# The Effects of Dance Therapy on Parkinson's Disease

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Parkinson's disease (PD) is a neurodegenerative disorder that worsens over time. The disease affects approximately 60,000 Americans each year and is growing rapidly amongst the elderly population. There are many pharmacological therapies available to alleviate the symptoms of PD, although none yet that actually reverse the effects of the disease. Furthermore, medication can become burdensome on an individual's life and is associated with a number of unpleasant side effects and never ending expenses. Therefore, it would make a tremendous difference in the lives of people living with PD to find an additional non-pharmacological approach that can eventually become an alternative therapy to manage their symptoms. Initial research suggests that dance therapy may alleviate PD symptoms. This study will expand on this research by focusing specifically on how jazz dance affects a large sample size of individuals with PD over a long duration of time.

Parkinson's disease is a chronic and progressive neurodegenerative movement disorder that is growing rapidly amongst the elderly population across the world (Baatile, Langbein, Weaver, Maloney & Jost, 2000). The disease is associated with difficulties in balance and walking (Earhart, 2009). Although it is not considered to be a fatal disease, symptoms do worsen over time and make life difficult (Parkinson Disease Foundation, 2010). The disease affects the physical, psychological, social and functional status of individuals (Goodwin, Richards, Taylor, Taylor & Campbell, 2008). Individuals with PD are often unable to perform daily movement functions, such as getting out of bed unaided and driving (Earhart, 2009). As such, PD can severely reduce the quality of life these of these people and when left untreated can lead to permanent disability (Morris, 2000). Most individuals are eventually forced to stop working due to the unavoidable progression of disabling symptoms. The amount of money that the United States and individuals spend each year on

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PD is staggering (Parkinson Disease Foundation, 2010). The cost of PD, including treatment, social security payments, and lost income from inability to work, is estimated to be nearly $25 billion per year in the United States alone (Parkinson Disease Foundation, 2010). Medication costs for an individual person with PD average $2,500 a year, and therapeutic surgery can cost up to $100,000 per individual (Parkinson Disease Foundation, 2010). Finding additional non-pharmacological approaches that can eventually be used as effective alternative treatments to medication, would be ideal for these individuals.

Specifically, PD involves the malfunction and death of vital nerve cells in the brain, called neurons (Yousefi, Tadibi, Khoei & Montazeri, 2009). Some neurons are responsible for producing dopamine, a chemical that sends messages to the part of the brain that controls movement and coordination (Baatile, Langbein, Weaver, Maloney & Jost, 2000). As PD progresses these particular neurons die and the amount of dopamine produced in the brain decreases, leaving a person unable to control movement normally (Parkinson's Disease Foundation, 2010). As many as ten million people worldwide live with PD and it is estimated that one million of these individuals

live in the United States (Baatile, Langbein, Weaver, Maloney & Jost, 2000; Parkinson's Disease Foundation, 2010). Approximately 60,000 Americans are diagnosed with PD each year, and this number does not reflect the thousands of cases that go undetected (Parkinson's Disease Foundation, 2010). Parkinson's disease is often difficult to diagnose because there is no standard test to determine for sure that a person has the disease. Physicians rely on a neurological examination and the individual's description of symptoms to determine whether he or she has PD. The four key motor symptoms of PD disease are: 1) tremor of the hands, arms, legs or jaw, 2) muscle rigidity or stiffness of the limbs and trunk, 3) slowness of movement (bradykinesia), and 4) postural instability which involves impaired balance and coordination (Parkinson's Disease Foundation, 2010 ; Fahn et al., 2004; Crizzle & Newhouse, 2006). Other common symptoms of the disease may include pain, confusion, fatigue, sleep disturbances, depression, constipation, cognitive changes, fear or anxiety, and urinary problems (Parkinson's Disease Foundation, 2010). All of these symptoms vary from person to person and since PD gradually progresses over a long period of time these symptoms are persistent and continue to worsen.

