The Effect of Apathy on Semantic Category Fluency Performance in Alzheimer's Disease Patients with MCI

Zachary Peart, B.S., Christina Nunez, M.S., Brittny Arias, B.S., Charles Golden, Ph.D.
Nova Southeastern University

NSU Florida
College of Psychology
NOVA SOUTHEASTERN UNIVERSITY

Introduction

Apathy is a common symptom that is observed in Alzheimer's disease (AD) which has been associated with increased functional impairment, caregiver burden, and mortality. The syndrome has been described more recently as reflecting deficits in executive functioning and goal-directed behavior. Recent research suggests a shared neural mechanism underpinning cognitive apathy and planning deficits in AD, and reduced performance on tests of executive functioning including verbal fluency. Among those with AD, patients within the category of MCI often show high levels of depression, and further study of the cognitive impact of apathy is warranted in this population.

Purpose: To investigate the effects of apathy on measures of semantic category fluency in a sample of AD/MCI patients while controlling for significant covariates including demographic factors and global cognitive impairment.

Method

- Data from this study were collected by the National Alzheimer's Coordinating Centers. The NACC database is funded by NIA/NIH Grant U24 AG072122. NACC data are contributed by the NIA-funded ADRCs.
- Inclusion criteria: clinician diagnosis of MCI and AD, MMSE score of 19-24
- Covariates included race, sex, education, MMSE
- Pre-test data of the sample are presented in Table 1
- ANCOVAs were used to investigate whether the presence and severity of apathy were associated with lower performance on neuropsychological tests of semantic category fluency.

Table 1. Pre-test Data

Apathy Severity	n	Age (yr.)	Sex (% female)	Education (yr.)	MMSE
None	2,393	75.68	58	14.05	21.83
Mild	833	74.99	55	14.19	21.71
Moderate	567	74.72	47	14.51	21.65
Severe	157	75.19	53	13.85	21.47

Table 2. Performance on Verbal Fluency Tasks

Apathy Severity	Vegetable		Animal	
	M	*SD*	*M*	*SD*
None	7.36	3.35	11.11	.09
Mild	7.15	3.47	10.94	.15
Moderate	6.69	3.25	10.40	.18
Severe	6.71	3.61	9.98	.34

Results

The severity of apathy had a significant effect on semantic category fluency performance in both tasks:

- Animal naming: $F(3,3852)=5.70, p<.001, \eta_p^2=.004$
- Vegetable naming: $F(3,3800)=2.91, p=.033, \eta_p^2=.002$

On the animal naming task, those with no apathy scored significantly higher than the moderate ($p=.004$) and severe ($p=.046$) groups. (Table 2)

On the vegetable naming task, the no apathy group scored higher on average than the mild, moderate, and severe groups. However, these findings did not maintain statistical significance following Bonferroni corrections. (Table 2)

Discussion

The findings of this secondary analysis support previous research suggesting that apathy is associated with modestly lower performance on neuropsychological tests of verbal fluency. The presence of apathy may signal more widespread disease pathology and deficits in executive functioning, which could aid clinicians in diagnosis of neurodegenerative disease and provide researchers with new insights into pathological mechanisms of AD. Alternatively, the psychiatric symptom may be a result of reduced psychological well-being and lowering performance on tests due to lack of motivation independent of actual cognitive ability. This in turn suggests that clinicians may overstate the degree of actual cognitive problems when apathy is not considered. In such cases, interventions targeting apathy may be more effective than cognitive interventions. Future research should investigate treatments targeting apathy in this population, and the potential etiological link between apathy and cognitive impairment.

Conclusion

After controlling for race, sex, education, and MMSE score, results suggest a relationship between apathy and reduced performance on semantic category fluency assessments in AD patients of MCI status.

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