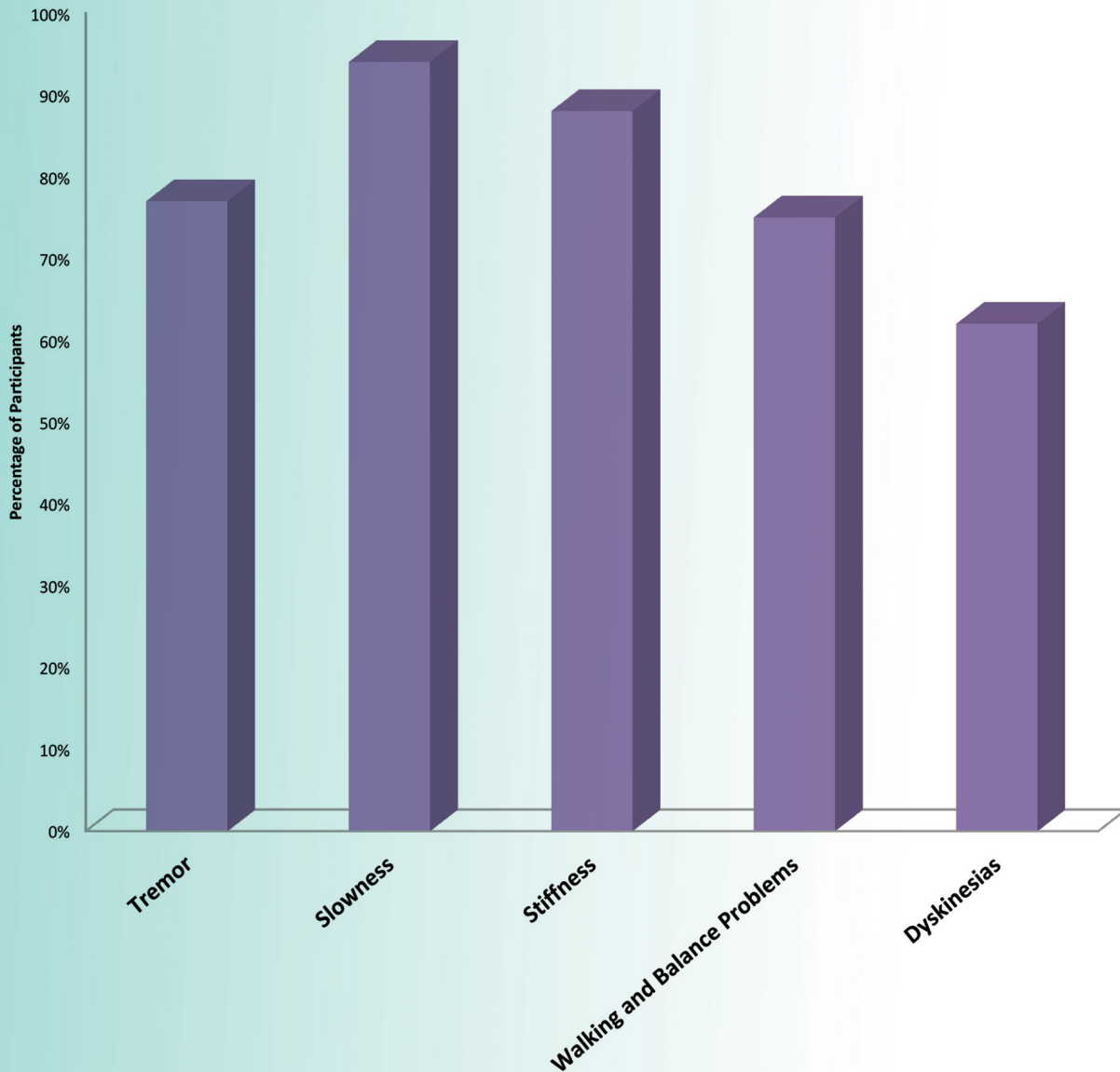


PARKINSON ALLIANCE



**Revisiting Motor Symptoms
in Parkinson's Disease:
Motor Symptoms and
Quality of Life from
the Patient's Perspective**

INTRODUCTION

Parkinson's disease (PD) is characterized by muscle rigidity (stiffness), resting tremor, bradykinesia (slowness of movement), and postural imbalance (e.g., walking difficulties or balance problems). The progressive decline in motor (movement) function has been associated with poorer health-related quality of life (QOL)¹. Although motor symptoms are the defining diagnostic features, the impact of non-motor symptoms on day-to-day life and QOL have been in the spotlight over the past several years. Moreover, the pendulum has swung toward a focus on non-motor symptoms, such as sleep, cognition (e.g., thinking skills), mood disorders, and autonomic dysfunction (i.e., gastrointestinal dysfunction, cardiovascular/blood pressure changes, and urinary disturbance)²⁻⁸. In fact, at present, sleep disorders, mainly fragmented sleep and nocturia (disrupted sleep at night due to the need to go to urinate), fatigue, mood disorders, especially depression, cognitive difficulties (i.e., memory, attention and concentration, and managing more complex tasks), communication difficulties, and urinary symptoms are considered the most frequent and the most disruptive non-motor symptoms for individuals with PD adversely impacting quality of life²⁻⁹.

It is important, however, to revisit and draw attention to the current perspectives on motor symptoms and how the motor symptoms impact factors related to quality of life from the patient's perspective. Tremor, balance and walking problems, slowness of movement and freezing, muscle stiffness, and drug-induced dyskinesias (uncontrollable involuntary movements that are different from tremors) can have a profound impact on quality of life. Some research has found that balance problems, gait disorders (e.g., walking disturbance), and motor impairment in the form of fluctuations (including drug-induced dyskinesias) have been found to affect quality of life the most^{6,10}.

OBJECTIVES

- To learn about the patients' experience with motor symptoms and their perspective on the impact of motor symptoms on day-to-day function.
- To assess the relationship between motor symptoms, emotional well-being, and quality of life (QOL).
- To provide general comments about and recommendations pertaining to treatment related to motor symptoms and QOL.

METHODS

- Participants were recruited from prior survey participation that was conducted by The Parkinson Alliance (PA), announcements at PD support groups, announcements in medical clinics, and The PA website.
- There were 922 individuals who participated in this survey. Participants included individuals with Deep Brain Stimulation (DBS; 221 (24%) participants) and without Deep Brain Stimulation (Non-DBS; 701 (76%) participants). See Table 1 for demographics and descriptive variables.