At this time, no treatment is effective in stopping the progression of the disease or reversing the effects of the disease (Crizzle & Newhouse, 2006). The cause of PD is unknown but the incidence of the disease is known to increase with age. The average age of onset is 60 years (Parkinson's Disease Foundation, 2010). Scientists have identified aging as an important risk factor; there is a 2-4% risk for PD among people over age 60, compared with 1-2% in the general population (Parkinson's Disease Foundation, 2010). The decline in functional mobility experienced by individuals with PD may be even more pronounced than the deterioration experienced by frail elderly individuals without PD. (Hackney, Kantorovich, Levin & Earhart, 2007). Although there is currently no cure for PD, there are treatment options available to alleviate symptoms experienced by individuals who are living with PD. Treatment for PD usually involves the use of a number of drugs; the most widely prescribed is Levodopa. However, like any prescribed drug currently on the market, it is only able to slow the progression of PD and therefore PD patients will continue to deteriorate (Crizzle & Newhouse, 2006). Surgical options, such as deep brain stimulation, may help alleviate a person's Parkinson's symptoms if and when they stop responding to medication (Earhart, 2009). However, this surgery is only effective for a small group of people with PD and is only recommended if an individual meets specific criteria (Parkinson's Disease Foundation, 2010). Researchers suggest physical therapy to be an effective non-pharmacological treatment for PD patients due to its positive effects on mobility and activities of daily living (Yousefi, Tadibi, Khoei & Montazeri, 2009). Yousefi, Tadibi, Khoei & Montazeri (2009) recommend a multidisciplinary approach, a combination of pharmacological and non-pharmacological treatments, as the ideal method to manage PD symptoms.

Despite the recommended multi-disciplinary approach, the use of Levodopa as dopamine-replacement therapy remains the standard pharmacological treatment (Fahn et al., 2004). This is thought to be due to the fact that clinical research concerning PD is lacking because the number of people volunteering to participate in clinical trials is not keeping up with the growth of available trials (Hackney & Earhart, 2009; Parkinson's Disease Foundation, 2010). As a result, a common limitation in many studies is the presence of a small sample size. A possible reason for this may be because many of the clinical trials being offered are drug-related and drugs are known to be associated with many side effects and possible complications. In some people, PD medications known as dopamine agonists, such as Levodopa, have been found to cause impulsive behaviors such as pathologic gambling, compulsive eating and shopping (Parkinson's Disease Foundation, 2010). Some more serious and undesirable side effects such as hallucinations, delusions, and paranoia can also occur as a result of drug related therapies (Parkinson's Disease Foundation, 2010). Therefore, finding an additional effective treatment would allow for the reduction or termination of the use of medication for PD patients, which may eliminate undesirable side effects.

Exercise and physical activity are known to increase dopamine levels in the body naturally and may explain why possible alternative therapies to medication are just as effective if not more effective (Crizzle & Newhouse, 2006). Dopamine is a chemical produced in the brain which creates feelings of pleasure and influences movement control by transmitting signals between nerve cells (Wang et al., 2000). Research suggests that exercising regularly or performing mild exercises such as walking, yoga, or aerobics increases dopamine levels (Baatile, Langbein, Weaver, Maloney & Jost, 2000). The U.S. Department of Health and Human Services recommends adults have two and a half hours per week of moderate physical activity for maximum health benefits (HHS Press Office, 2008). Hakney and Earhart (2009) report that 60% of Americans older than 65 do not achieve this recommended daily amount of physical activity and individuals with PD have 15% lower activity levels than those of age- matched controls.

In place of medication, exercise programs, physical therapy, and dance therapy have been found to be effective alternative therapies in improving motor control, functioning, and quality of life of individuals with PD. Studies designed to test the effects of movement therapy on individuals with PD include physical exercise on PD (Crizzle & Newhouse, 2006; Goodwin, Richards, Taylor, Taylor & Campbell, 2008; Baatile, Langbein, Weaver, Maloney & Jost, 2000), Argentine tango dance on PD (Hackney & Earhart, 2009), *PoleStriding* exercise program on PD (Baatile, Langbein, Weaver, Maloney & Jost, 2000),

contemporary dance on PD (Coubard, Duretz, Lefebvre, Lapalus & Ferrufino, 2011), and physical therapy on PD (Morris, 2000). The results of all these studies on PD individuals have shown improvements on the Unified Parkinson's Disease Rating Scale, Berg Balance Scale, Timed Up and Go test, self-reported freezing of gait, velocity of walking, dual- task walking, 6 minute walk, stride length, tandem stance and one leg stance. These rating scales assess the severity of movement symptoms and the extent to which the disease affects a person's daily activities (Baatile, Langbein, Weaver, Maloney & Jost, 2000). These tests assess how well the individual performs various balance activities and activities of daily living, and their overall muscle strength, stride length, speed and distance of gait and functional mobility. All exercise programs had a positive effect on the. In one study which involved a 12 week long exercise program, PD patients reported improvements in energy level, sleep and pain (Rodrigues de Paula, Teixeira-Salmela, Coelho de Morais Faria, Rocha de Brito, & Cardoso, 2006). Exercise was also found to improve functional independence and quality of life in individuals with PD (Baatile, Langbein, Weaver, Maloney & Jost, 2000). When compared to dance classes though, dance resulted in more improvement on these scales than physical exercise programs (Earhart, 2009; Hackney & Earhart, 2009).

