

Improving Motor Function in Adults with Parkinson's Disease through Occupational Therapy and Rehabilitation

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Abstract

This study gives information about the role of occupational therapy in improving motor function and patient satisfaction in adults with Parkinson's disease. Parkinson's is a neurodegenerative disorder that severely impacts motor skills, and while pharmacological treatments provide temporary relief, non-pharmacological interventions, such as occupational therapy are critical for long-term management. The study involved 25 participants from North Macedonia, divided into two groups: 20 receiving occupational therapy and 5 not. Data were collected using a structured questionnaire to assess therapy types, motor function improvement and satisfaction levels. Statistical analysis using ANOVA and Chi-Square tests revealed significant differences in satisfaction and motor function improvement between participants receiving OT and those who did not. The results showed that those who go through occupational therapy reported higher satisfaction and became aware of the improvements in their motor skills, accenting the effectiveness of occupational therapy. Stretching and balance exercises were the most commonly performed and participants indicated a moderate to high perceived benefit of these interventions. This study focuses on the need for integrating occupational therapy into comprehensive Parkinson's disease management programs and suggests expanding occupational therapy services for greater accessibility. While the results are promising, further research with larger sample sizes is necessary to validate these findings and explore the long-term impact of occupational therapy in Parkinson's management.

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Introduction

Parkinson's Disease is a progressive neurodegenerative disorder characterized by motor symptoms such as tremors, bradykinesia, rigidity and postural instability. These symptoms significantly impair the quality of life and functional independence of persons with Parkinson disease (DeMaagd et al., 2015). As Parkinson's disease progresses, the ability to perform everyday activities becomes challenging, with necessity for comprehensive management strategies to maintain and improve motor function (Tsukita et al., 2022).

One of the most critical aspects of managing Parkinson's Disease is addressing the motor symptoms that directly impact activities of daily living. Traditional pharmacological treatments play a crucial role in managing symptoms, but they often become less effective over time and may be accompanied by unpleasant side effects (Kulisevsky et al., 2022). As a result, there is a growing recognition of the importance of non-pharmacological interventions, particularly occupational therapy and rehabilitation in the management of Parkinson's disease (Milne-Ives et al., 2022).

Occupational therapy in the context of Parkinson's disease focuses on helping persons maintain their ability to perform everyday activities, ranging from basic self-care to complex tasks (Dixon et al., 2007). It involves personalized interventions that aim to improve fine and gross motor skills, improve cognitive function and promote physical and emotional well-being. Rehabilitation exercises, often connected to the specific needs of the patient are integral to this approach, with a focus on improving strength, flexibility, balance, and coordination (Goldman et al., 2024).

The role of occupational therapy and rehabilitation in improving motor function is being recognized as a basis of Parkinson's disease management. These interventions not only aim to slow the progression of motor impairments but also allowing persons with Parkinson's disease to keep a greater degree of independence and quality of life (Jansa et al., 2015). Through a multidisciplinary approach, combining the expertise of neurologists, physiotherapists, special educators and rehabilitators and occupational therapists, patients receive comprehensive care that shows the various challenges coming from the disease (Ohtsuka et al., 2024).

Despite the known benefits, the impact of occupational therapy on motor function in Parkinson's disease is an area that continues to improve, with ongoing research needed to refine and optimize therapeutic strategies (Foster et al., 2014). One of the primary roles of occupational therapy in Parkinson's disease is to address motor function impairments. Occupational therapy interventions are designed to improve both fine and gross motor skills, which are often compromised in persons with Parkinson disease (Radder et al., 2017). Fine motor skills, such as writing, buttoning clothes, or handling utensils can become increasingly difficult due to tremors, stiffness and bradykinesia. Occupational therapists work with patients to develop strategies that improve dexterity and coordination, often using adaptive devices to facilitate these tasks (Norman et al., 2013).

In addition to motor symptoms, Parkinson's Disease can also lead to cognitive and emotional challenges, such as difficulties with memory, attention, and problem-solving. Occupational therapists play a key role in these non-motor symptoms by helping patients develop strategies to manage cognitive deficits and manage with the emotional impact of the disease (Zhang et al.,

2020). A central goal of occupational therapy in Parkinson's disease is to promote independence. As the disease progresses, patients may find it difficult to perform everyday activities, such as dressing, bathing, cooking, and driving. Occupational therapists assess the individual's functional abilities and develop individualized interventions that enable them to keep as much independence as possible (Meek et al., 2010). Occupational therapy also draws attention to the importance of social participation and community engagement, which are often affected by the progression of Parkinson's disease. Social isolation can be a significant issue for persons with Parkinson disease, leading to lower quality of life and increased depression and anxiety. Occupational therapists motivate patients to stay connected with their communities and participate in social activities that bring them joy and fulfillment (Ahn et al., 2022).

