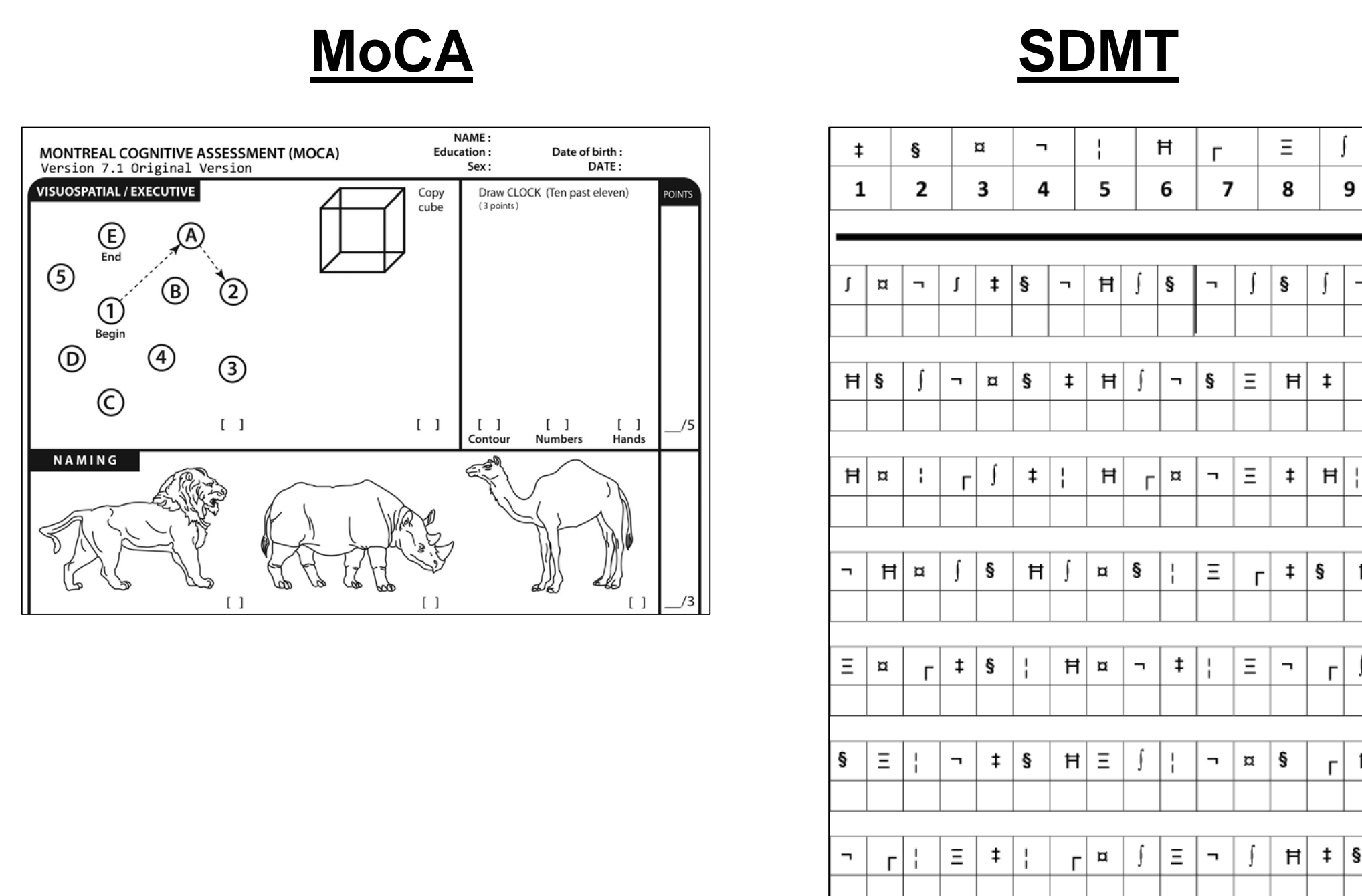


Introduction

Parkinson's Disease (PD) is a neurodegenerative disorder that predominately affects dopamine-producing neurons in a specific area of the brain called the substantia nigra¹. Approximately 60,000 Americans are diagnosed with PD each year, and nearly one million Americans will be living with PD by the end of 2020¹. Even though it is diagnosed by characteristic motor features (resting tremor, bradykinesia, limb rigidity, postural instability), PD can be accompanied by mild cognitive impairment². The Montreal Cognitive Assessment (MoCA) has been proven to be a valid test used by clinicians to identify mild cognitive impairment in patients with PD; however, the time it takes to complete the MoCA test has been seen as a problem³. **The aim of this study is to determine if the Symbol Digit Modalities Test (SDMT) can correctly predict the classification of cognitively impaired and cognitively normal in patients with PD.**

Methods

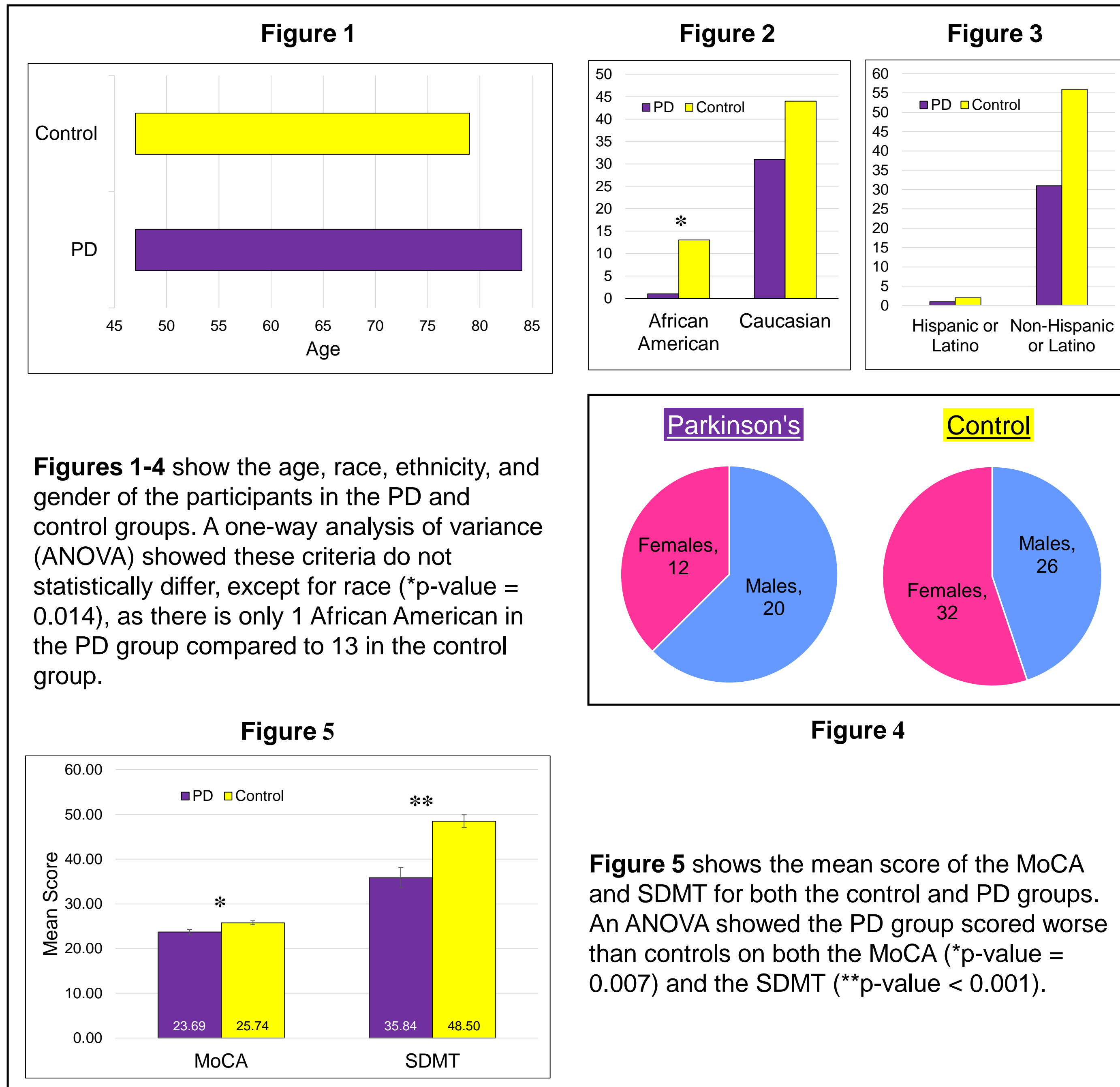
For this study, we recruited 32 patients with PD and 58 controls and administered both the MoCA and the SDMT to each participant.



