

Effectiveness of Physical Therapy Based on Intervention Followed by a Home Exercise Program on Gait and Cognition in Individuals with Parkinson's Disease

Morgan R. Reich (Faculty Mentors: Dr. Crystal Ramsey and Dr. Srikant Vallabhajosula)
Department of Physical Therapy Education



Introduction

- The 4 cardinal symptoms of Parkinson's disease are rigidity, tremor, bradykinesia and postural instability. ¹
- Cognitive impairment is a common non-motor complication of PD. ¹
- PD is diagnosed in approximately 60,000 Americans each year and roughly 1 million people are predicted to be living with PD in the United States by the year 2020. ²
- Several studies have shown that individuals with PD exhibit decreased gait speed and shorter step length. ³
- It is not known if an individualized and patient-directed program improves these symptoms and whether a home exercise program (HEP) effectively sustains the benefits.
- It is important to address these factors to reduce fall risk and improve health-related quality of life in individuals with PD.

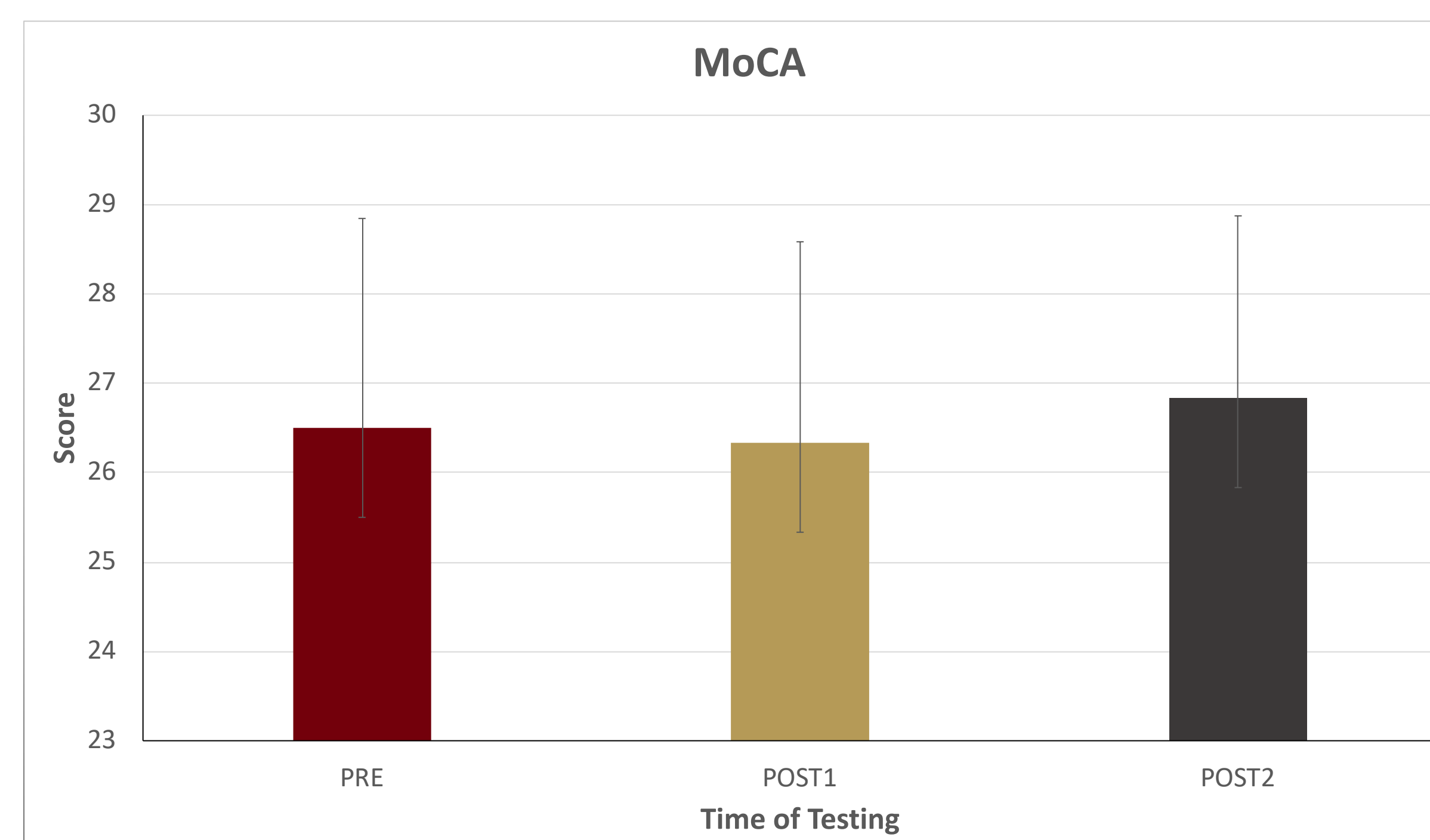
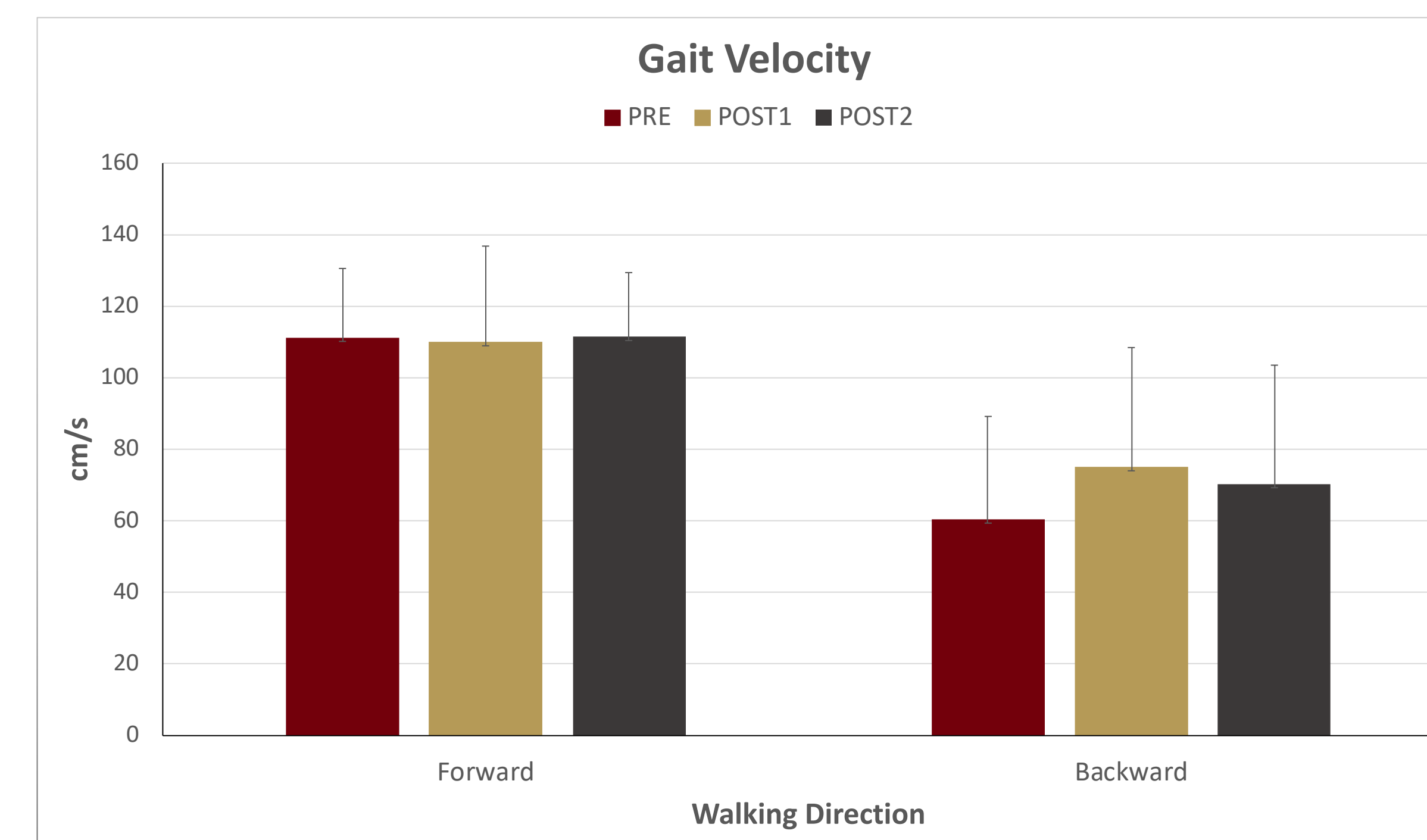
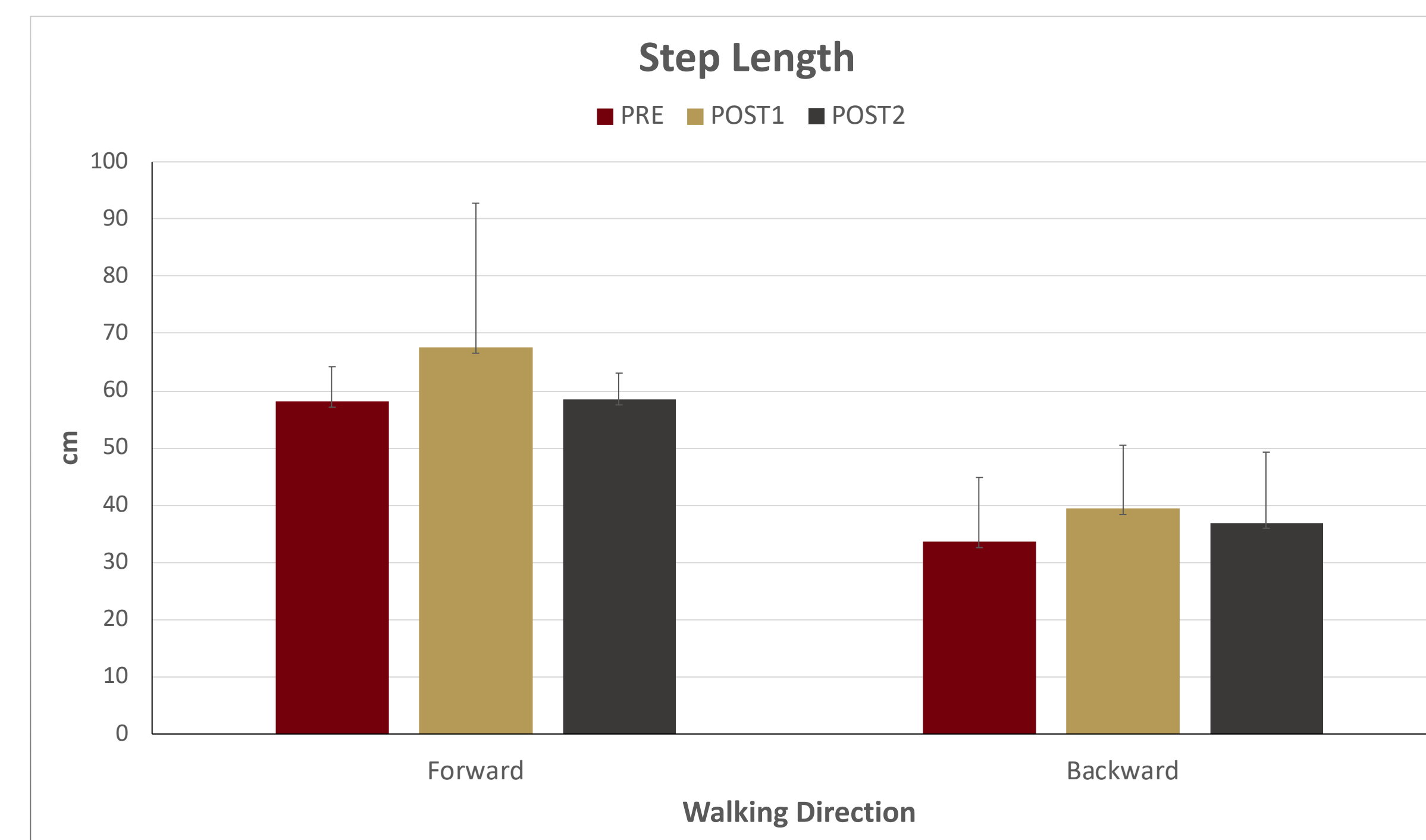
Purpose