As Parkinson's disease progresses, the decline of motor functions leads to increased dependence on caregivers, higher risks of falls and a decline in general quality of life (Martinez-Martin et al., 2023). The complexity of the disease requires a many-sided approach that goes beyond pharmacological management. This is where occupational therapy plays a critical role. Occupational therapy not only helps in maintaining motor function but also accents the psychological and emotional aspects of the disease, which are often missed in treatment plans (Fraker et al., 2014). Occupational therapy interventions focus on task simplification and the use of assistive devices, such as weighted utensils or specially designed grips, to improve daily functioning. These interventions have been shown to improve the fine motor skills necessary for activities like writing, eating, and dressing, which are often compromised in patients with Parkinson's disease (McDonald et al., 2016).

Another key component of occupational therapy in Parkinson's disease management is the focus on balance and coordination exercises. These exercises are designed to improve proprioception and reduce the risk of falls, which are common because of postural instability and freezing episodes (Lorenzo-Garzia et al., 2024). Balance training combined with strength exercises helps maintain stability, consequently preventing injuries and promoting greater mobility (James, 2003).

Occupational therapists also give training in compensatory techniques to manage tremors and rigidity, two authenticities of Parkinson's disease. Through specific task-oriented exercises, patients learn to modify their movements in ways that make tasks more manageable. This allows persons to keep their independence for as long as possible and reduces the weight on caregivers (Abril-Jimenez et al., 2021). The social aspect of occupational therapy is necessary for patients with Parkinson's disease. Social isolation is an important issue as the disease progresses, often leading to feelings of loneliness and depression. Occupational therapists motivate patients to remain active in their communities by facilitating participation in group activities, hobbies and social interactions. This focus on socialization has been shown to improve general quality of life and emotional health, while also reducing the risks of social isolation (Perepezko et al., 2019).

Methodology

Participants

The study included a total of 25 participants diagnosed with Parkinsons disease, selected from various regions from North Macedonia to ensure a various representation of the population. The participants were recruited from both urban and rural areas to capture a wide range of experiences with occupational therapy and rehabilitation. N=20 participants reported having received occupational therapy as part of their treatment, n=5 participants reported not having received occupational therapy. The sample included participants from a different age groups and durations of Parkinsons disease od occupational therapy on motor function.

Procedure

The data collection was conducted using a structured questionnaire designed by a special educator and rehabilitator with master's degree from motor impairments. The questionnaire was developed to assess various aspects of the participants experiences with occupational therapy and its impact on their motor function and quality of life. The inclusion criteria for participants involved in this study was persons diagnosed with Parkinsons disease, aged 40 years and above, ability to provide informed consent, participation in occupational therapy and/or other rehabilitation procedures, or willingness to discuss their experiences if they had not participated in such programs. The exclusion criteria were persons diagnosed with other neurological disorders that could affect motor function, cognitive impairments that would interfere with the ability to complete the questionnaire, participants who have undergone less than one month of occupational therapy, as the effects of therapy would not be adequately measurable within such a short period. Participants were provided with the questionnaire either in person or electronically, depending on their location and accessibility. The questionnaire was designed to be completed independently, but assistance was provided when necessary to ensure accurate responses. Informed consent was obtained from all participants, ensuring that they were fully aware of the study's purpose, their role in it, and their right to withdraw at any time without penalty. The confidentiality of the participants was maintained throughout the study, with all data being anonymized before analysis.

Instrument

The primary instrument used in this study was a self-reported questionnaire consisting of multiple sections, like demographic Information (age, gender, duration of Parkinson's Disease diagnosis, and whether they have received occupational therapy), questions related to the type and duration of occupational therapy received, types of rehabilitation exercises performed, and general satisfaction with the services. Respondents were asked to rate the extent to which they believe occupational therapy has contributed to their motor function improvement on a scale of 1 (Not at all) to 5 (Completely). Participants were asked if they would recommend occupational therapy and a multidisciplinary approach to others with Parkinson's Disease.

Statistical Analysis

The data collected from the questionnaires were analyzed using a combination of descriptive and inferential statistical methods. Basic demographic data and responses to the questionnaire were summarized using means, percentages and standard deviations where appropriate. This provided an overview of the sample characteristics and the general trends in responses.