Not only have these movement therapies improved motor control and physical functioning of individuals with PD, but previous studies suggest that dance can benefit the physical and/or cognitive health in the non- PD aging population (Coubard, Duretz, Lefebvre, Lapalus & Ferrufina, 2011; Jeon, Bark, Lee, Im, Jeong & Choe, 2005; Kattenstroth, Kalisch, Tegenthoff & Dinse, 2009). In an experiment designed to determine whether contemporary dance improves cognitive flexibility in aging, participants engaged in contemporary dance, Tai Chi Chuan and fall prevention programs. Contemporary dance showed improvements in "switching" attention tasks compared to Tai Chi Chuan and fall prevention, both of which showed no cognitive improvement (Coubard, Duretz, Lefebvre, Lapalus & Ferrufina, 2011). The authors conclude that contemporary dance stimulates plasticity in flexible attention (Coubard, Duretz, Lefebvre, Lapalus & Ferrufina, 2011). Traditional Korean dance has been thought to be beneficial for elderly women (Jeon, Bark, Lee, Im, Jeong & Choe, 2005). After a 12 week study in which elderly women participated in a traditional Korean dance movement program, elderly women had significant improvements in balance, depression, and decreased incidences of falls, compared to elderly women who did not participate in the dance program. The results of this study suggest that this dance program would be beneficial as a health promoting and fall prevention program for the elderly population (Jeon, Bark, Lee, Im, Jeong & Choe, 2005). In a year-long study, neurologically healthy elderly individuals participated in a dance class and were compared to healthy elderly individuals who did not participate in any type of dance, or physical exercise. The group of elderly dancers performed superiorly to the non-active group of older individuals on neuropsychological, intelligence, psychophysical and sensorimotor tests (Kattenstroth, Kalisch, Tegenthoff & Dinse, 2009). The results of this study suggest that dance improves the ability to perform simple and difficult tasks relating to sensory, motor and cognitive performance in elderly individuals (Kattenstroth, Kalisch, Tegenthoff & Dinse, 2009). Studies such as these, suggest that dance movement programs have been beneficial both physically and cognitively for the aging population; a population of people that is highly prone to Parkinson's disease.

Given that dance has positive effects on the quality of life and performance of sensory, motor, and cognitive tasks in elderly individuals, researchers have begun to study the effects that dance has on PD patients. Argentine tango is a popular dance form that has been tested amongst the elderly Parkinson's affected population. When Argentine tango dance was compared to American waltz/foxtrot dance for individuals with PD, both forms of dance were beneficial in improving motor control in PD patients, however, tango was the more effective dance therapy (Hackney & Earhart, 2009). When tango dance was compared to a strength flexibility exercise program, the tango group showed slight improvements on certain tests but there was no significant difference between the two groups. A larger sample size is necessary to confirm and extend the results of this study, but the data collected suggests that tango dance movement sessions are beneficial for individuals with PD and may be an appropriate and effective form of group exercise for these individuals (Hackney, Kantorovich, Levin & Earhart, 2007). When tango dance was compared between partnered tango and non partnered tango, results showed that both groups improved their balance, gait velocity and stride length (Hackney & Earhart, 2010). The only difference expressed between participants in the two dance groups was that partnered tango dancers expressed more enjoyment and had a greater interest in continuing the tango dancing (Hackney & Earhart, 2010).

It is common for people with PD to take a variety of medications, all at different dosages and at different times of day, in order to manage the symptoms of the disease. However, these medications have side effects and do not address certain symptoms (Parkinson's Disease Foundation, 2010). For example, none of them help with the common problems of fatigue, constipation or balance (Parkinson's Disease Foundation, 2010). Keeping track of medications and remembering which ones to take and the proper dosage can also be a challenging task. Finding possible alternative treatments for Parkinson's symptoms would make a tremendous difference in the lives of many who live with PD. The use of movement therapy to alleviate symptoms and slow the progression of PD would cut medication costs for the patient, as well as delay increases in medicinal doses and result in less side effects

for a prolonged period of time. In addition, dance therapy is a natural way to increase dopamine levels, which is a healthier alternative and is reported to be effective long term because it is enjoyable (Hackney & Earhart, 2009). Dance is an enjoyable form of therapy and it develops flexibility and balance, as well as confidence in the performer. Dance is also known to be a stimulating mental activity that connects mind to body. The goal of movement therapy for individuals with PD is to increase the longevity of muscles in an attempt to postpone the inevitable physical decline that results from PD (Crizzle & Newhouse, 2006). Although the findings from past research offer a lot of information on movement therapy, there are still factors that can be researched in regards to the effectiveness of dance therapy on individuals with PD.