To investigate the effectiveness of a physical therapy (PT)-based intervention followed by a home exercise program on gait and cognitive function in individuals with PD.

Methods

- Six individuals with PD (mean age = 70 ± 11.2 years), Hoehn and Yahr I-III participated in bi-weekly individualized program for 3 months supervised by a Physical Therapist and then received an individualized HEP for 3 more months with the participants informing the Physical Therapist of their preferred activities.
- Assessments of gait and cognition were administered before the interventions began (PRE), after the 3-month intervention period (POST1) and following the HEP phase (POST2).
- The Montreal Cognitive Assessment (MoCA) was used as a cognitive screening tool to detect clinical impairments.
- Subjects completed 5 forward and backward walking trials at their self-selected comfortable pace across a 16-foot instrumented walkway.
- Step length and gait velocity were calculated using the PKMAS software.
- Statistical analysis included separate one-way ANOVAs and a Bonferroni post hoc test to compare PRE, POST and POST2.

Results



Results Continued

- There were no significant differences between testing periods for forward step length ($p = 0.410$), forward velocity ($p = 0.953$), backwards velocity ($p = 0.088$) and MoCA ($p = 0.701$).
- For backwards step length, there was a significant difference between PRE, POST1 and POST2 as determined by one-way ANOVA ($p = 0.015$). A Bonferroni post hoc test revealed there were no significant differences between individual levels.

Discussion

- Backwards step length improved from PRE to POST1 and declined slightly from POST1 to POST2. A decline in function from POST1 to POST2 may be a result of not exercising at appropriate intensity at home compared with Physical Therapist supervision in addition to the rate of neurodegeneration. However, POST2 levels remained above PRE levels, which could be indicative of positive effects of Physical Therapist intervention on bradykinesia in individuals with PD.
- Sample size was a limitation for this study.

Conclusion

3 months of PT-based intervention followed by a 3 month HEP resulted in improved backwards step length. The preliminary results from this study can be used to further support the clinical focus on backward gait impairments as it relates to fall risk and disease progression.

References

1. Massano, J., & Bhatia, K. P. *Cold Spring Harbor Perspectives in Medicine*. 2012; 2(6).
2. Marras, C., Beck, J. C., Bower, J. H., Roberts, E., Ritz, B., Ross, G. W., Abbott, R. D., Savica, R., Van Den Eeden, S. K., Willis, A. W., & Tanner, C. *NPJ Parkinson's Disease*. 2018;4.
3. Sveinbjornsdottir, S. *Journal of Neurochemistry*. 2016; 139(S1), 318–324.