

Development Of A Computer-assisted Cognitive Test Battery For Testing Cognition in the Tamil-speaking older adults above 55 years of age

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BACKGROUND:

Cognitive assessment is the first step to diagnosis, management and treatment of any neurocognitive disorder and is of relevance in diverse clinical practice areas as well as research. Using normative data and standardized administration makes the evaluation more sensitive to even the mild cognitive disturbances leading to early detection of disorders that gives clinicians more options for treatment, prevention, and management. Unfortunately, there is a dearth of indigenously developed cognitive tests that are suitable for the Indian population and those that are available are not enough to meet our research and clinical needs. So, Indian clinicians depend on western tests that may or may not have relevant norms and are not standardized or culturally relevant to our population. This takes the science and empirical validity out of the assessment of cognition.

Computerized assessment It began with the advent of personal computers in the 1970s when researchers and clinicians noted the advantages of using technology in assessment. There is no comprehensive cognitive test battery available in Tamil. Tamil is one of the oldest surviving languages and has an estimated 77 million speakers globally. Given these numbers, the access to evidence-based healthcare is compromised for a significant section of the world's population due to the unavailability of a good test of cognitive function. Cognitive decline is a major concern in aging with many neurocognitive disorders having their symptom onset above 55 years of age and clinicians require sensitive tools for early detection and disease management. This is the lacuna that this research aimed to fill by developing a psychometrically sound computer-assisted cognitive test battery for assessing cognitive function in the Tamil speaking older adults that is easy to use for the clinician while keeping abreast with our new understanding of cognition and the modern advancements in the field of technology.

AIM:

To develop an Android OS based application and to standardize the administration and scoring of a comprehensive cognitive test battery, Tamil Arithiran Mathipeedu Battery (TAM Battery), in Tamil language to assess cognitive function in Tamil speaking older adults above 55 years of age.

OBJECTIVES:

1. To develop a comprehensive cognitive test battery in Tamil language as an Android OS based application.
2. To develop the test battery manual with standardized administration and scoring instructions.
3. To evaluate the psychometric properties of the test battery.

METHODS:

There were two phases to this research, phase 1 which included identifying tests, developing new tests, developing the test battery application and the test administration, and scoring manual. Phase 2 included testing the battery and its psychometric properties in the target population. The development of the TAM battery was in accordance to the prescribed guidelines of the international test commission for translating and adapting tests.

Phase 1-

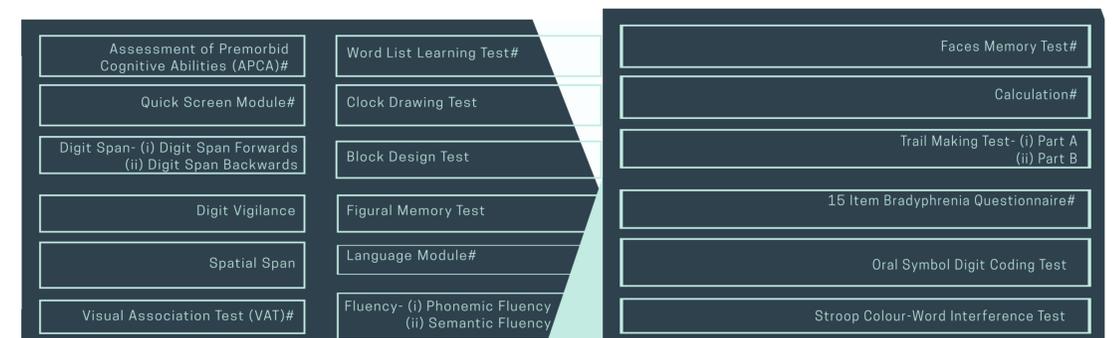
- Step 1: Survey of professionals who assess cognitive function in India and selection of cognitive domains and tests to be included
- Step 2: Development of tests and test items and refinement of that selection with a professional focus group
- Step 3: Development of the TAM battery app with the help of professional software developers
- Step 4: Development of the administration and scoring manual

TAM Battery:

TAM is short for Tamil Arithiran Mathipeedu which translates into Tamil Cognitive Measurement. It has 19 tests out of which 9 are newly developed. It took us about 2 and a half hours to administer the test to a neurotypical subject. It is a comprehensive cognitive test battery which assesses these cognitive domains. Our unique feature is the embedded symptom validity measures that detect sub-optimal performance by malingerers or due to other psychosocial factors. We also have a new test which helps us predict premorbid cognitive function in an objective manner instead of just using demographic details like education or occupation, which is the common practice currently.

Some of the other unique features of TAM Battery are that it is a complete patient management system which uses technology to its advantage, scoring is semi-automated, it is brief, the tests can be used as standalone measures without administering the whole battery, it is password-protected, it is safe and records are confidential. It is economical and time-saving with zero preparations required for testing. There is no paper trail.

Tests included in the test battery are:



The brief video of the TAM Battery app as well as the TAM Battery administration and scoring manual can be obtained from <https://porrselvi.wixsite.com/tambattery>

Phase 2-

The entire test battery was administered to 100 subjects belonging to the "Neurotypical Group" which included cognitively normal people who met the Mayo Older Americans' Normative Study (MOANS) Inclusion and Exclusion criteria. Out of this the battery was administered to a test-retest sub-group of 33 people at t2- 6 months after the first administration for testing test-retest reliability of the TAM Battery. The test was administered to 24 patients with Mild Cognitive Impairment (MCI), as diagnosed by a qualified neurologist to test the clinical and concurrent validity of the TAM Battery. The concurrent validity was tested against the Clinical Dementia Rating Scale. The test was also administered to a young neurotypical sample of 19 people who were asked to feign cognitive impairments to test the efficiency of the embedded symptom validity measure in detecting symptom exaggeration, malingering or sub-optimal performance.

RESULTS AND DISCUSSION:

The TAM Battery showed good clinical and concurrent validity. All the tests except the Figural Memory Test showed robust test-retest reliability. The symptom validity measures, especially the stand-alone test- Visual Association Test, showed good sensitivity to sub-optimal performance. The Assessment of Premorbid Cognitive Abilities (APCA) score proved to be a good objective baseline measure of cognitive function, better than traditionally used demographic details. The Figural Memory Test and the Word List Learning Test proved to be the best tests at detecting MCI. Test performance showed gradual decline with increasing age in the neurotypical group in agreement with prior literature. Test performance was better with increasing number of years of formal education and with increasing APCA Score. Limitation of the study: Small sample size.