AN EVALUATION OF ADDENBROOKE’S COGNITIVE EXAMINATION III (ACE-III) SCORES, NEUROPSYCHOLOGICAL ASSESSMENT SCORES, AND DIAGNOSIS OUTCOME WITHIN A MEMORY SERVICE.

Service Related Project
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**ACE-III**

- attention / 18
- memory / 26
- fluency / 14
- language / 26
- visuospatial / 16
- total / 100

### Memory

- **Tell:** "I'm going to give you a name and address and I'd like you to repeat the name and address after me. So you have a chance to learn, we'll be doing that 3 times. I'll ask you the name and address later."

Score only the third trial.

<table>
<thead>
<tr>
<th>Name</th>
<th>1st Trial</th>
<th>2nd Trial</th>
<th>3rd Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harry Barnes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>73 Orchard Close</td>
<td></td>
<td></td>
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<tr>
<td>Kingsbridge</td>
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<td></td>
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<tr>
<td>Devon</td>
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</tbody>
</table>

Memory [Score 0 – 7]

### Language

- Ask the subject to name the following pictures:

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
Recommended clinical cut-offs

Differentiated between groups of people with a diagnosis of frontotemporal dementia or Alzheimer’s disease and a group of control participants at:

- 88/100 \([\text{sensitivity} = 1.0, \text{specificity} = 0.96]\)
- 82/100 \([\text{sensitivity} = 0.93, \text{specificity} = 1.0]\)

(Hsieh, Schubert, Hoon, Mioshi, & Hodges, 2013)

Distinguished between early-onset dementia and healthy controls at:

- 88/100 \([\text{sensitivity} = 0.91, \text{specificity} = 0.96]\)

and early-onset dementia and those with subjective impairment at:

- 88/100 \([\text{sensitivity} = 0.91, \text{specificity} = 0.86]\)

(Elamin, Holloway, Bak & Pal, 2015)
However...

Mixed findings with different samples

Optimal cut-off of:

81/100 [sensitivity = 0.79, specificity = 0.96]

in a sample of 75-85 year olds with Alzheimer’s disease, Alzheimer’s disease with cerebrovascular disease, and vascular dementia

Jubb and Evans (2015)

76.5/100 [sensitivity = 0.81, specificity = 0.85]

in sample of people diagnosed with mild dementia (including Alzheimer’s, vascular, frontotemporal, Lewy body, mixed and unspecified dementia subtypes)

(Cheung et al., 2015)
RESEARCH QUESTIONS

one

How do a sample of people referred for further neuropsychological assessment within a memory service perform on the ACE-III?

two

Can different diagnostic groups be differentiated based on their ACE-III total scores?

three

Do ACE-III subtests perform as expected against neuropsychological tests of same cognitive domain?

four

What does neuropsychological assessment add?
METHOD

Collected retrospective data:
- Demographics
- ACE-III scores
- Neuro scores
- Diagnosis outcome

Split data into four groups:
- No diagnosis
- Mood disorder
- MCI
- Dementia
Sample

156 participants
72 males and 80 females (4 missing recorded data)
37-93 years ($M = 69.19$)
dementia ($n = 50$)
MCI ($n = 61$)
mood ($n = 21$)
no diagnosis ($n = 24$)

<table>
<thead>
<tr>
<th>Group</th>
<th>Diagnosis (ICD-10)</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dementia</td>
<td>Alzheimer’s disease late onset</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Alzheimer’s atypical/mixed</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Early onset Alzheimer’s dementia</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Unspecified dementia</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Multi-infarct dementia</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Dementia in Parkinson's disease</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Dementia in Pick's disease</td>
<td>2</td>
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<tr>
<td></td>
<td>Vascular dementia</td>
<td>1</td>
</tr>
<tr>
<td>Mood</td>
<td>Mixed anxiety and depression</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Depressive episode</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Generalised anxiety disorder</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Severe depressive episode with psychotic symptoms</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Schizophrenia</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Adjustment disorder</td>
<td>1</td>
</tr>
</tbody>
</table>
ACE-III RESULTS

![Box plot showing ACE Total scores for different groups: No diagnosis, Mood, MCI, Dementia.](image)
ACE-III RESULTS

- total: MCI > dementia; no diagnosis > dementia
- attention: MCI > dementia
- memory: MCI > dementia; no diagnosis > dementia
- fluency: MCI > dementia; MCI > no diagnosis
- language: MCI > dementia
- visuospatial: MCI > dementia
ACE-III - NEURO

- Test scores correlated broadly
- attention - attention (Digit Span),
- memory - memory (verbal & visual; WMS),
- fluency - fluency (DKEFS),
- language - reading ability (TOPF)
- visuospatial - visuospatial construction (Block Design), visual copying (WMS),
Group differences similar to ACE-III findings - MCI scores significantly higher than dementia scores across majority of cognitive tests.

However, neuropsychological data did identity further group differences undetected by the ACE-III.

- MCI > no diagnosis on visuospatial construction

- Mood > dementia on immediate and delayed visual memory, however not on recognition?

- MCI, mood, no diagnosis > dementia on category switching
WHAT DOES IT MEAN...?

- The findings demonstrate the limitations of the ACE-III in the diagnostic process for dementia.
- Impossible to state diagnostic category based on test scores alone.
- Findings may point to benefit of further neuropsychological testing.
- Importance of comprehensive assessment - scores should be considered within context of other assessment information.
CONCLUSIONS

one
how do a sample of people referred for further neuropsychological assessment within a memory service performed on the ACE-III? Varied!

two
Can different diagnostic groups within the sample could be differentiated based on their ACE-III total scores? No!

three
Do ACE-III cognitive domain subtests perform as expected against neuropsychological test scores? Yes!

four
What does neuropsychological assessment add? Normative comparisons, hypothesis-driven cognitive testing & interpretation!
REFERENCES