A one-way Analysis of Variance (ANOVA) was employed to examine the relationship between general satisfaction with occupational therapy and the likelihood of recommending it. The ANOVA test was chosen to compare the mean satisfaction levels across the different recommendation categories (Yes, No, Maybe). A statistically significant F-value indicated that satisfaction levels differed significantly based on the participants' willingness to recommend occupational therapy. Chi-Square Tests were used to examine the association between categorical variables such as gender, age group, and the likelihood of receiving occupational therapy. All statistical analyses were conducted using SPSS software, and a p-value of less than 0.05 was considered statistically significant.

Results

Table 1. *Age Group Distribution*

Age Group	Count	Percentage (%)
60-69	12	48.0%
50-59	9	36.0%
70 and above	3	12.0%
40-49	1	4.0%

The largest age group among the participants is 60-69 years, comprising 48% of the total sample. This indicates that almost half of the participants are in their early to late sixties. The 50-59 age group is the second-largest, representing 36% of the respondents. The above 70 group makes up 12% of the sample, indicating a smaller proportion of elderly respondents. The youngest age group, between 40-49 accounts for only 4% of the respondents, suggesting that younger persons are less represented in this study. The mean age of the participants, based on the midpoints of the age ranges is approximately 62,6 years, indicating that the study population is generally in the older adult range.

Table 2. *Gender Distribution*

Gender	Count	Percentage (%)
Male	13	52.0%
Female	12	48.0%

The gender distribution among respondents is relatively balanced, with males making up 52% and females 48% of the sample. This near-equal distribution suggests that the study is representative

of both genders. The mean count of participants across genders is 12,5 with a small standard deviation of approximately 0,71, indicating that the gender distribution is very close to equal.

Table 3. *Duration of Parkinson's Disease Diagnosis*

Duration of Diagnosis	Count	Percentage (%)
7-10 years	12	48.0%
4-6 years	9	36.0%
More than 10 years	3	12.0%
1-3 years	1	4.0%

The majority of respondents (48%) have had Parkinson's disease for 7-10 years, followed by 36% who have had it for 4-6 years. Only a small percentage (12%) have had the disease for more than 10 years, and an even smaller group (4%) have had it for 1-3 years. The mean count of participants across the duration categories is 6.25, with a standard deviation of approximately 4.57, indicating some variability in the duration distribution.

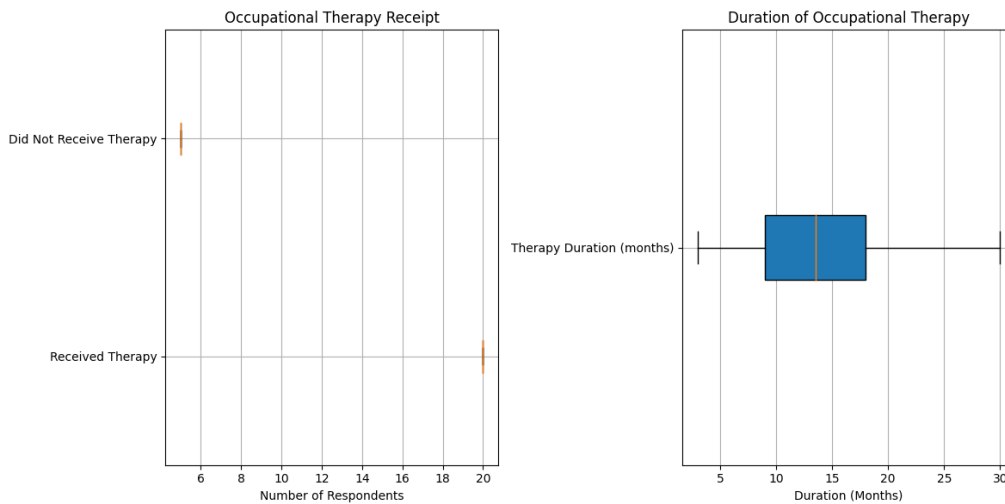


Figure 1. Distribution of Occupational Therapy Receipt and Duration Among Respondents.

