Smartphones as a Cognitive Prosthetic in Parkinson's Disease: A Pilot Study

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INTRODUCTION

- Parkinson disease (PD) is associated with cognitive as well as motor impairment.
- One potential non pharmacological treatment of PD cognitive impairment is the utilization of everyday technologies to support memory. For example, using GPS to help with directions or a reminders app to help remember what to get at the store.
- We use the term Technological Reserve (TR) to refer to the development of technology rich habits and devices to support cognitive functioning in those with neurodegenerative disease.
- To date, there has been little work studying how TR might work in individuals with PD.
- Thus, the purpose of this pilot study was to evaluate:

1) **How individuals with PD are using smartphones as cognitive prosthetics.**
2) **If high cognitive prosthetic use is associated with lower perceived day to day cognitive difficulties.**

METHODS AND PARTICIPANTS

- 18 participants with PD and their collaterals participated.
- Individuals were screened over the phone to preclude those with dementia, then neuropsychological testing was used to categorize them as having mild cognitive impairment (MCI) (N=7) or no MCI (N=11).
- Participants then completed a modified Media and Technology Usage scale that included more questions germane to cognitive prosthetic features. The group was stratified into high and low utilizers from these results. High utilizers were above the average in self-reporting use of cognitive prosthetic features. Low utilizers were below the average.
- Collaterals also completed an E-Cog questionnaire. The E-Cog questionnaire allowed caregivers an index of their patient's day to day cognitive difficulties. Higher E-Cog scores mean worse perceived day to day function; lower E-Cog scores mean better perceived day to day function.
- The subjects' average age was 73, with most having college degrees, mild PD, mild PD motor dysfunction, and all owning a smartphone.

RESULTS

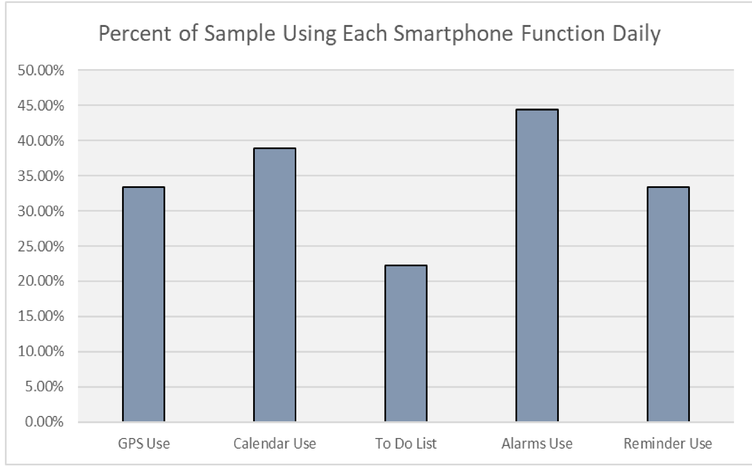

Figure 1: A percentage of respondents reporting daily cognitive prosthetic smartphone functions within the sample group, N = 18.

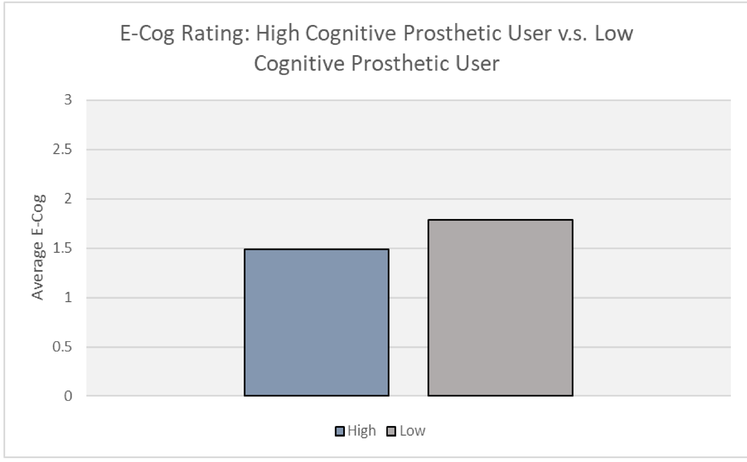

Figure 2: A measurement of day-to-day cognitive difficulties between high and low cognitive prosthetic users within the sample group, N = 18, Welch's T-score = -1.33, Cohen's D = -0.59, p = 0.10.

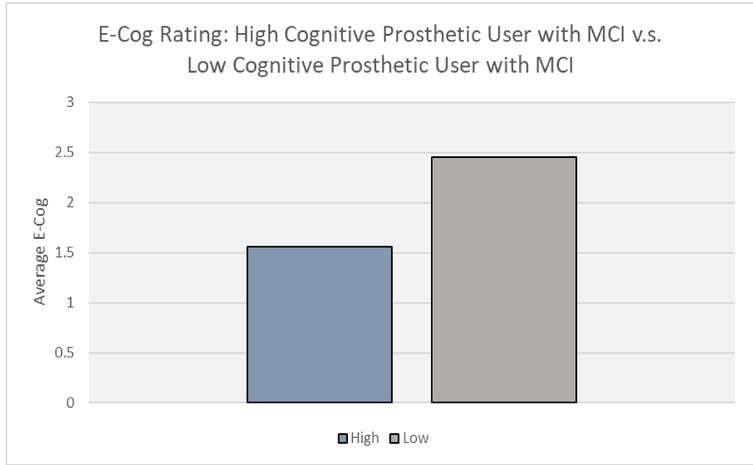

Figure 3: A measurement of day-to-day cognitive difficulties between high and low cognitive prosthetic users within the MCI sample group, N = 7, Welch's T-score = -2.19, Cohen's D = -1.58, p = 0.10.

CONCLUSIONS

- Patients who reported higher cognitive prosthetic use were perceived as having fewer day to day cognitive difficulties, but also tended to have less overall cognitive impairment as measured by neuropsychological tests.
- However, even when only individuals with MCI diagnoses were evaluated, there was a trend toward less perceived day to day cognitive difficulties in those with high technology.
- Overall, the use of daily technologies may help buffer perceived day to day cognitive difficulties in individuals with Parkinson's Disease. Technological interventions may be a way of modifying the impact of cognitive decline on important patient centered outcomes.
- Future projects should look at increasing the sample size and configuring demographics variables – education status, smartphone access and usage, technological literacy, self-reporting, and cognitive status – to expand future results.