- Participants represented 50 states, with New Jersey (14%), California (12%), New York (11%), Florida (9%), Texas (8%), Pennsylvania (8%), Arizona (6%), Minnesota (2%), Colorado (2%), Tennessee (1%), and Massachusetts (1%) having the most participants. There were 26 (3%) international participants.

Questionnaires/Measures:

1. The Demographic Questionnaire; 2. Unified Parkinson's Disease Rating Scale (UPDRS), Motor Section – select items;
3. Patient Reported Outcome Measure – Global Health: Physical and Mental Health domains.

The Demographic Questionnaire:

The self-report questionnaire inquired about basic demographic information (e.g., sex status, marital status, education) as well as pertinent clinical information pertaining to motor symptoms, emotional well-being, and quality of life.

The Unified Parkinson's Disease Rating Scale (UPDRS), Part III Motor Section: The UPDRS is the most widely used clinical rating scale for PD. The scale provides a relatively comprehensive assessment of motoric aspects of PD. Certain items from the Motor Section of the UPDRS were selected. Items are rated on a five-point scale. Higher scores reflect worse symptoms.

Patient Reported Outcome Measurement Information System (PROMIS) – 10 Global Health¹¹:

The PROMIS-10 Global Health is a 10-item questionnaire that assesses two primary domains: Physical Health and Mental Health. Physical Health includes items related to general physical health, ability to carry out physical activities, pain, and fatigue. Mental Health includes items related to quality of life, general mental health, satisfaction with social activities and relationships, and emotional well-being. Items are rated on a five-point scale (1=poor; 5=excellent). A higher score indicates better [perceived] global health.

Comparisons based on age and disease duration groups:

- Age: For the purpose of the survey report, age groups were divided into a **Younger PD group** (≤ 69 years of age) and an **Older PD group** (≥ 70 years).
- Disease Duration: Research pertaining to individuals with PD has noted that the average time from symptom onset to development of motor complications was 6 years^{12,13}. Thus, research has divided groups into **Early PD (<6 years)** and **Advanced PD (6+ years)** to define a valid partition between early and advanced disease states.

Factors to consider when interpreting the results:

- This study used a survey-based methodology. Generalizability of the results may be limited. Sample sizes noted in the sections below may vary somewhat within specific groups (e.g., younger, older, early, advanced, etc.), since some individuals may not have responded to a specific question. Research has found that some individuals with PD, particularly as cognitive difficulties become more apparent, may have reduced insight/awareness into or appreciation of their difficulties, a factor warranting consideration when interpreting self-report questionnaires. Importantly, the subjective report in this survey serves to highlight the “patient’s perspective” about his or her experience with motor symptoms and quality of life.