Figure 1 consists of two box plots. The occupational therapy receipt box plot visualizes the distribution of respondents based on whether they received occupational therapy. The majority of respondents received therapy, as indicated by the larger box plot section, while a smaller number did not receive therapy. The Duration of occupational therapy box plot represents the distribution of the duration for which respondents have been receiving occupational therapy for a significant duration. The whiskers indicate the minimum and maximum reported durations, which range from about 5 months to 30 months. The median duration is centered around approximately 15,6 months, with the interquartile range extending from 9 to 18 months, showing that most respondents have been receiving therapy for a significant duration. The whiskers indicate the minimum and maximum reported durations, which range from about 5 months to 30 months. This box plots

accents the prevalence of occupational therapy among the study participants and provides information into the duration of occupational therapy among those who have received it.

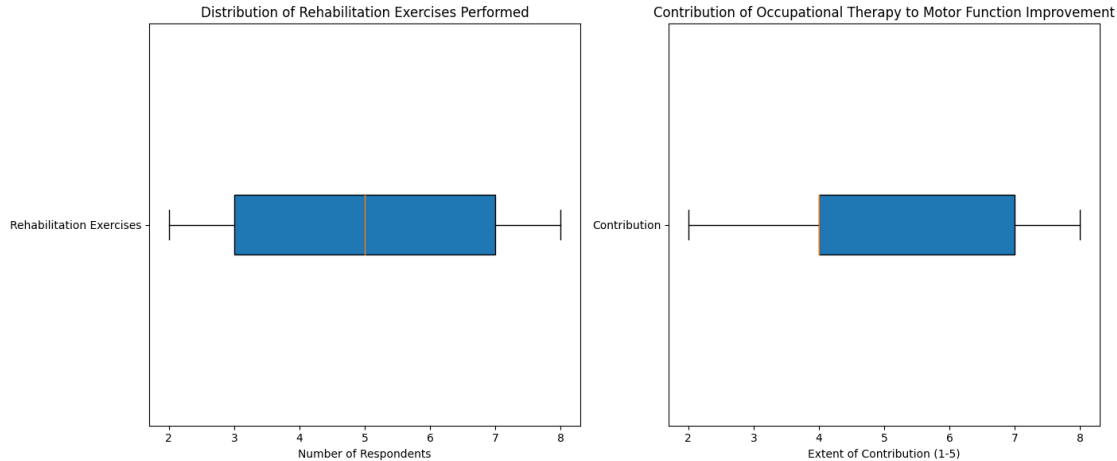


Figure 2. Types of Rehabilitation Exercises Performed and Perceived Impact of Occupational Therapy on Motor Function Improvement

Figure 2 consists of two box plots that illustrate key aspects of occupational therapy among respondents with Parkinson's disease. The first box plot displays the distribution of the number of respondents who engage in various types of rehabilitation exercises. The category includes stretching exercises, with 8 respondents, strength training, with 5 respondents, balance exercises, with 7 respondents, coordination exercises, with 3 respondents and walking exercises, with 2 respondents. The distribution gives information that stretching and balance exercises are the most commonly performed rehabilitation activities among the participants, while coordination and walking exercises are less prevalent. This data reveals a preference for certain types of rehabilitation exercises, with stretching and balance being the most favored. This information can guide therapists in focusing on these areas to align with patient preferences and improve therapy programs.

The second box plot represents respondents' perceptions of how occupational therapy has contributed to their motor function improvement, rated on a scale from 1 to 5. The median response indicates a moderate to significant perceived impact of occupational therapy on motor function improvement. The majority of respondents perceive occupational therapy as beneficial to their motor function, suggesting that occupational therapy plays a crucial role in managing Parkinson's disease symptoms. However, a small proportion of participants feel that the impact is minimal, indicating the need for individualized therapy plans to maximize effectiveness for all patients.

Table 4. *Satisfaction Levels and Recommendation*

Recommendation	Mean Satisfaction	Count	F-Value	P-Value
Yes	4.2	10	3.67	0.04
No	2.0	5	3.67	0.04
Maybe	3.8	5	3.67	0.04

The table summarizes the results of an ANOVA analysis that examines the relationship between general satisfaction with occupational therapy services and the likelihood of recommending these services to others with Parkinson's Disease. The key metrics included in the table are the mean satisfaction scores, the number of respondents (count), and the statistical results from the ANOVA test (F-value and P-value). The significant P-value (0.04) implies that the likelihood of recommending occupational therapy is significantly influenced by the respondent's general satisfaction with the therapy services. In other words, how satisfied a respondent is with their therapy experiences strongly affects whether they would recommend it to others. The table gives information about the importance of maintaining high satisfaction levels among patients. Improving satisfaction could potentially lead to higher recommendations, which is essential for the success and broader acceptance of occupational therapy services within the Parkinson's Disease community.

