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Improving Motor Function and Quality of Life in Early-Stage Parkinson's Disease:

A Structured Exercise Intervention

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Introduction

Parkinson's Disease (PD) is a progressive neurodegenerative disorder affecting over one million Americans.

Motor symptoms include bradykinesia, rigidity, tremor, and postural instability, significantly reduce independence and quality of life.

Exercise is a powerful non-pharmacologic intervention shown to improve mobility, strength, and overall function.

Despite strong evidence, structured exercise programs are not consistently integrated into early PD care.

This DNP project evaluated a 12-week structured exercise intervention in early-stage PD.

Background

- **Problem:** Individuals with early-stage PD often experience functional decline and reduced activity levels. This contributes to physical disability, increased fall risk, and reduced quality of life.
- **Purpose:** The purpose of this project was to implement and evaluate a structured physical exercise program designed to improve motor function and quality of life in adults with early-stage PD.
- **Framework:** The Iowa Model of Evidence-Based Practice guided this project. The model emphasizes identifying a clinical need, implementing evidence-based change, and evaluating outcomes to promote sustainable practice transformation.

Research Question and Hypothesis

Research Question

- In adults with early-stage Parkinson's Disease, how does participation in a structured physical exercise program, compared with no structured exercise program, affect motor function and quality of life?