Prior research makes apparent that there is positive correlation between dance therapy, quality of life and motor control present. What has not been determined is whether dance therapy can be a definite alternative treatment to medication. In order to expand on prior research that has been done on this topic, my research will test a much larger sample size and will be a long duration study with follow up periods. The aim of the current study is to determine whether dance therapy, specifically jazz, improves motor control functioning and quality of life in individuals with PD. Jazz was chosen as the form of dance therapy being tested in this study because participants can execute it individually and it is a fun and energetic form of dance consisting of unique moves, fancy footwork, big leaps and quick turns (Alpert et al., 2009). All of these elements encourage individuals to work on their balance, flexibility and cognitive skill to improve their motor control. Jazz dance may not be as rigorous as tap dance or other advanced forms of ballroom and does not require a high level of physical fitness, which is ideal for individuals with PD (Alpert et al., 2009). I hypothesize that individuals diagnosed with Parkinson's disease participating in a long duration dancing therapy class, will present improved motor control, functioning as well as quality of life when compared to individuals with PD who do not participate in any type of movement therapy class over the same time period.

## PROPOSED METHOD

### Study Design

I will conduct a between-subjects experimental study which will evaluate the effects of a dance program on the motor control and quality of life of individuals with PD. The participants will take part in a dance program which will allow me to investigate the effectiveness of dance therapy on the progression of PD.

### Participants

I plan to recruit 600 individuals diagnosed with definite idiopathic PD based on the Hoehn-Yahr scale (Bhidayasiri & Tarsy, 2012). The Hoehn and Yahr scale was used in many prior studies to determine the individual's current stage of PD progression (e.g., Hackney & Earhart, 2009). Movement symptoms such as tremors, impaired balance and coordination, speed of movement, stride length, muscle stiffness and pain are rated on a scale of 1-5 of difficulty (Bhidayasiri & Tarsy, 2012). 1 and 2 represent early-stage, 2 and 3 mid-stage, and 4 and 5 advanced-stage PD (Bhidayasiri & Tarsy, 2012). All participants in this study will all be diagnosed, by a physician, with stage I-II Parkinson's disease (mild-moderate PD), (see Appendix A). Participants will be between the ages of 65 and 75 years old and there will be an equal number of males and females of no specific race. Participants will be recruited form the New York City. These individuals with PD must be able to stand for at least 30 minutes unassisted and must be able to walk independently for more than 3 meters without an assistive device. All of the 600 participants will have to demonstrate clear benefit from PD medications and will continue to take their medication regularly throughout the duration of the study. It will be confirm by a physician that all 600 participants do not have other neurological, orthopedic or cardiovascular problems and are only in pharmacological treatment (Rodrigues de Paula, Teixeira-Salmela, Coelho de Morais Faria, Rocha de Brito, & Cardoso, 2006). Consistent with the methodology of Rodrigues de Paula, Teixeira-Salmela, Coelho de Morais Faria, Rocha de Brito, & Cardoso (2006), the physician will also confirm that the participants do not show severe cognitive impairments that could prevent comprehension during the evaluation and dance program

### Measures

The Unified Parkinson's Disease Rating Scale (UPDRS) and the Parkinson's Disease Questionnaire (PDQ-39) will be administered to all participants before and after the study. The PDQ-39 questionnaire is used to evaluate the impact of PD on the health and quality of life of the participants (Baatile, Langbein, Weaver, Maloney & Jost, 2000). It consists of 39 questions with eight discrete dimensions, in which PD patients must note the frequency of each event experienced, such as difficultly walking 100 yards, on a likert scale (see Appendix B). UPDRS is used to characterize the severity of PD at the time of testing. It is administered as an interview composed of three parts-mood/behavior, activities of daily living and motor sections (Hackney, Kantorovich, Levin & Earhart, 2007 ) (see Appendix C). It takes into account movement symptoms as well as cognitive difficulties, ability to carry out daily activities and treatment complications (Baatile, Langbein, Weaver, Maloney & Jost, 2000). Additional tests/scales that will be used to asses balance and gait and determine motor control progress: Timed Up and Go Test,

Berg Balance Scale, six minute walk test, freezing of gait, tandem stance and the one leg stance. All of the measures listed above, including the UPDRS and the PDQ-39, have been used in prior research.