Discussion

This study aimed to explore the impact of occupational therapy and rehabilitation on motor function improvement among adults with Parkinson's disease. The findings focus on the significant role that occupational therapy plays in improving the quality of life for persons with Parkinson's disease, particularly in maintaining and improving motor function, which is critical for everyday activities and general well-being.

Key Findings

The analysis revealed that participants who went to regular occupational therapy reported higher levels of satisfaction and perceived greater improvements in their motor function compared to those who did not receive such therapy. The significant difference in satisfaction levels across the different recommendation groups, as demonstrated by the ANOVA results defines the positive impact of occupational therapy on patient outcomes.

The box plots illustrating the types of rehabilitation exercises performed most often and the perceived contribution of occupational therapy to motor function improvement provide additional information. The preference for stretching and balance exercises among the participants suggests that these types of activities are particularly beneficial for this population. The majority of participants rated the impact of occupational therapy on their motor function as moderate to significant, indicating that these interventions are not only well-received but also effective.

Comparison with Previous Studies

Our research aligns with previous studies that have documented the effectiveness of occupational therapy in managing Parkinson's disease. For instance, the retrospective program evaluation by Sadural et al. (2022) on the proactive, consultative occupational therapy program for people with early Parkinson's disease gives information about the effectiveness of occupational therapy interventions in addressing motor deficits and promoting self-management in early-stage of the disease. This study found that occupational therapy services, when implemented early in the disease course led to high patient satisfaction and continued adherence to home exercise programs, with 75% of participants reporting satisfaction and 60% maintaining exercise adherence. When compared to the findings of our study on the role of occupational therapy in improving motor function among adults with Parkinson's disease, several parallels can be drawn. Both studies defined the positive impact of occupational therapy on motor function and patient satisfaction. However, while Sadural et al. focused on early-stage of the disease, our study included a wider range of disease stages, revealing that occupational therapy is beneficial across all stages, not just in the early stages. Additionally, our study found that satisfaction with occupational therapy influences the possibility of patients recommending the therapy to others, a factor not explored in the retrospective evaluation.

The systematic review by Welsby et al. (2019) focuses on the effectiveness of occupational therapy interventions in improving the quality of life and occupational performance for persons with Parkinson's disease. The review found that occupational therapy interventions, particularly those focusing on meaningful activities and upper limb therapy have short-term benefits in improving occupational performance and upper limb function. When comparing these findings to the results of our study, several similarities connect. Both studies are focusing on the positive impact of occupational therapy on motor function and general quality of life in persons with Parkinson disease.

The systematic review and meta-analysis by Tofani et al. (2020) found that occupational therapy interventions significantly improve the quality of life in patients with Parkinson's disease, both in the short-term (2-3 months) and longer-term (6-12 months) follow-ups. The study's findings, supported by a mean difference indicating improvement in quality of life, strengthening the value of occupational therapy in the comprehensive management of Parkinson's Disease. When comparing these results to our research, both studies focused on the effectiveness of occupational therapy in improving the lives of persons with Parkinson's disease. Both studies support the inclusion of occupational therapy as a critical component of Parkinson's disease management, but further research is needed to strengthen the evidence base and optimize therapy strategies.

The study protocol by Sturkenboom et al. (2013) shapes a large-scale randomized controlled trial designed to evaluate the effectiveness of occupational therapy in improving the daily functioning of patients with Parkinson's disease. This trial is particularly important for its focus on rigorous methodology, including assessor blinding and a control group, to provide conclusive evidence regarding the value of occupational therapy in Parkinson's care. The study aims to assess a range of outcomes, including daily functioning, quality of life, and cost-effectiveness, with both patient and caregiver perspectives considered. When compared to our research, both studies focus on the

importance of occupational therapy in managing Parkinson's disease, but they differ in scope and methodology. Our study primarily explores the impact of occupational therapy on motor function and patient satisfaction, finding that occupational therapy significantly improves motor function and is positively received by patients, leading to higher satisfaction and recommendation rates.