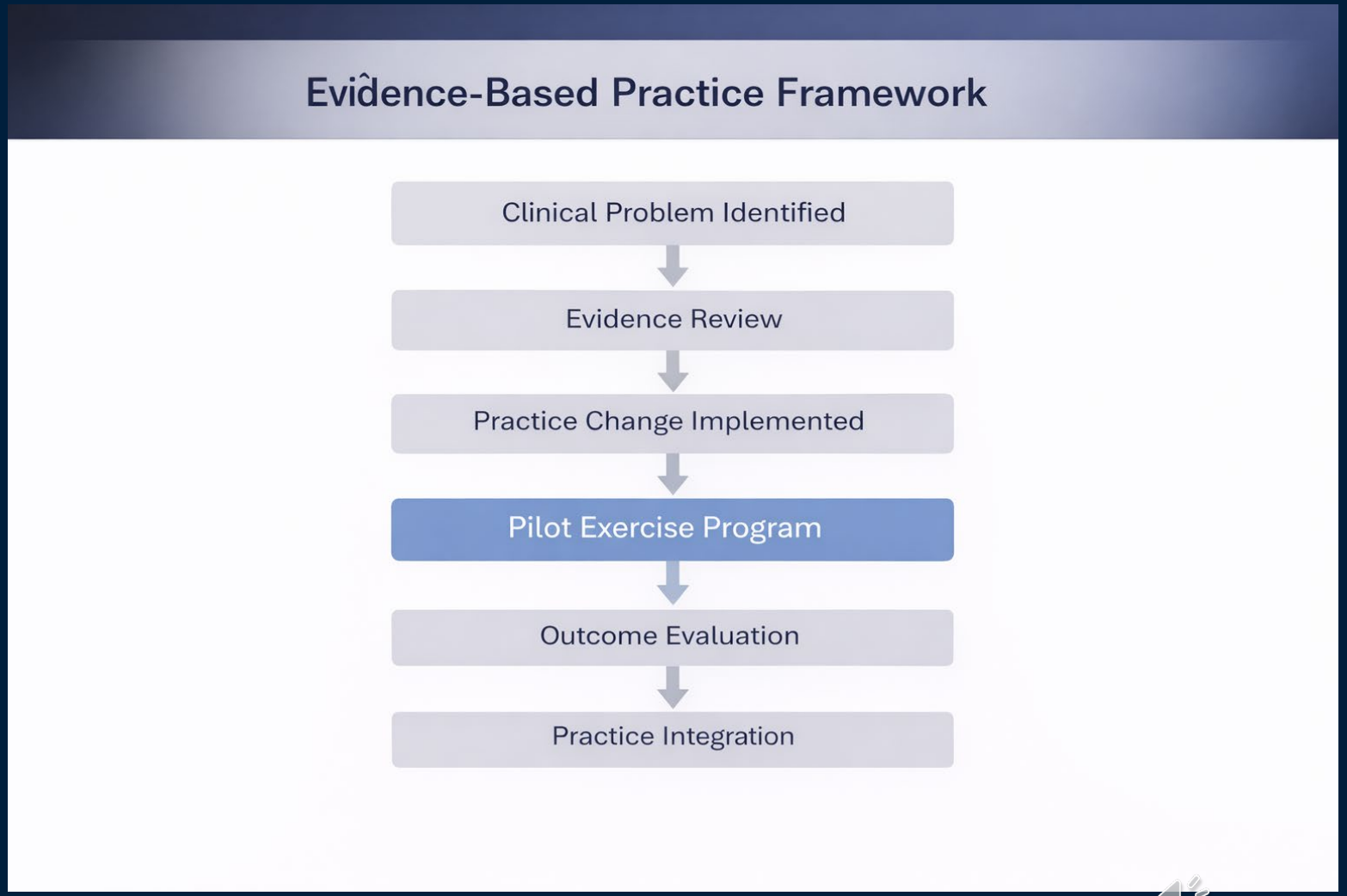
Hypothesis

- Participation in a structured exercise program will improve:
  - Motor function
  - Mobility
  - Quality of life

Measured using

  - UPDRS-III
  - Timed Up and Go (TUG)
  - PDQ-39

Theoretical Framework: Iowa Model of Evidence-Based Practice



Literature Review

Exercise = Key Non-Pharmacologic Strategy

Improves mobility, balance, and quality of life in early-stage Parkinson's Disease (PD).

- **Evidence Base**:
  - High-intensity, task-specific training promotes neuroplasticity (Petzinger et al., 2021).
  - Structured aerobic, strength, and balance training improves confidence and function (Mak et al., 2017; Schenkman et al., 2018).
- **Practice Gap**: Despite strong evidence, structured programs remain underused due to limited access and provider referral barriers.
- **Implication**: Integrating evidence-based, supervised exercise early in PD care supports independence and slows decline. Guided by the Iowa Model of Evidence-Based Practice for sustainable implementation.

Practice Gap

Despite strong evidence supporting exercise interventions in Parkinson's Disease:

- Fewer than 50% of patients receive structured exercise referrals
- Exercise recommendations are often general rather than program-based
- Access to specialized exercise programs remains limited

Result

- Patients may experience preventable functional decline and reduced quality of life.

Project Goal

- Translate evidence into practice by implementing a structured exercise intervention for early-stage PD.

Structure of the Exercise Program

Program Details

- 12 weeks
- 2–3 sessions per week
- Supervised group sessions

Program Goals

- Improve motor control
- Enhance balance & mobility
- Promote neuroplasticity

Methods

Design & Setting

- Mixed method pretest-post test project conducted in a community rehabilitation center
- **Participants**
- Convenience sample of 10 adults age 50+ with early-stage PD (Hoehn & Yahr I–II)
- **Intervention**
- 12-week supervised exercise program; 2–3 sessions/week for 45–60 minutes
- **Program Components**
- Aerobic warm-up, resistance training, balance and flexibility, posture/breathing, and cool-down

Methods (continued)

Outcome	Tool	Focus
Motor Function	UPDRS-III	Movement performance
Mobility	Time Up and Go (TUG)	Gait and balance
Quality of Life	PDQ-39	Daily living impact
Process	Attendance logs, feedback surveys	Adherence and satisfaction

Results

10 participants completed the 12-week structured exercise program.

Mean UPDRS-III score improved from 27.5 pre-intervention to 21.4 post-intervention.

All participants improved in motor function, with individual reductions of 5–7 points on the UPDRS-III.