RESULTS

- The summary of the demographic information and clinical characteristics of the participants in this study can be found in Table 1.
 - There were 922 individuals who participated in this survey.
 - The average age of the participant was 71 years, with an average disease duration of 10 years.
 - Just over half of the participants were male and the majority of the participants were Caucasian with over half of the participants having a college degree or graduate degree.
 - The **Non-DBS group** was slightly older [on average] than the **DBS group (average: 72 versus 68 years, respectively)**. By contrast, the **DBS group** had a significantly younger average age at PD diagnosis (**52 years**) than the **Non-DBS group (64 years)** and a longer duration of PD (**DBS: 16 years; Non-DBS: 8 years**).

Sex (male greater than female), marital status (the majority being married), race (the majority being White/Caucasian), and education (the majority having higher education) were comparable between groups.

Table 1. Demographics and Clinical Features of the Sample

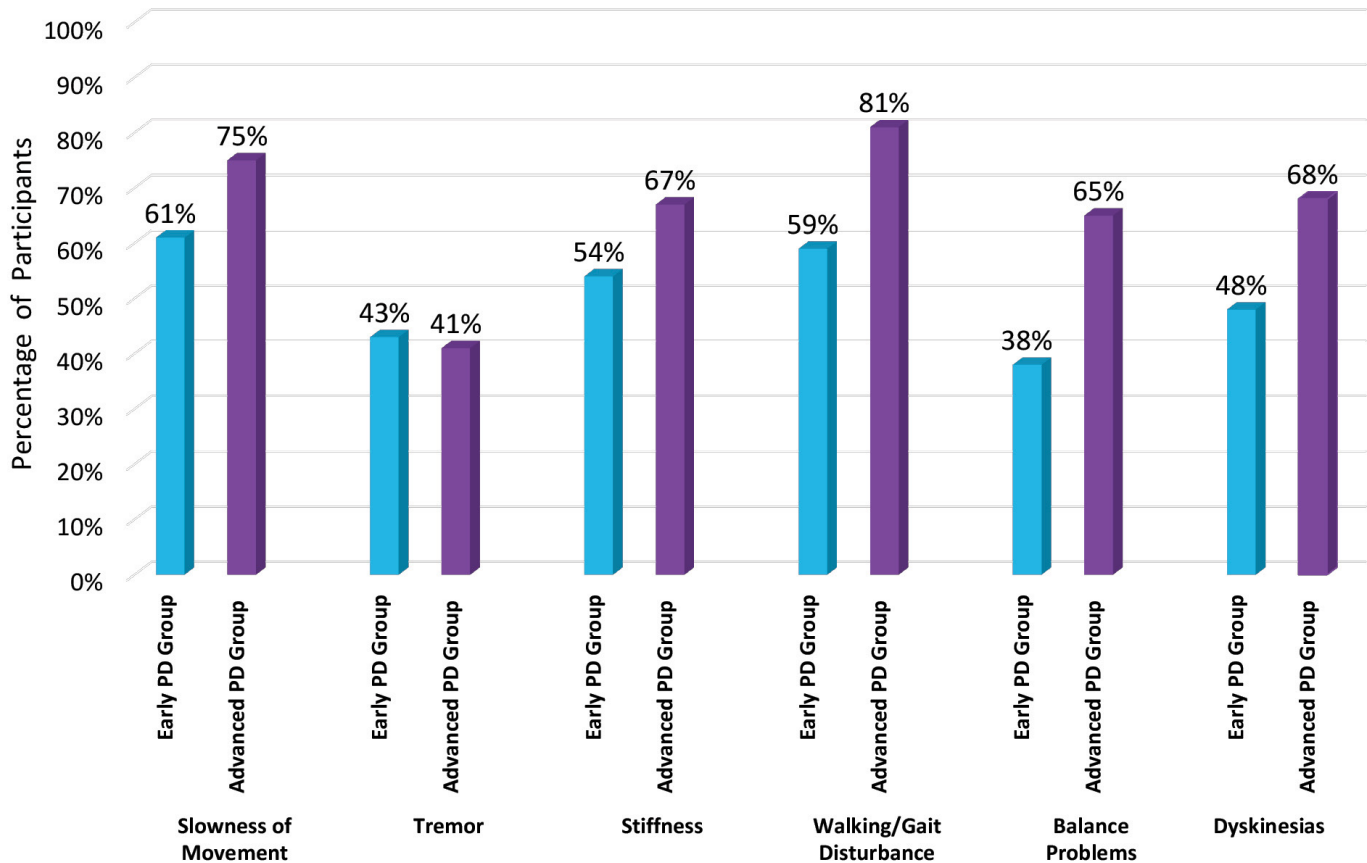
	DBS (n =221)	Non-DBS (n =701)
Average Age in Years (range)	68 (43-92)	72 (46-97)
Duration of PD in Years (range)*	16 (2-42)	8 (0-38)
Average Age of PD Diagnosis (range)*	52 (28-73)	(64 (30-86)
Average Age at Time of DBS in Years (range)	61 (31-80)	n/a
Average Duration since DBS in Years (range)	7 (0-37)	n/a
Target: STN	41%	n/a
GPI	10%	n/a
Not Sure	49%	n/a
Male	58%	53%
Female	42%	47%
Married	80%	76%
Lives Alone	12%	17%
Race		
Caucasian	95%	95%
African American	3%	2%
Other	2%	3%
Education		
<12 years	4%	3%
High School	9%	8%
Some College or Associate's Degree	24%	24%
College	32%	28%
Graduate/Advanced Degree	31%	37%
* Clinically significant difference between groups n/a = not applicable		

