Comparison of MMSE and ACTIVE Methods for the Identification of MCI
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Abstract
Mild Cognitive Impairment (MCI) is a term used to identify older adults with memory deficits but without dementia or significant related functional disability. Some research suggests that MCI is an introductory phase that may develop into more severe dementia. Ideally, multiple assessment tools should be used to determine MCI but this is often not practical in the clinical setting.

Using secondary data on 2,045 participants from the Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) study, we compared two methods of determining MCI: the Mini Mental State Examination (MMSE) and composite scores from nine tests measuring memory, processing speed and reasoning (e.g., Hopkins Verbal Learning Test, Word Series Test).

MCI designation was determined by using a cutoff score of <27 for the MMSE and by using a formula for the composite scores from the ACTIVE study. Chi-square analysis was used to compare MCI designation using the two methods and kappa values were calculated to assess agreement. Results showed that the two methods only agreed 68% of the time. The kappa statistic was .139 (p<.001) suggesting low agreement between the two measures.

While the ACTIVE tests for MCI are more rigorous than the MMSE, the ACTIVE tests are significantly more time-consuming and not practical in the clinical setting. While it is possible that the MMSE may not be sensitive enough to detect MCI, it may still be useful as a screening tool. However, caution is warranted. Older adults identified with MCI by the MMSE should be referred for further testing.

Research Question
How much agreement is there between two different methods of determining MCI?

Measures
1. Mini-Mental State Examination (Folstein, Folstein, & McHugh, 1975) adjusted for age and education using Mungas et al’s. (1996) formula. A cutoff score of <27 was used to indicate MCI.

2. ACTIVE-derived MCI was calculated using the procedures described in Wadley et al., 2007 with one exception: missing baseline values were not replaced with post-intervention values.

Memory composite tests included the Hopkins Verbal Learning Test (HVLT; Brandt, 1991), the Auditory Verbal Learning Test (AVLT; Rey, 1941) and the Rivermead Behavioral Memory Test (RBMT; Wilson, Cockburn, Baddeley, Horns, 2008).

Reasoning composite tests were comprised of the Word Series Test (Gonda, 1978), the Letter Series Test and Letter Set Test (Thurstone and Thurstone, 1949).

Processing speed composite used tasks 2, 3, and 4 from the Useful Field of View Test (Ball and Olsawy, 1993).

Sample
This study utilized secondary data analysis from the Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) study, a multisite clinical trial of the use of cognitive training to combat long-term cognitive decline. The ACTIVE study collected data from 2,832 participants from across the Eastern United States. Our final sample was 2,045 (351 participants were excluded due to missing baseline data).

Table 1. Participant Characteristics N=2045

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mean (SD or Percent)</th>
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<tbody>
<tr>
<td>Age</td>
<td>74.19 (5.72)</td>
</tr>
<tr>
<td>Percent White</td>
<td>73% (1813)</td>
</tr>
<tr>
<td>Percent Female</td>
<td>27% (532)</td>
</tr>
<tr>
<td>Total Years Education</td>
<td>14.1 (12.72)</td>
</tr>
<tr>
<td>MMSE Total Score (ADJ)</td>
<td>27.41 (1.59)</td>
</tr>
</tbody>
</table>

Method
Chi-square analysis was used to compare MCI designation using the two methods and kappa values were calculated to assess agreement.

Results

- The MMSE method identified MCI in 30% (n=710) of the sample while the ACTIVE method identified MCI in 18% (n=443).
- The two methods agreed only 68% of the time. Only 8% (n=192) of the sample were identified with MCI by both.
- The kappa statistic was .139 (p<.001) suggesting low agreement between the two measures.

Implications

- While the ACTIVE tests for MCI are more rigorous than the MMSE, the ACTIVE tests are significantly more time-consuming and not practical in the clinical setting.
- While the MMSE identified more participants with possible MCI than the ACTIVE method, only 8% were identified by both.
- Because it is more practical, the MMSE is useful as a screening tool to identify potential MCI. Older adults identified by the MMSE can be referred for further testing.

Limitations

- Secondary data analysis
- No consensus on MMSE cutoff for MCI
- ACTIVE designation involved multiple data manipulations