Huan W, Wensheng Z, Feifei R, et al. Efficacy and evaluation of therapeutic exercises on adults with Parkinson’s disease: A systematic review and

network meta-analysis. BMC Geriatrics. 2022;22(1):1-14. doi: 10.1186/s12877-022-03510-9. PubMed PMID: edsdoj.8cd5dcc66cc34a818aa708d9f3bc77de.

22. de Oliveira MPB, Lobato DFM, Smaili SM, Carvalho C, Borges JBC. Effect of aerobic exercise on functional capacity and quality of life in individuals with Parkinson's disease: A systematic review of randomized controlled trials. Archives of Gerontology and Geriatrics. 2021;95. doi: 10.1016/j.archger.2021.104422. PubMed PMID: S0167494321000856.

23. Zhang S-k, Gu M-l, Xu H, Zhou W-s, Mao S-j, Yang Y. Effects of Different Exercise Modes on Gait Performance of Parkinson's Disease Patients: A Systematic Review and Network Meta-Analysis. Perceptual & Motor Skills. 2023;130(4):1524-61.

24. Dauwan M, Begemann MJH, Slot MIE, Lee EHM, Scheltens P, Sommer IEC. Physical exercise improves quality of life, depressive symptoms, and cognition across chronic brain disorders: A transdiagnostic systematic review and meta-analysis of randomized controlled trials. Journal of neurology. 2021;268:1222-46. doi: 10.1007/s00415-019-09493-9.

25. Timblin H, Rahmani E, Ryczek CA, Hill CR, Jones JD. Physical inactivity links depressive symptoms and cognitive functioning among individuals with Parkinson’s disease. Neuropsychology. 2022;36(6):505-12. doi: 10.1037/neu0000837. PubMed PMID: 2022-74636-001.

26. Yuxin W, Xue S, Fei L, Qi L, Yi J. Efficacy of non-pharmacological interventions for depression in individuals with Parkinson's disease: A systematic review and network meta-analysis. Frontiers in Aging Neuroscience. 2022;14:01-20. doi: 10.3389/fnagi.2022.1050715.

27. Ferrusola-Pastrana A, Davison G, Meadows SN. The therapeutic effects of multimodal exercise for people with Parkinson's: A longitudinal community-based study. Parkinsonism & related disorders. 2023;110:105366-. doi: 10.1016/j.parkreldis.2023.105366.

28. Cleary AS, Rossi A, States RA. Parkinson's Disease: Exploring motives for long-term adherence to a group exercise program. Rehabilitation Nursing: The Official Journal of the Association of Rehabilitation Nurses. 2020;45(3):131-9. doi: 10.1097/rnj.0000000000000187. PubMed PMID: 30272624.

29. Rossi A, Torres-Panchame R, Gallo PM, Marcus AR, States RA. What makes a group fitness program for people with Parkinson’s disease endure? A mixed-methods study of multiple stakeholders. Complementary Therapies in Medicine. 2018;41:320-7. doi: 10.1016/j.ctim.2018.08.012. PubMed PMID: S0965229918306101.

30. Reitano MR, Guidetti M, Maiorana NV, De Sandi A, Carusi F, Rosci C, et al. The effects of a new integrated and multidisciplinary cognitive rehabilitation program based on mindfulness and reminiscence therapy in patients with Parkinson's disease and mild cognitive impairment: A pilot study. Brain Sciences (2076-3425). 2023;13(2):201. doi: 10.3390/brainsci13020201. PubMed PMID: 162085251.

31. Kwok JYY, Choi EPH, Wong JYH, Lok KYW, Ho M-H, Fong DYT, et al. A randomized clinical trial of mindfulness meditation versus exercise in Parkinson's disease during social unrest. NPJ Parkinson's Disease. 2023;9(1):1-11. doi: 10.1038/s41531-023-00452-w.

32. Prell T, Liebermann JD, Mendorf S, Lehmann T, Zipprich HM. Pain coping strategies and their association with quality of life in people with Parkinson's disease: A cross-sectional study. PLoS ONE. 2021;16(11):1-15. doi: 10.1371/journal.pone.0257966. PubMed PMID: 153347565.

33. Advocat J, Enticott J, Vandenberg B, Hassed C, Hester J, Russell G. The effects of a mindfulness-based lifestyle program for adults with Parkinson's disease: A mixed methods, wait list controlled randomised control study. BMC Neurology. 2016;16:1-11. doi: 10.1186/s12883-016-0685-1.