*Procedure*

300 participants will take partake in a jazz dance program, three times a week, for 20 weeks total. The class will be 45 minutes long and will be taught by five different instructors. Each instructor will teach two different groups throughout the week. There will be ten groups total with 30 participants in each group. In order to keep the variable of several dance instructors a controlled factor, each instructor will have roughly the same amount of experience and will teach their class according to a rigid schedule in order to keep the same pace. The jazz dance group will be the experimental group of the study. The other 300 individuals of the participant pool, will make up the control group of the study and will be restricted from engaging in any type of movement therapy including dance, exercise and physical therapy. All participants will reside in a group home for the duration of the study in order to keep these variables controlled. Participants will be randomly assigned to one of the two groups. The dance lessons will include postural stretches, balance exercises, foot work patterns and experimentation with timing steps to music. Participants in the experimental group will be encouraged to continue to participate in a jazz dance class, which will be made available to them, after the conclusion of the study. After the completion of the 20 week experiment, semi-annual follow-ups of participants in both the experimental and control groups will take place, during which the UPDRS and PDQ-39 will be administered. Balance, gait and motor control progress of individuals will also be assessed in these follow-up assessments, through the administration of the Timed Up and Go Test, Berg Balance Scale, six minute walk test, freezing of gait, tandem stance and the one leg stance. The follow-ups will continue for a total of five years.

## CONCLUDING REMARKS

*Limitations*

Parkinson's disease is a progressive neurodegenerative disorder and therefore the speed of progression of the disease varies from person to person. Since this a long term study, the disease may worsen quicker in some people over the time of the study and therefore it may be hard to determine whether the dance therapy is ineffective or whether the disease is progressing faster in some than in others. In addition, all patients will continue to take their medication throughout the study, making it difficult to determine whether expected improvements are a result of the dance therapy or their continued use of prior pharmacological treatment. Another possible limitation of this study could be due to the fact some people learn new material quicker than others. The dance material could be more challenging for some than it is for others, therefore making the dance therapy less effective for the slow learners. In addition, cultural diversity of participants may affect their performance in the dance program. In some cultures dance is performed as a form of emotional or spiritual expression, social interaction, or exercise, giving some individuals an advantage because they have either engaged in dance classes or have been exposed to dance, prior to the study. The experimental group of the study is also being divided into ten groups and being taught by five different instructors which presents a limitation. While this factor will be controlled to the best of its ability, each instructor may have a different teaching style and different techniques. The physical fitness of participants can also considered a limitation of the study because the more fit individuals may perform superiorly in the dance program. Lastly, this study will not be testing participants on the later stages of PD, which are much more severe form of PD. Therefore the results of this study will only be beneficial for those patients with less severe PD.

*Significance*

Prior researchers have mainly focused on the effects of Argentine tango on PD patients in the St. Louis, MO community. These previous studies have been carried out on small sample sizes, with 150 participants being the largest sample tested. This study will expanded on prior research by using a larger sample size of participants from a different part of the United States. As opposed to Argentine tango, this study will focusing on specifically on jazz dance to determine whether jazz has similar positive effects on PD patients as Argentine tango has suggested.

This study is significant because early intervention through dance therapy may slow the progression of the PD and therefore decrease the severity of symptoms experienced. This may prolong the life spans of individuals with PD and hence improve the quality of life of these individuals. The participation in a dance therapy class may enhance the well being of these individuals because it is interactive, social and enjoyable and is thought to instill confidence and stimulate mental activity. The results of this study can potentially help determine whether dance can be used as an alternative treatment to pharmacological therapies. This finding would have a great impact on the lives of many who are living with PD, by saving patients a lot of money and unwanted side effects. The goal of this study is to confirm that dance therapy is unquestionably beneficial for PD individuals on a large scale, with the next step involving the elimination of medication taken by patients, and testing dance as an alternative therapy to medication.

# APPENDIX A

**Hoehn and Yahr Scale**

1: Only unilateral involvement, usually with minimal or no functional disability
2: Bilateral or midline involvement without impairment of balance
3: Bilateral disease: mild to moderate disability with impaired postural reflexes; physically independent
4: Severely disabling disease; still able to walk or stand unassisted
5: Confinement to bed or wheelchair unless aided

**Modified Hoehn and Yahr Scale**

1.0: Unilateral involvement only
1.5: Unilateral and axial involvement
2.0: Bilateral involvement without impairment of balance
2.5: Mild bilateral disease with recovery on pull test
3.0: Mild to moderate bilateral disease; some postural instability; physically independent
4.0: Severe disability; still able to walk or stand unassisted
5.0: Wheelchair bound or bedridden unless aided

# APPENDIX B

**PDQ-39 QUESTIONNAIRE**

*Please complete the following*
*Due to having Parkinson's disease, how often <u>during the last month</u> have you....*

*Please tick one box for each question.*

**Never | Occasionally | Sometimes | Often | Always (or cannot do)**

1. Had difficulty doing the leisure activities which you would like to do?
2. Had difficulty looking after your home, e.g. DIY, housework, cooking?