MOTOR SYMPTOMS AND PERCEPTION OF PHYSICAL AND MENTAL HEALTH

Motor symptoms:

- Of the most common motor symptoms of PD reported in this survey (N=922), balance problems were reported in the greatest frequency, followed by slowness of movement, drug-induced dyskinesias, stiffness, and then tremor.
- Slowness of movement was the most frequently reported motor symptom in the **Early PD group**, while Walking/Gait was the most frequently reported motor symptom in **Advanced PD group**. (See Figure 1).

Figure 1. Percentage of participants reporting motor symptoms for Early and Advanced disease duration groups*



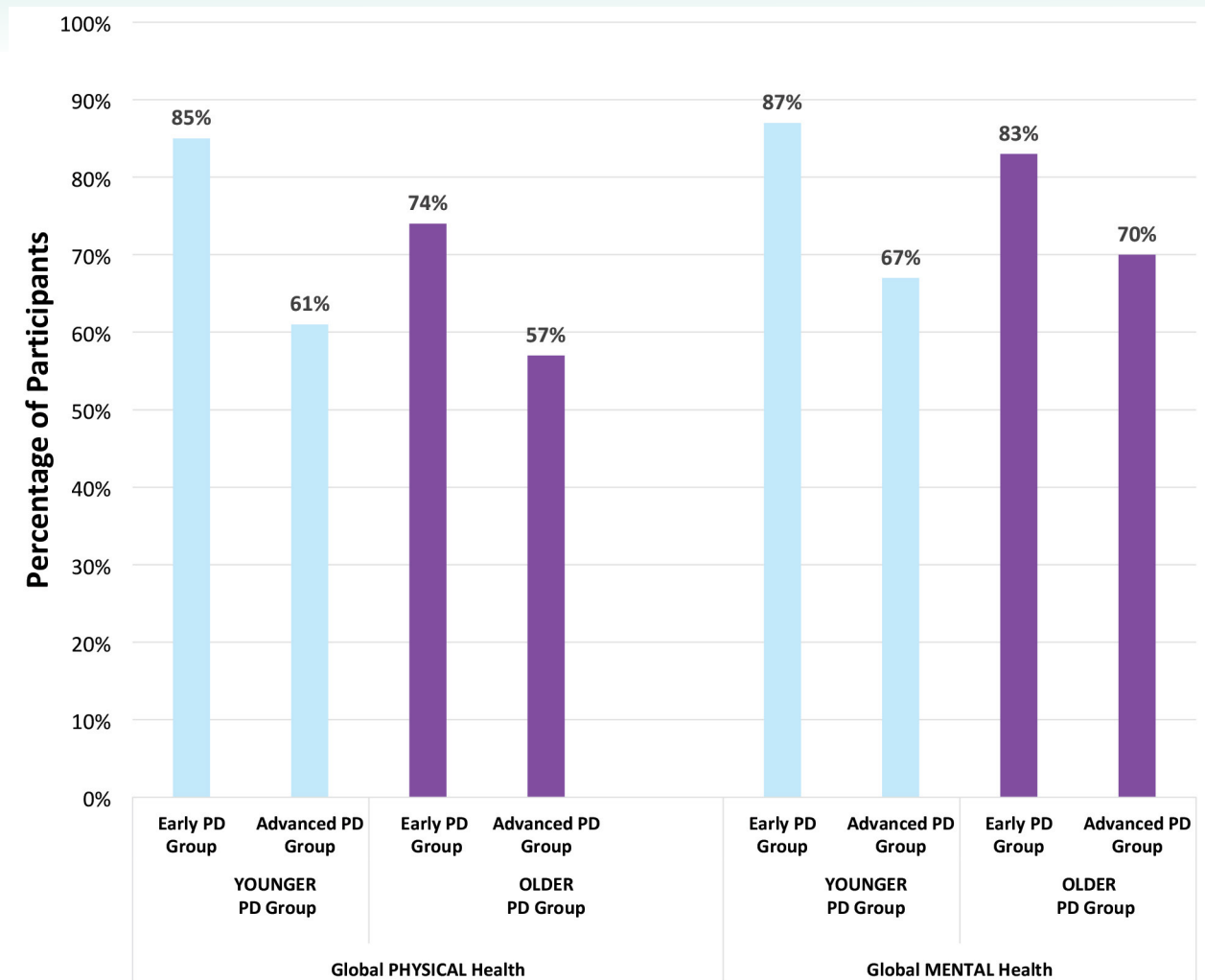
*Disease Duration: Early PD Group: 0 to 5 years (n=260); Advanced Disease Duration: ≥ 6 years (n=632)