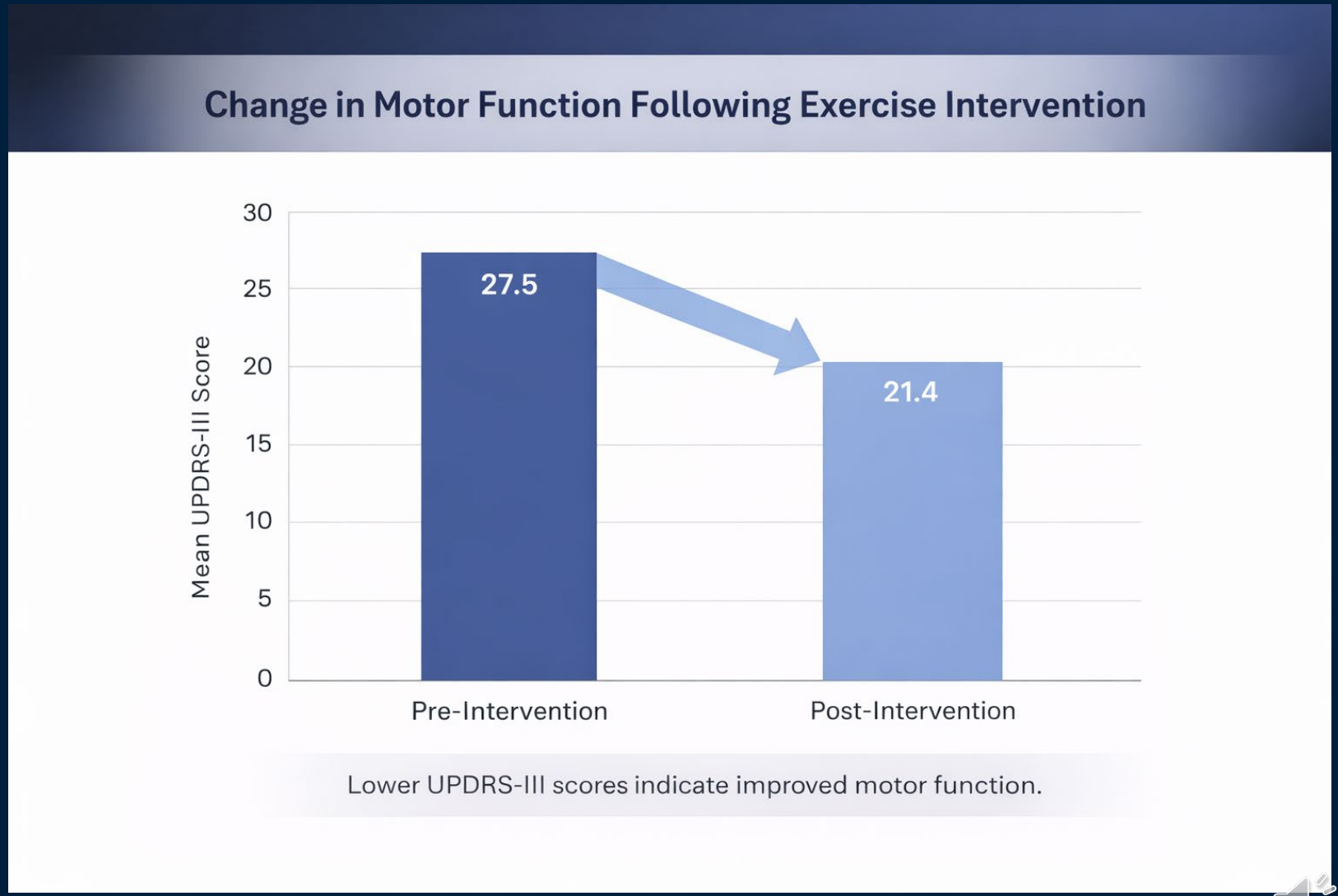
TUG performance improved for all participants, indicating better mobility and gait speed.

Participant Characteristics

Participant ID	Age (years)	Gender	Hoehn & Yahr Stage
PD-01	72	Male	I
PD-02	65	Male	II
PD-03	58	Female	I
PD-04	71	Male	II
PD-05	62	Male	II
PD-06	75	Male	II
PD-07	69	Female	II
PD-08	64	Male	I
PD-09	60	Female	I
PD-10	73	Male	I

- **Note.** All participants were diagnosed with early-stage Parkinson's Disease (Hoehn & Yahr stages I–II).
- **Table 1: Participant Characteristics**

UPDRS-III Motor Function Scores Pre- and Post-Intervention



Mobility and Quality of Life Outcomes Pre- and Post-Intervention

- **Note.** Lower scores indicate improved mobility (TUG) and improved quality of life (PDQ-39).
  - **Table 3: Mobility and Quality of Life Outcomes Pre- and Post-Intervention**