3. Had difficulty carrying bags of shopping?

4. Had problems walking half a mile?

5. Had problems walking 100 yards?

6. Had problems getting around the house as easily as you would like?

7. Had difficulty getting around in public?

8. Needed someone else to accompany you when you went out?

9. Felt frightened or worried about falling

10. Been confined to the house more than you would like?

11. Had difficulty washing yourself?

12. Had difficulty dressing yourself?

13. Had problems doing up your shoe laces?

14. Had problems writing clearly?

15. Had difficulty cutting up your food?

16. Had difficulty holding a drink without spilling it?

17. Felt depressed?

18. Felt isolated and lonely?

19. Felt weepy or tearful?

20. Felt angry or bitter?

21. Felt anxious?

22. Felt worried about your future?

23. Felt you had to conceal your Parkinson's from people?

24. Avoided situations which involve eating or drinking in public?

25. Felt embarrassed in public due to having Parkinson's disease?

26. Felt worried by other people's reaction to you?

27. Had problems with your close personal relationships?

28. Lacked support in the ways you need from your spouse or partner? If you do not have a spouse or partner tick here

29. Lacked support in the ways you need from your family or close friends?

30. Unexpectedly fallen asleep during the day?

31. Had problems with your concentration, e.g. when reading or watching TV?

32. Felt your memory was bad?

33. Had distressing dreams or hallucinations?

34. Had difficulty with your speech?

35. Felt unable to communicate with people properly?

36. Felt ignored by people?

37. Had painful muscle cramps or spasms?

38. Had aches and pains in your joints or body?

39. Felt unpleasantly hot or cold?

Please check that you have ticked one box for each question before going on to the next page

Thank you for completing the PDQ 39 questionnaire

# APPENDIX C

**UNIFIED PARKINSON'S DISEASE RATING SCALE (UPDRS)**

*<u>I. MENTATION, BEHAVIOR AND MOOD</u>*
**1. Intellectual Impairment**
0 = None.
1 = Mild. Consistent forgetfulness with partial recollection of events and no other difficulties.

2 = Moderate memory loss, with disorientation and moderate difficulty handling complex problems. Mild but definite impairment of function at home with need of occasional prompting.
3 = Severe memory loss with disorientation for time and often to place. Severe impairment in handling problems.
4 = Severe memory loss with orientation preserved to person only. Unable to make judgments or solve problems. Requires much help with personal care. Cannot be left alone at all.

**2. Thought Disorder (Due to dementia or drug intoxication)**
0 = None.
1 = Vivid dreaming.
2 = "Benign" hallucinations with insight retained.
3 = Occasional to frequent hallucinations or delusions; without insight; could interfere with daily activities.
4 = Persistent hallucinations, delusions, or florid psychosis. Not able to care for self.

**3. Depression**
0 = None.
1 = Periods of sadness or guilt greater than normal, never sustained for days or weeks.
2 = Sustained depression (1 week or more).
3 = Sustained depression with vegetative symptoms (insomnia, anorexia, weight loss, loss of interest).
4 = Sustained depression with vegetative symptoms and suicidal thoughts or intent.

**4. Motivation/Initiative**
0 = Normal.
1 = Less assertive than usual; more passive.
2 = Loss of initiative or disinterest in elective (non-routine) activities.
3 = Loss of initiative or disinterest in day to day (routine) activities.
4 = Withdrawn, complete loss of motivation.

*II. ACTIVITIES OF DAILY LIVING (for both "on" and "off")*
**5. Speech**
0 = Normal.
1 = Mildly affected. No difficulty being understood.
2 = Moderately affected. Sometimes asked to repeat statements.
3 = Severely affected. Frequently asked to repeat statements.
4 = Unintelligible most of the time.

**6. Salivation**
0 = Normal.
1 = Slight but definite excess of saliva in mouth; may have nighttime drooling.
2 = Moderately excessive saliva; may have minimal drooling.
3 = Marked excess of saliva with some drooling.
4 = Marked drooling, requires constant tissue or handkerchief.

**7. Swallowing**
0 = Normal.
1 = Rare choking.
2 = Occasional choking.
3 = Requires soft food.
4 = Requires NG tube or gastrotomy feeding.

**8. Handwriting**
0 = Normal.
1 = Slightly slow or small.
2 = Moderately slow or small; all words are legible.
3 = Severely affected; not all words are legible.
4 = The majority of words are not legible.

**9. Cutting food and handling utensils**
0 = Normal.
1 = Somewhat slow and clumsy, but no help needed.
2 = Can cut most foods, although clumsy and slow; some help needed.
3 = Food must be cut by someone, but can still feed slowly.
4 = Needs to be fed.

**10. Dressing**
0 = Normal.
1 = Somewhat slow, but no help needed.
2 = Occasional assistance with buttoning, getting arms in sleeves.
3 = Considerable help required, but can do some things alone.
4 = Helpless.