- When looking at the role of age in motor symptoms, for participants in this survey:
 - Age demonstrated a relationship with disease progression. The **Younger PD group** presented with greater difference of reported motor symptoms as the disease progressed (**Early PD group** vs. **Advanced PD group**), when compared **Older PD group**, suggesting a perception of greater increase in motor symptoms for the **Younger PD** when compared to the **Older PD group**.
 - Dyskinesias were prevalent for participants across age and disease duration groups.
 - A significantly greater number of participants reported dyskinesias for the **Advanced PD group (disease duration for ≥ 6 years)** when compared to those participants with less than 6 years of disease duration.
 - The **Older PD group** with disease duration of less than 6 years appeared more vulnerable to experiencing dyskinesias in greater frequency than the **Younger PD group** with disease duration of less than 6 years.

Perception of physical and mental health:

- As the disease duration increased, lower ratings of physical and mental health were reported. (See Figure 2)
- Mental health had higher ratings than physical health as the disease progressed (perception that one has better mental health than physical health on average).
- Although age-related factors were relevant to a modestly lower rating of physical and mental health in the **Older PD group**, disease duration was a better predictor for perceived lower physical and mental health for both the **Younger** and **Older PD groups**.

Figure 2. Perceived Physical and Mental Health as it relates to disease duration and age groups



*Global Physical Health is comprised of questions pertaining to general physical health, ability to carry out physical activities, pain, and fatigue.

*Global Mental Health is comprised of questions pertaining to quality of life, general mental health, satisfaction with social activities and relationships, and emotional well-being.

Participant ratings of depression and anxiety (N=922):

- 25% of the participants reported experiencing “moderate” to “severe” DEPRESSION.
- 32% of the participants reported experiencing “moderate” to “severe” ANXIETY.

Table 2. Severity Rating for Depression and Anxiety (N=922)

	None	Mild	Moderate	Severe	Worst Imaginable
Depression	36%	39%	20%	5%	<1%
Anxiety	26%	42%	26%	6%	<1%

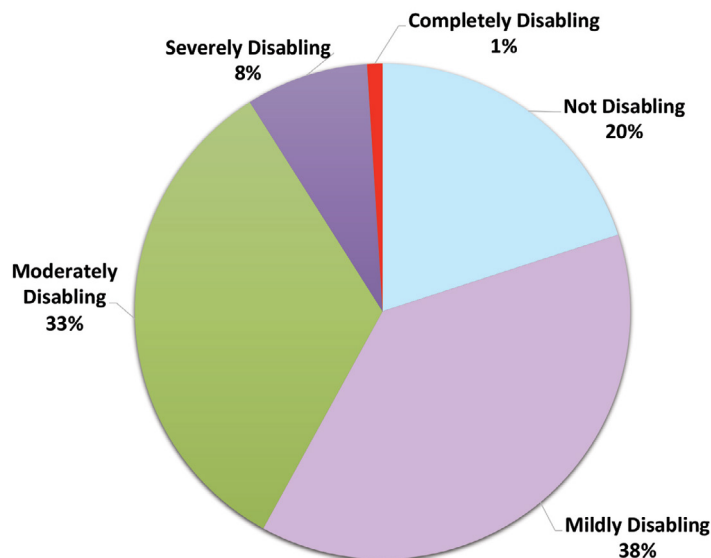
- Age did not have a significant relationship with symptoms of depression or anxiety.
 - **Younger and Older PD Group:** 25% reported “moderate” or “severe” depression.
 - **Younger and Older PD Group:** 32% reported “moderate” or “severe” anxiety.