34. Vandenberg BE, Advocat J, Hassed C, Hester J, Enticott J, Russell G. Mindfulness-based lifestyle programs for the self-management of Parkinson's disease in Australia. Health Promotion International. 2019;34(4):668-76. doi: 10.1093/heapro/day021.

35. Sharma N, Kaur M, Goyat A, Sharma P, Srivastav AK, Agrawal BK. Therapeutic regime to ameliorate quality of life in patients with Parkinson's disease. Physical & Occupational Therapy in Geriatrics. 2022;40(1):64-78. doi: 10.1080/02703181.2021.1973172.

36. Kessler D, Hauteclocque J, Grimes D, Mestre T, Côtéd D, Liddy C. Development of the Integrated Parkinson's Care Network (IPCN): using co-design to plan collaborative care for people with Parkinson's disease. Quality of Life Research. 2019;28(5):1355-64. doi: 10.1007/s11136-018-2092-0.

37. Soilemezi D, Palmar-Santos A, Navarta-Sánchez MV, Roberts HC, Pedraz-Marcos A, Haahr A, et al. Understanding support systems for Parkinson's disease management in community settings: A cross-national qualitative study. Health Expectations. 2023;26(2):670-82. doi: 10.1111/hex.13691.

38. Eggers C, Dano R, Schill J, Fink GR, Hellmich M, Timmermann L, et al. Patient-centered integrated healthcare improves quality of life in Parkinson’s disease patients: A randomized controlled trial. Journal of Neurology. 2018;265(4):764-73. doi: 10.1007/s00415-018-8761-7.

39. Kessler D, Hatch S, Alexander L, Grimes D, Côté D, Liddy C, et al. The Integrated Parkinson's disease Care Network (IPCN): Qualitative evaluation of a new approach to care for Parkinson's disease. Patient Education & Counseling. 2021;104(1):136-42. doi: 10.1016/j.pec.2020.07.002.

40. Vester LB, Haahr A, Nielsen TL, Bartolomeu S, Portillo MC. A Parkinson care-coordinator may make a difference: A scoping review on multi-sectoral integrated care initiatives for people living with Parkinson's disease and their caregivers. Patient education and counseling. 2023;116:107931-. doi: 10.1016/j.pec.2023.107931.

41. Kluger BM, Miyasaki J, Katz M, Galifianakis N, Hall K, Pantilat S, et al. Comparison of integrated outpatient palliative care with standard care in patients with Parkinson disease and related disorders: A randomized clinical trial. JAMA neurology. 2020;77(5):551-60. doi: 10.1001/jamaneurol.2019.4992.

42. Prizer LP, Gay JL, Wilson MG, Emerson KG, Glass AP, Miyasaki JM, et al. A mixed-methods approach to understanding the palliative needs of Parkinson's patients. Journal of Applied Gerontology. 2020;39(8):834-45. doi: 10.1177/0733464818776794.

43. Chen Y, Zhang R, Lou Y, Li W, Yang H. Facilitators and barriers to the delivery of palliative care to patients with Parkinson's disease: A qualitative study of the perceptions and experiences of stakeholders using the socio-ecological model. BMC Health Services Research. 2023;23:215. doi: 10.1186/s12913-023-09203-2.

44. Rafferty MR, Hoffman L, Feeney M, Schulte C, Hutber A, Galati T, et al. Parallel development of Parkinson's-specific competencies for exercise professionals and criteria for exercise education programs. Parkinsonism & related disorders. 2023;112:105407-. doi: 10.1016/j.parkreldis.2023.105407.

45. Whitsel LP, Bantham A, Chase PJ, Dunn P, Hovind L, McSwain B. The current state of physical activity assessment and interventions with public policy solutions. Progress in cardiovascular diseases. 2024;83:29-35. doi: 10.1016/j.pcad.2024.02.012.

46. Jagota P, Phutrakool P, Kamble N, Dang THT, Aldaajani Z, Hatano T, et al. Exercise habits in people with Parkinson's: A multinational survey. Movement Disorders Clinical Practice. 2024;11(11):1396-409. doi: https://doi.org/10.1002/mdc3.14197.

47. Agley L, Hartley P, Lafortune L. Exercise and physical activity promotion for people newly diagnosed with Parkinson’s disease: a UK survey exploring current practice and the views of healthcare professionals. Physiotherapy. 2024;122:17-26. doi: 10.1016/j.physio.2023.12.004.