How Well Does the ADAS-Cog Measure the Spectrum of Alzheimer's Disease Severity?

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BACKGROUND

The ADAS-cog is the most frequently used measure in clinical trails of Alzheimer's disease (AD) medications.

Despite its widespread use, little is known about the psychometric properties of the ADAS-cog subscales.

The purpose of the current study was to use Item Response Theory analyses to determine how the ADAS-cog subscales perform across the spectrum of AD related cognitive impairment.

METHODS

PARTICIPANTS

We evaluated ADAS-cog scores from a sample of 1,239 dementia patients from an AD center.

Patients were selected for this analysis if they had a diagnosis of dementia and had completed the ADAS-cog during their most recent visit to the clinic.

Most (83.9%) had probable AD, while 5.9% had possible AD (a category which included individuals with mild cognitive impairment), and 5.2% met the criteria for probable AD as well as for another neurodegenerative process, and 5.2% carried a diagnosis of mixed AD and vascular dementia or vascular dementia alone.

All diagnostic formulations were made using appropriate diagnostic guidelines (for example, NINCDS-ADRDA criteria).

Patients averaged 74.7 (SD = 8.5) years of age, had 13.8 (SD = 3.5) years of education, were 62.9% female and 96% Caucasian.

The sample had a mean score on the ADAS-cog of 31.0 (SD = 16.5), a MMSE score of 17.1 (SD = 7.3), and a mean CDR global score of 1.5 (SD = 0.9).

MEASURES

ADAS-cog: This instrument measures several domains of cognition including:

Recall
Recognition
Orientation
Language comprehension
Expressive Language / Naming
Praxis / Construction

Scores range from 0 (no errors) to 70 (all errors).

METHODS (CONT.)

PROCEDURE

Patients underwent full neurological and neuropsychological evaluations at baseline and yearly.

As part of this larger protocol, patients were administered the ADAS-cog by trained psychometricians.

The most recent ADAS-cog scores were selected for the current study to allow for the inclusion of a broad range of dementia severity in the analysis.

DATA ANALYSIS

The analyses were conducted within an Item Response Theory (IRT) framework.

IRT analyses allow for the evaluation of how items perform across the spectrum of a latent variable. Thus, in the current study we could evaluate the relationship of observed scores to latent cognitive impairment in AD.

FIGURE 1. FACTOR ANALYSIS

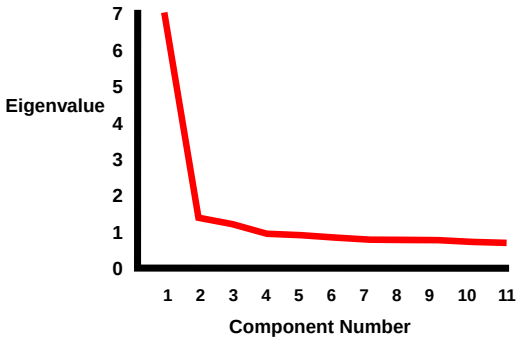


FIGURE 2. TEST CHARACTERISTIC CURVE

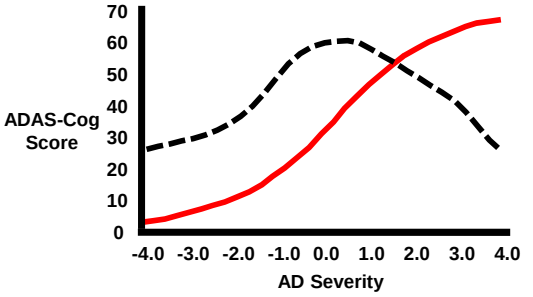
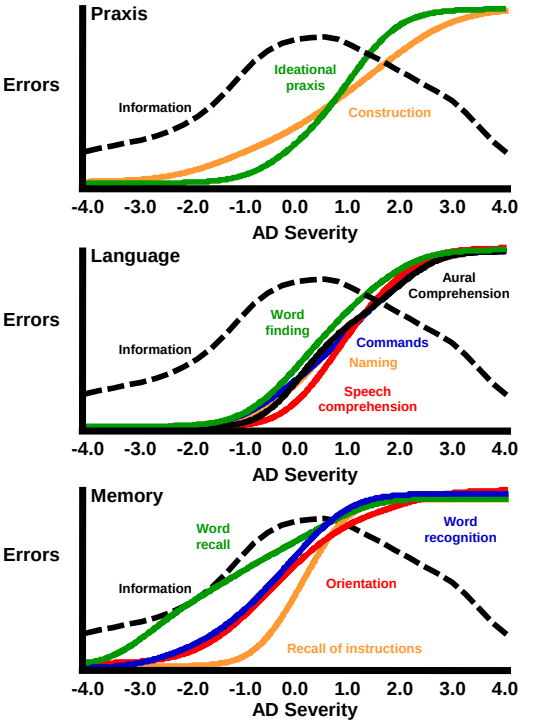


FIGURE 3. ITEM CHARACTERISTIC CURVES



RESULTS AND DISCUSSION

1. The magnitude of dementia severity represented by each point on the ADAS-cog is not equal across the scale. A 3-point difference can represent an actual difference of dysfunction of anywhere from .70 SDs to .14 SDs of disease severity.
2. Subtests tended to provide maximum information at more moderate stages of dementia severity.
3. Only performance on the immediate free recall task measured AD well at mild stages of the disease.
4. Using IRT, other measures (e.g., delayed recall) may be added that are sensitive to mild AD, thus allowing the ADAS-cog to provide more information at very mild levels of the disease.

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