- **Disease Duration** did have an impact on severity ratings of depression and anxiety
 - Depression:
 - **Early PD Group** (0 to 5 years): 17% reported “moderate” or “severe” depression.
 - **Advanced PD group** (≥ 6 years): 29% reported “moderate” or “severe” depression.
 - Anxiety
 - **Early PD Group** (0 to 5 years): 21% reported “moderate” or “severe” anxiety.

MOTOR SYMPTOMS AND THE IMPACT ON DAY-TO-DAY EXPERIENCES

- 80% of the participants perceived their PD motor symptoms as disabling (see Figure 3).
 - When considering the impact of disease duration on perceived disability:
 - **Early PD group:** 65% reported disabling symptoms (40% mild; 21% moderately; 3% severely; 1% completely).
 - **Advanced PD group:** 85% reported disabling symptoms (37% mild; 37% moderately; 10% severely; 1% completely).

Figure 3. Percentage of participants reporting disabling motor symptoms (N=922)



- Motor symptoms had a significant impact on engagement in functional independence in the home, during day-to-day activities in general, and in social and community activities.
 - Approximately half of the participants stated that motor symptoms impact independence in the home “somewhat” to “extremely/completely.”
 - Over half of the participants stated that motor symptoms “somewhat” to “extremely” impact day-to-day functions.
 - Over half of the participants stated that motor symptoms “somewhat” to “extremely” impact participation in social and community activities.

Table 3. The Impact of Motor Symptoms on Day-to-Day Experiences (N=922)

The Impact of Motor Symptoms on:	Not at all	A little bit	Somewhat	Quite a Bit	Extremely
INDEPENDENCE in the home	24%	28%	23%	15%	10%
Day-to-Day FUNCTIONS (in general)	8%	32%	30%	21%	9%
SOCIAL and COMMUNITY Activities	18%	27%	28%	18%	9%

- As **disease duration** increased for both the **Younger** and **Older PD groups**, the negative impact of motor symptoms on levels of independence in the home, day-to-day functions in general, and social and community-based activities was reported in greater frequency.
- **Disease duration** was a better predictor than **age** for the impact of motor disturbance on functional ability and social engagements.

THE RELATIONSHIP BETWEEN MOTOR SYMPTOMS, EMOTIONAL WELL-BEING AND QUALITY OF LIFE

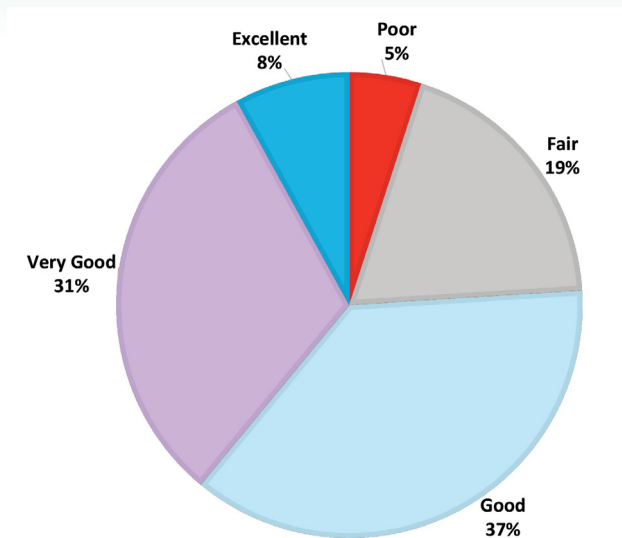
- **There was a significant relationship between motor symptoms, emotional well-being, and quality of life.**
 - The greater the motor symptoms and functional difficulties the greater the report of depression or anxiety and the lower the ratings of quality of life.
 - Approximately half of the participants stated that motor symptoms CONTRIBUTED to DEPRESSION: “somewhat” to “extremely.”
 - Approximately half of the participants stated that motor symptoms CONTRIBUTED to ANXIETY: “somewhat” to “extremely.”

