A systematic review of neuropsychological tests for the assessment of dementia in non-Western, low educated or illiterate populations

Sanne Franzen
Neuropsychologist/researcher
Erasmus Medical Center, Rotterdam, the Netherlands
**Introduction**

The world population is aging, especially in LMIC. In Europe: aging of labor immigrants

Literacy rates among elderly are low: India 42%, China 74%, Brazil 74%, Africa (general) <50%

Current neuropsychological assessment based on Western, higher educated populations.

What instruments are available to diagnose dementia in patients with a non-Western, low educated background?
Study aims

1. Generate an overview of all studies with low-educated, non-Western participants investigating either:
   - Traditional neuropsychological tests with/without adaptations
   - New, assembled neuropsychological tests

2. Examine the quality of these studies, the validity and reliability of the tests and determine cross-cultural and cross-linguistic potential
Methods – inclusion criteria

- Dementia, MCI or CIND
- Study conducted in non-Western country or non-Western population in a Western country (Western: EU/EEA, Australia, NZ, USA, Canada)
- Study included low educated or illiterate people

Excluded:
- Screening tests
- Intelligence tests
- Studies in healthy controls only
Methods

Medline, Embase, Web of Science, Cochrane, Psycinfo and Google Scholar

Studies up to August 2018
Results: included studies
Results

44 studies:

- 17 studies on Alzheimer; 16 on MCI/dementia unspecified; 11 studies mixed population (e.g. AD and non-AD); 1 study Parkinson’s disease dementia
- Only 5 studies using existing tests sufficiently describe their adaptation procedures
- Relatively few studies described blinding procedures (15)
- Few studies described using multiple sources to confirm the diagnosis (e.g. imaging)
Results - Memory

Most extensively studied (14 tests, 18 studies). Story recall tests, word lists, Wechsler Memory Scale subtests, cued recall (often with pictures)

Fuld Object Memory Evaluation (FOME) > everyday household objects, multisensory modality method (touch/see/hear)

AUCs were high (0.74-0.99)
Results - Language

12 studies, mostly naming tests, only 3 other types of tests: Token, Comprehension WAIS, Vocabulary WAIS

Often (adapted) Boston Naming Test > (unsuitable) black-and-white line drawings

Remarkable differential item functioning in 1 study (acorn/pomegranate vs mermaid/compass)

Variable AUC (0.61-0.90), no information about Comprehension and Vocabulary from the WAIS
Results – Attention

8 studies – 5 tests: Five Digit Test, TMT, Digit Span, Corsi Block Tapping Test and Digit Symbol

Traditional tests, such as TMT, led to “frustration” or up to 100% failure rate in low educated patients (even healthy controls!)

AUCs rather low 0.66-0.84 (Digit Span especially variable)

Relatively new test is the Five Digit Test:
Results – Executive functioning

13 studies – 2 tests: verbal fluency and Tower of London

AUCs were fair to excellent for both instruments (0.79-0.94)

Different optimal cut-offs may be required for low-educated people

Some tests in domain attention also tap EF
Results - Visuospatial

17 studies – 7 tests: Clock Drawing Test, Constructional Praxis test, Stick Design Test, Block Design, Object Assembly WAIS, Olfactory Identification Test and Cross-Cultural Smell Identification Test

Traditional tests are unsuitable; wide-range of AUCs, sometimes not reported

Stick Design Test more acceptable and lower failure rates, but possible ceiling effects. Variable performance in Nigeria vs. Brazil

Olfactory Identification Test (Hong Kong) > describes adaptation procedure
Results (assessment batteries)

5 studies: CERAD (2 studies), Literacy Independent Cognitive Assessment (LICA), European Cross-Cultural Neuropsychological Test Battery (CNTB), Non-Linguistic Cognitive Assessment (NLCA)

CERAD: 8/20 participants “not testable” (Jamaica), designing Korean equivalent was hard

CNTB: mostly good AUCs, except for picture naming and visuoconstruction

LICA: AUC 0.83, with potentially interesting subtests, validity subtests unknown

NLCA: (mostly) traditional tests with non-verbal instructions, AUC 0.94 (subtest validity unknown)
Discussion: limitations and recommendations

Limitations

• Few studies from Africa and the Middle East > no word for ‘neuropsychology’; other databases?
• African Americans excluded from the review
• Studies in healthy controls, screening tests?

Recommendations:

• Describe blinding and support diagnosis with additional biomarkers
• Describe adaptation procedures (use International Test Commission guidelines)
Discussion: future studies

- Include other types of dementia, such as VaD, FTD

- Other aspects of cognitive functioning: symptom validity tests (see: Nijdam-Jones), social cognition, gnosis, orientation

- Possibly: increase ecological validity? VR?
Conclusions: recommendations for clinicians

Choose from a wide variety of memory tests (e.g. FULD)

Stay away from traditional paper-and-pencil tests of attention and visuoconstruction (e.g. try Five Digit Test, Stick Design)

Language and executive functioning still difficult to assess with current tests

Test batteries: CNTB as the basis of the neuropsychological assessment, extend assessment with other tests
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s.franzen@erasmusmc.nl