The MoCA involves 30 questions that assess an individual's short-term memory, orientation, attention, abstraction, executive function, and language abilities. The SDMT is a short test where there is a symbol key at the top of the page that pairs each unique symbol with a single digit ranging from 1-9. Below the key, there are rows of the symbol only, and patients are asked to orally report the correct number for each corresponding symbol. The oral version was administered to prevent for any interference from motor impairment that would affect the written version.

Results

Parkinson's vs. Controls



Figures 1-4 show the age, race, ethnicity, and gender of the participants in the PD and control groups. A one-way analysis of variance (ANOVA) showed these criteria do not statistically differ, except for race (*p-value = 0.014), as there is only 1 African American in the PD group compared to 13 in the control group.

Figure 5 shows the mean score of the MoCA and SDMT for both the control and PD groups. An ANOVA showed the PD group scored worse than controls on both the MoCA (*p-value = 0.007) and the SDMT (**p-value < 0.001).

SDMT vs. MoCA

Figure 6 shows the correlation between the scores of the MoCA and SDMT of all participants. Statistical analysis gave a Pearson correlation value of 0.580 (p-value < 0.001). This shows that participants who score worse on one score worse on the other.

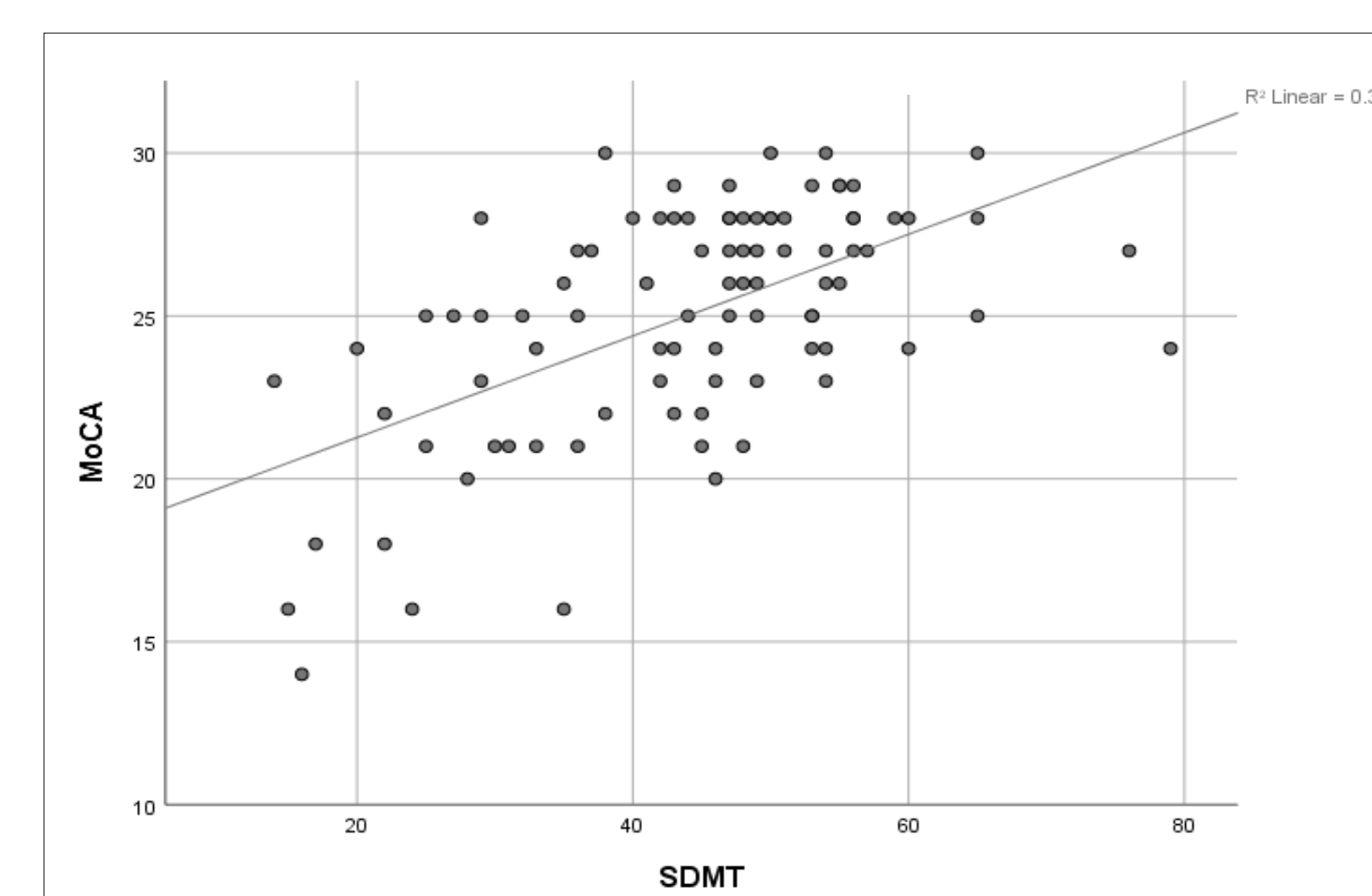


Figure 6

Classification

| | | SDMT | | Percentage Correct |
|--------------------|------------|------------|----------|--------------------|
| | | Unimpaired | Impaired | |
| MoCA | Unimpaired | 5 | 3 | 62.5 |
| | Impaired | 0 | 24 | 100.0 |
| Overall Percentage | | | | 90.6 |

Table 1 Participants were divided into impaired based on a MoCA score <26 or unimpaired score ≥26. In a logistic regression analysis, the SDMT correctly classified 90.6% of all the participants in the correct group even with age and education as variables in the equation (Wald χ^2 .4.3, p = 0.38).