Table 4. Percentage of Patients who Reported that Motor Symptoms Directly Contributed to Depression and Anxiety

Motor Symptom Contributed to:	Not at all	A little bit	Somewhat	Quite a Bit	Extremely
Depression	24%	27%	21%	18%	10%
Anxiety	21%	31%	22%	19%	7%

- **QUALITY OF LIFE:**
 - Balance problems and walking disturbance had a greater adverse impact on quality of life than tremor symptoms.
 - 76% of the participants reported “good” to “excellent” quality of life. (See Figure 4).

Figure 4. Participant rating of QOL



Deep Brain Stimulation and Motor Symptoms (N=221):

- **The majority of the participants reported that DBS improved motor symptoms:**
 - Not at all: 5%
 - A little bit: 6%
 - Somewhat: 19%
 - Quite a bit: 38%
 - Extremely: 32%
- **PARTICIPANT COMMENTS: Some examples**
 - “DBS had a major impact on my answers. Without it I would be wheelchair bound and on disability. With it I am able to work full time.”
 - “DBS has made all the difference in my PD.”
 - “The DBS surgery helped a lot to control my PD. I don’t know what I would do without it.”
 - “DBS has improved my quality of life.”
 - “DBS made a big difference in my ability to handle Parkinson’s. My tremors were very bad before DBS. I feel it’s gone after DBS.”

SUMMARY & DISCUSSION

It is important to understand the current perspectives on motor symptoms and how the motor symptoms impact factors related to well-being from the patient’s perspective. Tremor, balance and walking problems, slowness of movement, muscle stiffness, and drug-induced dyskinesias (uncontrollable involuntary movements that are different from tremors) can have a profound impact on quality of life. Some research has found that balance problems, gait disorders (e.g., walking disturbance), and motor impairment in the form of fluctuations (including freezing and drug-induced dyskinesias) have been found to affect quality of life the most^{6,10}.

TAKE HOME POINTS FROM THIS SURVEY:

- **Objective 1.** To learn about the patients' experience with motor symptoms and their perspective on the impact of motor symptoms on day-to-day function.
 - Balance problems were reported in the greatest frequency, followed by slowness of movement, drug-induced dyskinesias, stiffness, and then tremor. The order of this symptom list is in direct relationship to what our medications and interventions treat best.
 - The **Younger PD group** appears to have more vulnerability to experience a greater increase in motor symptom severity from **Early to Advanced PD** when compared to the **Older PD group** [matched on disease duration]. In other words, the data suggests that the **Young PD group** has greater vulnerability to experience a steeper increase in motor symptoms as disease duration progresses when compared to individuals diagnosed later in life.
 - While it is clear that the greater the disease duration, the more likely an individual is to report worse physical symptoms, "mental health" had higher ratings than "physical health" as the disease progressed. Thus, global mental health (i.e., perspective on life; attitude) may be relatively less adversely impacted when compared to the perspective that physical health is worsening.
 - Data clearly revealed, however, that disease duration (with greater reports of disabling symptoms) had a significant impact on emotional health, where greater frequency of depression and anxiety (the latter being greater than the former) occurred in the **Advanced PD group** when compared to the **Early PD group**.
- **Objective 2.** To assess the relationship between motor symptoms, emotional well-being, and quality of life (QOL).
 - Motor symptoms had a strong relationship with emotional well-being independent of age. Moreover, along with advanced disease and greater reports of motor symptoms, the ratings of depression and anxiety also increased.
 - Approximately half of the participants indicated that motor symptoms significantly contributed to feelings of depression and anxiety.
 - Depression and anxiety had a strong relationship with quality of life.
 - Motor symptoms had a strong relationship with quality of life. The greater the report of motor symptoms with Advanced PD, the lower rating of Quality of Life. Such a finding is consistent with other research in that disease severity due to progressive motor symptoms has been found to impact quality of life¹⁴.
 - Although motor symptoms are highly prevalent across age and disease duration groups, the majority of the participants (76%) in this survey generally reported good to excellent quality of life.
 - Consistent with the literature, this study found that balance problems and walking disturbance had a greater adverse impact on quality of life than tremor symptoms^{6,10}.

GENERAL COMMENTS AND RECOMMENDATIONS:

1. The experience of motor symptoms for individuals with PD can be quite diverse. When considering management of intervention for motor symptoms and dyskinesias, it is recommended that you speak with your neurologist/ movement disorders specialist to discuss optimal medication management and non-medication-based intervention that may be of benefit. Recommendations to follow are for general points of education that have been sighted in the literature and may be worthwhile to discuss with your doctor.