**11. Hygiene**
0 = Normal.
1 = Somewhat slow, but no help needed.
2 = Needs help to shower or bathe; or very slow in hygienic care.
3 = Requires assistance for washing, brushing teeth, combing hair, going to bathroom.
4 = Foley catheter or other mechanical aids.

**12. Turning in bed and adjusting bed clothes**
0 = Normal.
1 = Somewhat slow and clumsy, but no help needed.
2 = Can turn alone or adjust sheets, but with great difficulty.
3 = Can initiate, but not turn or adjust sheets alone.
4 = Helpless.

**13. Falling** (unrelated to freezing)
0 = None.
1 = Rare falling.
2 = Occasionally falls, less than once per day.
3 = Falls an average of once daily.
4 = Falls more than once daily.

**14. Freezing when walking**
0 = None.
1 = Rare freezing when walking; may have start hesitation.
2 = Occasional freezing when walking.
3 = Frequent freezing. Occasionally falls from freezing.
4 = Frequent falls from freezing.

**15. Walking**
0 = Normal.
1 = Mild difficulty. May not swing arms or may tend to drag leg.
2 = Moderate difficulty, but requires little or no assistance.
3 = Severe disturbance of walking, requiring assistance.
4 = Cannot walk at all, even with assistance.

**16. Tremor** (Symptomatic complaint of tremor in any part of body.)
0 = Absent.
1 = Slight and infrequently present.
2 = Moderate; bothersome to patient.
3 = Severe; interferes with many activities.
4 = Marked; interferes with most activities.

**17. Sensory complaints related to Parkinsonism**
0 = None.
1 = Occasionally has numbness, tingling, or mild aching.
2 = Frequently has numbness, tingling, or aching; not distressing.
3 = Frequent painful sensations.
4 = Excruciating pain.

*III. MOTOR EXAMINATION*
**18. Speech**
0 = Normal.
1 = Slight loss of expression, diction and/or volume.
2 = Monotone, slurred but understandable; moderately impaired.
3 = Marked impairment, difficult to understand.
4 = Unintelligible.

**19. Facial Expression**
0 = Normal.
1 = Minimal hypomimia, could be normal "Poker Face".
2 = Slight but definitely abnormal diminution of facial expression.
3 = Moderate hypomimia; lips parted some of the time.
4 = Masked or fixed faces with severe or complete loss of facial expression; lips parted 1/4 inch or more.

**20. Tremor at rest** (head, upper and lower extremities)
0 = Absent.
1 = Slight and infrequently present.
2 = Mild in amplitude and persistent. Or moderate in amplitude, but only intermittently present.
3 = Moderate in amplitude and present most of the time.
4 = Marked in amplitude and present most of the time.

**21. Action or Postural Tremor of hands**
0 = Absent.
1 = Slight; present with action.
2 = Moderate in amplitude, present with action.
3 = Moderate in amplitude with posture holding as well as action.
4 = Marked in amplitude; interferes with feeding.

**22. Rigidity** (Judged on passive movement of major joints with patient relaxed in sitting position. Cog wheeling to be ignored.)
0 = Absent.
1 = Slight or detectable only when activated by mirror or other movements.
2 = Mild to moderate.
3 = Marked, but full range of motion easily achieved.
4 = Severe, range of motion achieved with difficulty.

**23. Finger Taps** (Patient taps thumb with index finger in rapid succession.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

**24. Hand Movements** (Patient opens and closes hands in rapid succession.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

**25. Rapid Alternating Movements of Hands** (Pronation-supination movements of hands, vertically and horizontally, with as large an amplitude as possible, both hands simultaneously.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

26. Leg Agility (Patient taps heel on the ground in rapid succession picking up entire leg. Amplitude should be at least 3 inches.)
0 = Normal.
1 = Mild slowing and/or reduction in amplitude.
2 = Moderately impaired. Definite and early fatiguing. May have occasional arrests in movement.
3 = Severely impaired. Frequent hesitation in initiating movements or arrests in ongoing movement.
4 = Can barely perform the task.

**27. Arising from Chair** (Patient attempts to rise from a straight-backed chair, with arms folded across chest.)
0 = Normal.
1 = Slow; or may need more than one attempt.
2 = Pushes self up from arms of seat.

3 = Tends to fall back and may have to try more than one time, but can get up without help.
4 = Unable to arise without help.

**28. Posture**
0 = Normal erect.
1 = Not quite erect, slightly stooped posture; could be normal for older person.
2 = Moderately stooped posture, definitely abnormal; can be slightly leaning to one side.
3 = Severely stooped posture with kyphosis; can be moderately leaning to one side.
4 = Marked flexion with extreme abnormality of posture.

