

Novelty Seeking in Individuals with Parkinson's Disease and Mild Cognitive Impairment

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Introduction

- Parkinson's Disease (PD) is a neurodegenerative disease associated with motor and cognitive deficits as well as changes in personality and temperament.
- Novelty seeking (NS), a personality characteristic that is related to increased excitement in response to new stimuli or cues of potential rewards, was found to be decreased in individuals with PD (Santangelo et al., 2017; Kaasinen et al., 2004).
 - NS is also closely linked to dopamine activity (Cloninger, 1987).
- Throughout PD progression, decreased dopaminergic activity has been associated with cognitive decline from normal to mild cognitive impairment (MCI) (Silver and Kaye, 2010).
- NS and cognition have both been found to be related to decreased dopaminergic activity in PD; therefore, we hypothesize that individuals with PD and greater levels of cognitive impairment will exhibit less NS.
 - Comparing the differences in NS between PD patients with and without MCI can provide more knowledge about the personality profiles of patients with PD - informing clinicians of how to develop treatment plans that work with their typical patterns of behaviors.
- To investigate this hypothesis, the current study compared NS in individuals with PD and mild cognitive impairment (PD-MCI) to those with PD and normal cognition (PD-N).

Methods

Participants

Table 1. Demographic and Parkinson's Disease-Related Characteristics for non-demented individuals (n = 84)

	PD-N (n = 48) Mean (SD)	PD-MCI (n = 36) Mean (SD)	P-value
Age	66.90 (7.27)	69.39 (6.78)	0.11
Education	16.87 (2.41)	15.74 (2.82)	*0.05
Gender (# of M/F)	28/20	26/10	0.19
Disease Duration (Months)	72.88 (65.93)	55.61 (41.23)	0.17
LED	726.47 (670.75)	635.76 (455.04)	0.49
Hoehn & Yahr (H&Y) stage %	14.6 / 4.2 / 52.1 / 6.3 / 20.8 / 2.1 /	22.2 / 0 / 55.6 / 5.6 / 11.1 / 2.8 /	0.73
1 / 1.5 / 2 / 2.5 / 3 / 4 / 5	0	2.8	
HAMD Total Score	4.81 (4.89)	4.03 (4.07)	0.44
Mattis DRS Total Score	139.98 (2.95)	136.69 (4.06)	** < 0.001

Note: Levodopa Equivalent Dosage (LED) was calculated using the criteria of Tomlinson et al. (2010).

Unified Parkinson's Disease Rating Scale (UPDRS) was administered by a senior neurologist specializing in movement disorders who determined the Hoehn & Yahr stage.

Dementia was based on a total score of >123 on the Mattis Dementia Rating Scale (MDRS).

Confirmed diagnosis of idiopathic PD based on UK Brain Bank criteria.

Materials

- Participants were administered a modified version of the Temperament and Character Inventory (mTCI), a self-report questionnaire that measures Novelty Seeking (NS).
- NS consists of a total score and scores for 4 facets:
 - Exploratory Excitability vs Stoic Rigidity (NS1)
 - Impulsiveness vs Reflection (NS2)
 - Extravagance vs Reserve (NS3)
 - Disorderliness vs Regimentation (NS4)
- Higher scores in each facet reflect that the individual endorsed more of the former characteristics (excitability, impulsiveness, etc.) whereas lower scores reflect endorsement of more of the latter (rigidity, reflection, etc.).

Statistics

- Independent samples T-Tests were conducted to determine if the demographic and disease-related characteristics were significantly different between the PD-N group and the PD-MCI group (Table 1).
 - Education ($p = 0.05$) was significantly different between the two groups.
- Correlations were also conducted to examine the relationships between NS (Total; NS facets 1-4) and the demographics and disease characteristics in Table 1.
 - Mood, represented by HAMD, was significantly associated with NS3 ($p = 0.02$) and NS4 ($p = 0.03$); no other demographics/characteristics were associated with NS.
- While controlling for education and mood, analyses of covariance (ANCOVAs) were conducted wherein the NS Total and NS facets 1-4 were set as separate dependent variables to investigate group differences.

Results

Figure 1. PD-MCI reported significantly less Total Novelty Seeking overall compared to PD-N above and beyond education and mood

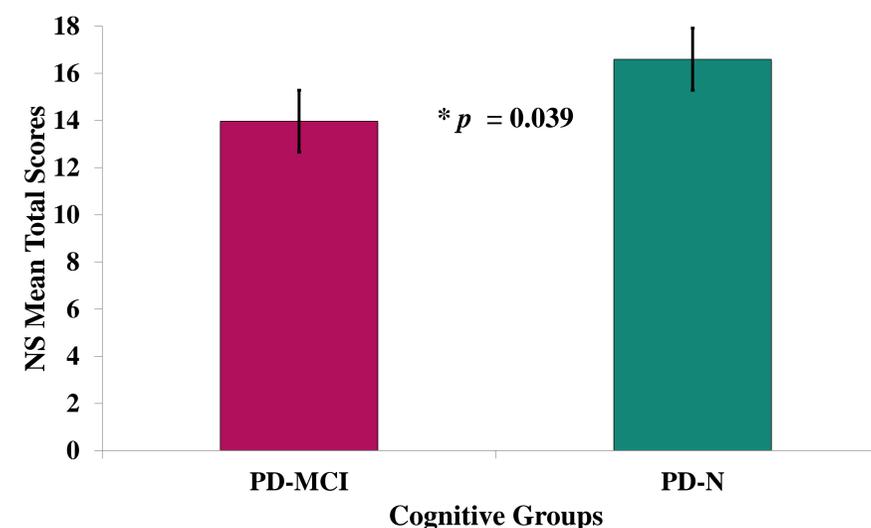


Figure 2. PD-MCI reported significantly less Extravagance (more Reserved) compared to PD-N above and beyond education and mood