2. **Exercise** (aerobic exercise, boxing, dancing, walking, martial arts) has been found to improve QOL for individuals with PD, as well as to aid in the management of motor symptoms and neuroprotection^{15,4,16,17}. Exercise (i.e., Dance, Rock Steady Boxing, running) is an activity with combined effects on both physical and mental well-being, such as improving balance and helping with mood and attitude.
3. **As for other non-medication-based intervention**, Yoga, Tai Chi, and Health Qigong have been found to aid in motor function, psychological well-being, and quality of life^{16,18}.
 - a. Health Qigong is a Chinese exercise which aligns movement, breathing and meditation to encourage well-being¹⁷. Health Qigong exercise could significantly improve PD patients' muscle hardness, functional walking capacity, hand-eye coordination, stability, and balance¹⁷.
4. **Dyskinesias**: Several therapeutic strategies are used to manage dyskinesias, including adjusting existing PD medications, conducting trials of supplemental medications, and having DBS surgery¹⁹⁻²⁴.
5. **Surgical Intervention**:
 - a. **Deep Brain Stimulation therapy** can be an effective intervention, addressing motor symptoms of PD (e.g., tremor, rigidity/stiffness, slowness of movement) and reducing dyskinesias. Patients with PD who may benefit from surgery include those who have substantial dyskinesias unresponsive to medication adjustments, are levodopa responsive, do not have dementia, and do not have neuropsychiatric impairment¹⁹. Consideration for DBS therapy and possible benefits can be discussed with your movement disorder specialist.
 - b. **Duodopa**[®] therapy is used to treat advanced PD²⁴. The Duodopa[®] system is a treatment for advanced Parkinson's disease offered to patients when various combinations of Parkinson's medications are no longer sufficient to provide a good quality of life. It is a gel mixture of levodopa and carbidopa administered throughout the day through a portable pump that is surgically placed and passes through the abdominal wall, the stomach and into the small intestine. It allows a constant amount of levodopa to be present in the blood, which can reduce motor fluctuations therefore, decreasing the number of times patients alternate between significant "off" time and uncontrolled movement (dyskinesia).
6. **Regarding Depression and Anxiety**:
 - a. It should be noted that the direction of causality between emotional well-being, quality of life, and perceived disability is difficult to establish for many individuals. The association of PD with depression and anxiety is well-known²⁵⁻²⁷, however, but the treatment of depression and anxiety is often insufficient²⁸. Moreover, in addition to any pharmacological efforts to overcome the motor symptoms of PD, psychological intervention may also be important in improving QOL.
 - b. Have a conversation about anxiety and depression (psychological and biological contributions; physical and psychological symptoms of anxiety and depression) and related treatments with a specialist in movement disorders (e.g., a neurologist, psychiatrist, neuropsychologist, psychologist who are familiar with PD).
 - c. Exercise can provide diverse stimulation, social, and emotional interaction, and the physical activity with a variety of brain areas activated, resulting in improved psychological health⁴.
 - d. Medications for psychological/psychiatric difficulties may be beneficial (i.e., for depression and anxiety).
 - a. Since perspective management is difficult, and since there are many challenges related to coping with PD, cognitive-behavioral psychotherapy (CBT) for individuals with PD (and treatment for family members

too, if appropriate) can be an effective treatment for addressing emotional difficulties that are secondary to, if not directly related to (biological changes) Parkinson's disease²⁹. Psychotherapy can assist in validating one's personal experiences, feeling supported, and developing coping strategies to reduce and manage symptoms of depression and anxiety. Such intervention can aid in coping and adjustment to help improve with function, relationships with others, and quality of life.

- b. Medications that facilitate psychological well-being, in conjunction with psychotherapy, may be helpful for participants who experience depression and anxiety. However, caution is indicated when it comes to selecting certain medications, as some medications (e.g., benzodiazepines, anticholinergic medications and dopamine agonists) can cause or worsen cognitive and psychological symptoms. It is recommended that use of psychotropic medications be monitored by a specialist in PD.
7. Treatment pertaining to the well-being in PD needs to be tailored to an individual's preferences and capabilities. A one-size-fits-all approach is not the best approach. For a review of a broad scope of PD symptoms including treatment considerations related to motor and non-motor symptoms, one can review previous survey reports on The Parkinson Alliance website that addresses a breadth of symptoms and treatment considerations is at www.parkinsonalliance.org/research-resources/patient-centered-research.

***Please visit The Parkinson Alliance website pertaining to patient-centered research to review previously written reports about specific topics related to PD. More comprehensive understanding and treatment guidelines are referenced in each report.**

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