**29. Gait**
0 = Normal.
1 = Walks slowly, may shuffle with short steps, but no festination (hastening steps) or propulsion.
2 = Walks with difficulty, but requires little or no assistance; may have some festination, short steps, or propulsion.
3 = Severe disturbance of gait, requiring assistance.
4 = Cannot walk at all, even with assistance.

**30. Postural Stability** (Response to sudden, strong posterior displacement produced by pull on shoulders while patient erect with eyes open and feet slightly apart. Patient is prepared.)
0 = Normal.
1 = Retropulsion, but recovers unaided.
2 = Absence of postural response; would fall if not caught by examiner.
3 = Very unstable, tends to lose balance spontaneously.
4 = Unable to stand without assistance.

**31. Body Bradykinesia and Hypokinesia** (Combining slowness, hesitancy, decreased arm swing, small amplitude, and poverty of movement in general.)
0 = None.
1 = Minimal slowness, giving movement a deliberate character; could be normal for some persons. Possibly reduced amplitude.
2 = Mild degree of slowness and poverty of movement which is definitely abnormal. Alternatively, some reduced amplitude.
3 = Moderate slowness, poverty or small amplitude of movement.
4 = Marked slowness, poverty or small amplitude of movement.

*IV. COMPLICATIONS OF THERAPY (In the past week)*
**A. DYSKINESIAS**

**32. Duration: What proportion of the waking day are dyskinesias present?** (Historical information.)
0 = None
1 = 1-25% of day.
2 = 26-50% of day.
3 = 51-75% of day.
4 = 76-100% of day.

**33. Disability: How disabling are the dyskinesias?** (Historical information; may be modified by office examination.)
0 = Not disabling.
1 = Mildly disabling.
2 = Moderately disabling.
3 = Severely disabling.
4 = Completely disabled.

**34. Painful Dyskinesias: How painful are the dyskinesias?**
0 = No painful dyskinesias.
1 = Slight.
2 = Moderate.
3 = Severe.
4 = Marked.

**35. Presence of Early Morning Dystonia** (Historical information.)
0 = No

1 = Yes

**B. CLINICAL FLUCTUATIONS**

**36. Are "off" periods predictable?**
0 = No
1 = Yes

**37. Are "off" periods unpredictable?**
0 = No
1 = Yes

**38. Do "off" periods come on suddenly, within a few seconds?**
0 = No
1 = Yes

**39. What proportion of the waking day is the patient "off" on average?**
0 = None
1 = 1-25% of day.
2 = 26-50% of day.
3 = 51-75% of day.
4 = 76-100% of day.

**C. OTHER COMPLICATIONS**

**40. Does the patient have anorexia, nausea, or vomiting?**
0 = No
1 = Yes

**41. Any sleep disturbances, such as insomnia or hypersomnolence?**
0 = No
1 = Yes

**42. Does the patient have symptomatic orthostasis?** (Record the patient's blood pressure, height and weight on the scoring form)
0 = No
1 = Yes

**_V. MODIFIED HOEHN AND YAHR STAGING_**

STAGE 0 = No signs of disease.
STAGE 1 = Unilateral disease.
STAGE 1.5 = Unilateral plus axial involvement.
STAGE 2 = Bilateral disease, without impairment of balance.
STAGE 2.5 = Mild bilateral disease, with recovery on pull test.
STAGE 3 = Mild to moderate bilateral disease; some postural instability; physically independent.
STAGE 4 = Severe disability; still able to walk or stand unassisted.
STAGE 5 = Wheelchair bound or bedridden unless aided.

**_VI. SCHWAB AND ENGLAND ACTIVITIES OF DAILY LIVING SCALE_**

100% = Completely independent. Able to do all chores without slowness, difficulty or impairment. Essentially normal. Unaware of any difficulty.
90% = Completely independent. Able to do all chores with some degree of slowness, difficulty and impairment. Might take twice as long. Beginning to be aware of difficulty.
80% = Completely independent in most chores. Takes twice as long. Conscious of difficulty and
slowness.
70% = Not completely independent. More difficulty with some chores. Three to four times as long in some. Must spend a large part of the day with chores.
60% = Some dependency. Can do most chores, but exceedingly slowly and with much effort.
Errors; some impossible.

50% = More dependent. Help with half, slower, etc. Difficulty with everything.
40% = Very dependent. Can assist with all chores, but few alone.
30% = With effort, now and then does a few chores alone or begins alone. Much help needed.
20% = Nothing alone. Can be a slight help with some chores. Severe invalid.
10% = Totally dependent, helpless. Complete invalid.
0% = Vegetative functions such as swallowing, bladder and bowel functions are not functioning.
Bedridden.

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