The retrospective study by Franciotta et al. (2019) evaluates the impact of occupational therapy on hand functionality and finger dexterity in patients with Parkinson's disease. Their findings give information that both early-stage and medium-advanced Parkinson disease patients experienced significant improvements in dexterity and hand functionality following a specific occupational therapy program. This mirrors the results of our study, where participants who received occupational therapy also reported improvements in motor function, especially in tasks requiring fine motor skills such as buttoning clothes or handling utensils. Also, Ebersbach's study gives information about the long-term complications of Parkinson's disease (PD), particularly focusing on the progressive impairments in motor function, speech, gait and balance that remain pharmacoresistant despite optimal medical management. Rehabilitative therapies, such as occupational therapy and physiotherapy are accentuated as crucial interventions to prevent these deficits. This line up with our study, which also focuses on the importance of occupational therapy in improving motor function and patient independence.

Saluja et al. (2023) are accentuating the growing importance of multi-modal rehabilitation strategies in managing Parkinson's disease and related disorders, particularly when pharmacological and surgical treatments become less effective or lead to side effects like dyskinesias. Their review draw attention to a variety of rehabilitative techniques, including physiotherapy, occupational therapy and newer modalities such as virtual reality and exergaming, which improve both motor and non-motor symptoms in Parkinson's disease patients. This connects with the findings of our study, which also demonstrated the positive impact of occupational therapy in improving motor function and patient satisfaction. Both studies give information about the significance of holistic, non-pharmacological interventions in Parkinson's disease management. While Saluja et al. explore a broader range of rehabilitation techniques, our research focuses specifically on occupational therapy and its role in improving motor skills, particularly fine motor control. The potential for newer technologies, as discussed in Saluja's review presents exciting prospects for future rehabilitation approaches, which may complement the improvements observed in our study through traditional occupational therapy methods.

Abbruzzese et al. (2016) in their research give information about the growing importance of rehabilitation as an essential supplement to pharmacological and surgical treatments for Parkinson's disease. Their study focuses on exercise-dependent plasticity as a key mechanism behind physiotherapy's benefits, improving synaptic strength and neurotransmission. While their research covers a broad range of rehabilitation methods including physiotherapy, virtual reality, and innovative techniques like exergaming and motor imagery, the results show short-term but meaningful improvements, particularly in gait and balance. In comparison, our study focuses specifically on occupational therapy and its role in improving motor function, especially fine motor skills and patient satisfaction. Both studies draw attention to the need for individualized, goal-based rehabilitative approaches, but Abbruzzese et al. stress the heterogeneity of existing therapies and the lack of consensus on optimal methods. Our study line up with this in accentuating occupational therapy as a crucial, personalized intervention, particularly focusing on the improvement in patient independence and daily activities.

Implications for Practice

The results of this study have important implications for clinical practice. First, they focus on the need for healthcare providers to prioritize occupational therapy as a central component of Parkinson's disease management. By focusing on patient-centered care that includes regular occupational therapy sessions, healthcare providers can help patients maintain their independence and improve their quality of life. Additionally, the study gives information about the importance of patient satisfaction in the success of occupational therapy programs. Satisfied patients are more likely to stick to their therapy and recommend these services to others, which can lead to inclusive acceptance and use of occupational therapy within the Parkinson's disease community. Occupational therapy providers should continuously evaluate and adapt their programs to meet the individual needs of patients, ensuring high levels of satisfaction and optimal outcomes.

Limitations and Future Research

While the study provides valuable information, there are some limitations that should be considered. The sample size, though representative, is relatively small, which may limit the generalizability of the findings to the wider Parkinson's disease population. Future research with larger and more diverse samples would help to validate and extend these findings. Also, the study relied on self-reported data, which can be subject to biases such as recall bias and social desirability bias. Future studies could benefit from incorporating objective measures of motor function improvement, such as standardized clinical assessments, to complement self-reported outcomes. Another area for future research is the long-term impact of occupational therapy on motor function in Parkinson's disease. Longitudinal studies that track patients over extended periods could provide more comprehensive information into the sustainability of the benefits observed in this study.

Conclusion

The study gives information about the significant benefits of occupational therapy in managing motor function impairments in Parkinson's Disease, strengthening its value as a critical component of holistic care. The positive relationship between patient satisfaction and the likelihood of recommending occupational therapy gives the importance of delivering high-quality, client-centered care that meets the individual needs of patients. As the disease progresses, occupational therapy remains an essential tool for maintaining independence and improving quality of life. Given the significant findings, occupational therapy providers should consider expanding the availability and accessibility of occupational therapy services to a wider population of persons with Parkinson's disease. Future research should continue to explore the long-term benefits of occupational therapy and identify optimal strategies for integrating these services into comprehensive care plans.

Conflict of Interest

The authors declare no conflict of interest regarding the publication of this research.

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