

Title: Rasch analysis to test the cross-cultural item equivalence of the Alzheimer's Disease

Assessment Scale – Cognition (ADAS-Cog)

Authors: Anzalee Khan^{1,2}, Ioan Stroescu¹, Alexandra Atkins¹, Rich Keefe^{1,3}

¹NeuroCog Trials

²Nathan S. Kline Institute for Psychiatric Research

³Duke University

Abstract

Methodological Question: Bias is a significant challenge to the validity of cognitive tests. Differential item functioning (DIF) is present when different groups have differing responses on test items, after controlling for overall ability. Differential Item Functioning (DIF) investigates the items in a test, one at a time, for signs of interactions with sample characteristics. Item functioning is intended to be invariant with respect to aspects of the participants, such as gender, ethnicity and cultural status. The DIF analysis for one item is as independent as possible of the DIF analyses of the other items. But a consequence is that the overall impact of item DIF, accumulated across the whole test, is unclear. As the ADAS-Cog is translated and utilized across many countries, identifying items that show DIF for various geo-cultural groups, can help guide rater training and data monitoring programs to develop tailored training across cultures. Do test items on the ADAS-Cog function in different ways for different geo-cultural groups?

Introduction: The specific aim of this study was to examine the cross-cultural differences of the ADAS-Cog items across geo-cultural regions.

Methods: Data from the Critical Path Institute Online Data Repository (CODR) was used. The dataset included 3,939 subjects with AD. For the geo-cultural group: Africa (n = 95), Australia (n = 164), Eastern Asia (n = 46), Northern Europe (n = 503), Southern Europe (n = 162), Russia (n = 23), Southern Europe (n = 334), North America (n = 2,571). Africa, Eastern Asia and Russia were not included in the analysis due to small sample size. A principle components analysis assessed unidimensionality of the subscales. Differential Item Functioning (DIF) analysis examined cross-cultural differences among each item of the ADAS-Cog.

Results: Across all groups moderate to significant differential item functioning ($p \leq .0038$) was found for all groups for the Word Recognition Task, Word Recall and comprehension Language subtests, with Africa showing the most significant differences compared to North America (the reference or comparison

group). Individuals in Africa also had significant difficulties scoring the comprehension subtest compared to other groups. Australia and Northern Europe also had difficulties with the Orientation subtest.

Conclusions: The results of the current study further highlight the need for thorough individualized training and data review of scores on the ADAS-Cog across different groups (geo-cultural), to reduce sources of unreliability. A strength of the DIF analysis is that problematic items are identified and specific modifications are performed to improve efficacy and sensitivity to change. The results showed support to further assess administration and scoring of specific items across cultural groups.