Participant ID	TUG Pre (sec)	TUG Post (sec)	PDQ-39 Pre	PDQ-39 Post
PD-01	13.2	11.4	42.1	34.2
PD-02	12.6	11	39.8	31.5
PD-03	11	9.7	34.2	27
PD-04	14.1	12.4	45.3	37.6
PD-05	12.4	10.6	32.5	24.8
PD-06	11.8	10.3	30.2	22.7
PD-07	13.6	11.7	38.1	30.2
PD-08	12.9	11.1	41.6	33.1
PD-09	11.7	9.9	35.9	27.8
PD-10	13	11.3	40.9	32

Process Measures - Attendance and Satisfaction

Participant ID	Attendance (%)	Satisfaction Rating
PD-01	91	Very satisfied
PD-02	87	Satisfied
PD-03	95	Very satisfied
PD-04	83	Neutral
PD-05	92	Very satisfied
PD-06	85	Satisfied
PD-07	94	Satisfied
PD-08	81	Neutral
PD-09	96	Very satisfied
PD-10	89	Satisfied

- **Note.** Satisfaction was assessed using a post-intervention survey.
- **Table 4: Process Measures - Attendance and Satisfaction**

Results (cont.)

PDQ-39 scores decreased after the intervention, reflecting improved quality of life.

Attendance was high; every participant attended at least 82% of scheduled sessions.

Most participants reported being satisfied or very satisfied with the program.

Discussion

Structured exercise demonstrated clinically meaningful improvements in motor function, mobility, and quality of life.

The consistent reduction in UPDRS-III scores supports exercise as a meaningful non-pharmacologic strategy during early disease stages.

High attendance and favorable satisfaction responses support the feasibility and acceptability of the intervention.

Findings are consistent with the literature supporting early exercise to preserve function and leverage neuroplasticity.

Limitations include small sample size, convenience sampling, lack of a control group, and short intervention duration.

Clinical Significance of Findings

Mean UPDRS-III improvement: 6.1 points

A ≥5-point reduction in UPDRS-III scores is considered clinically meaningful in Parkinson's Disease research.

Findings suggest structured exercise may:

Preserve functional independence

Reduce fall risk

Improve patient quality of life

Implications for Nursing Practice

Nurses play a key role in:

- Educating patients about exercise benefits
- Referring patients to structured exercise programs
- Supporting adherence and motivation
- Collaborating with interdisciplinary rehabilitation teams

Exercise should be considered a core component of Parkinson's disease management.

Sustainability and Practice Integration

Program sustainability strategies include:

Integrating exercise referrals into neurology visits	Collaboration with rehabilitation specialists	Community exercise partnerships	Electronic health record prompts

Goal: **Embed structured exercise into routine Parkinson's care.**

Recommendations for Future Research

Future studies should:

1. Include larger sample sizes
2. Use randomized controlled designs
3. Evaluate long-term outcomes
4. Explore optimal exercise intensity and frequency
5. Assess program accessibility across diverse populations

Summary

A structured 12-week exercise program was feasible and beneficial for adults with early-stage Parkinson's Disease.

Participants demonstrated clinically meaningful improvements in motor performance, mobility, and perceived quality of life.

Nurses and advanced practice providers should promote early referral to evidence-based exercise programs.

Integrating structured exercise into routine PD care may improve patient outcomes and support independence.

Future research should include larger randomized studies and long-term follow-up.

References

- Bloem, B. R., Okun, M. S., & Klein, C. (2021). Parkinson's disease. The Lancet, 397(10291), 2284–2303.
- Canning, C. G., et al. (2020). Exercise therapy for prevention of falls in people with Parkinson's disease: A systematic review and meta-analysis. Movement Disorders, 35(11), 1909–1918.
- Langeskov-Christensen, M., Franzén, E., Grøndahl Hvid, L., & Dalgas, U. (2024). Exercise as medicine in Parkinson's disease. Journal of Neurology, Neurosurgery & Psychiatry, 95(11), 1077–1088.
- Mak, M. K., Wong-Yu, I. S., Shen, X., & Chung, C. L. (2017). Long-term effects of exercise and physical therapy in people with Parkinson's disease. Nature Reviews Neurology, 13(11), 689–703.
- Petzinger, G. M., et al. (2013). Exercise-enhanced neuroplasticity targeting motor and cognitive circuitry in Parkinson's disease. The Lancet Neurology, 12(7), 716–726.
- Schenkman, M., et al. (2018). High-intensity exercise in early Parkinson disease. Neurology, 90(14), e1418–e1426.

Thank you very much!

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