Figure 7

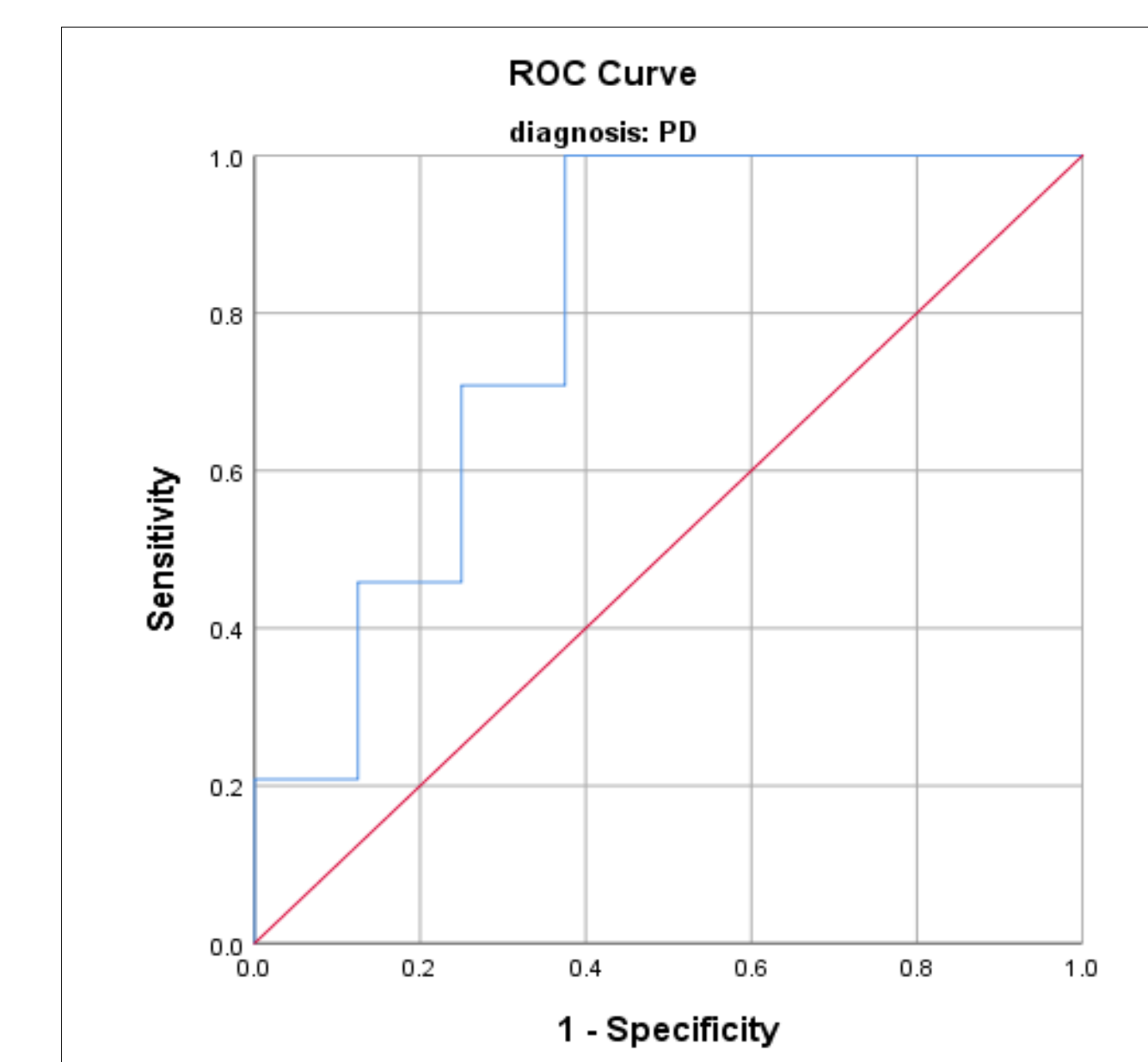


Figure 7 shows the Receiver Operating Characteristics (ROC) curve, which calculated an area under the curve value of 0.80. This test was run to determine the sensitivity of the SDMT screening in PD patients.

Conclusions

- Patients with PD perform worse on the SDMT than controls
- The SDMT and MoCA are positively correlated
- The SDMT is a brief assessment that may be an effective test used to detect mild cognitive impairment in PD

References

- [1] Parkinson's Foundation, <https://www.parkinson.org/>
- [2] Muslimovic D, Post B, Speelman JD, Schmand B. Cognitive profile of patients with newly diagnosed Parkinson disease. *Neurology* 2005;65:1239-1245.
- [3] Hoops, S., Nazem, S., Siderowf, A. D., Duda, J. E., Xie, S. X., Stern, M. B., & Weintraub, D. (2009). Validity of the MoCA and MMSE in the detection of MCI and dementia in Parkinson disease. *Neurology*, 73, 1738-1745. doi:10.1212/WNL.0b013e3181c34b47