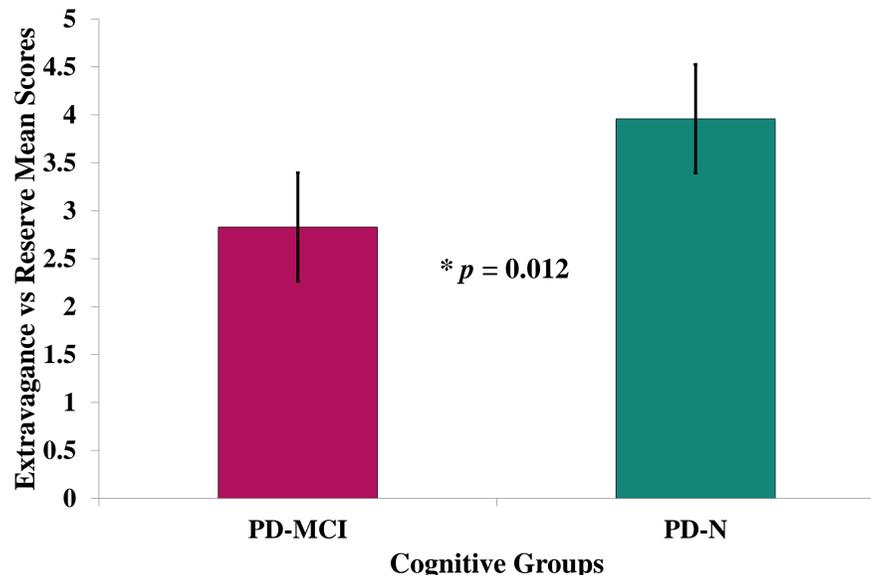
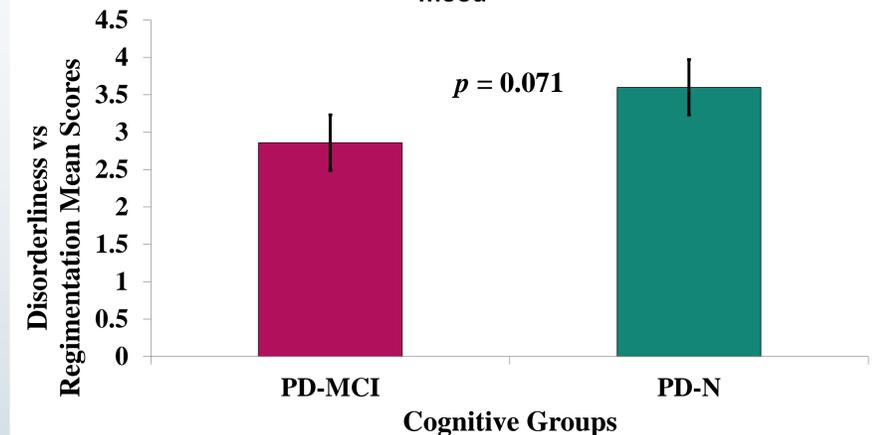


Figure 3. PD-MCI tended to report less Disorderliness (more Regimentation) compared to PD-N above and beyond education and mood



Summary

- The PD-MCI group endorsed significantly less novelty seeking specific to the Extravagance vs Reserve facet (i.e., more reserved) and trended towards lower scores in the Disorderliness vs Regimentation facet (i.e., more regimented) than individuals with PD and normal cognition above and beyond the effects of education and mood.

Conclusion/Discussion

- These findings suggest that individuals with PD and MCI may be more reserved (unwilling to utilize available resources) and regimented (cognitively inflexible) than individuals with PD and normal cognition.
 - Therefore, an individual with more cognitive deficits may not be as willing and open to try new things such as a new treatments or recommended lifestyle changes.
- Based on a patient's cognitive status, clinicians can be informed of the potential behaviors associated with the novelty seeking personality characteristic.
 - Thus, it may be beneficial for providers to tailor specific treatment recommendations for their PD patients depending on their patient's cognitive status.
 - For example, clinicians may want to emphasize and explain the benefits of new treatment or lifestyle changes to a PD-MCI patient who may be reluctant to deviate from their routine.
- However, it has yet to be shown whether cognition causes the changes in personality or vice versa.
 - Future longitudinal studies investigating the changes in both cognition and NS in PD could further expand our knowledge regarding the relationship between personality and cognition in PD.

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