Exploring the relationship between cognition and real world reasoning in adults with severe TBI at 6 months post injury

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Discipline of Speech Pathology
Impairments following TBI

Cognitive Communication Disorder

- E.g.
  - Excessive talkativeness or inappropriate comments
  - Difficulty staying on topic
  - Repetitiveness of ideas, whole conversations or stories

Cognitive Impairment

- Executive functions
  - Problem-solving, reasoning, self-monitoring
- Attention and speed of thinking
- Memory

(ASHA, 2005) (McDonald, 2013)
Assessment of cognitive communication disorder

› Traditional aphasia batteries not sensitive (Turkstra, Coelho, & Ylvisaker, 2005)

› Functional Assessment of Verbal Reasoning and Executive Functions (FAVRES) (MacDonald & Melnichouk, 2005).

› Standardised test (MacDonald & Johnson, 2005)

› Four activity level tasks

- Planning an event
- Scheduling a workday
- Deciding on gifts
- Building a case
Clinicians use FAVRES to determine the presence of cognitive communication disorder.

Limited research on the nature of the association between cognitive communication disorder and cognition.

Does performance on FAVRES reflect on cognitive skills?
Research questions

1. Is the overall performance on the FAVRES associated with overall neuropsychological test performance?

1. What is the association between the performance on each of the FAVRES subtests and overall neuropsychological test performance?

1. What is the association between the performance on each of the FAVRES subtests and the performance on each of the three cognitive measures including attention and speed of thinking, memory and executive function?
Design and Participants

› Cross-sectional observational study
  - 1 group of participants at 6 months post injury
  - Approved by a local institutional ethics committee
  - Data is a sub-set from a larger longitudinal study focusing on communication recovery funded by NHMRC

› Participants
  - Recruited from 3 brain injury units in Sydney
  - 31 males, 7 females
  - Aged 16-56 years at time of TBI
  - PTA 10-96 days (mean 42.42 days)
Speech Pathology Ax

FAVRES
1. Planning an event
2. Scheduling a workday
3. Deciding on gifts
4. Building a case to solve a problem

Cognitive Neuropsychology Screen
Attention and speed of thinking
Memory
Executive Function
FAVRES Measures

- **Time**: Length of time to complete task (minutes)
- **Accuracy**: Score for correct response
- **Rationale**: Score for reasons provided for choice of answer
- **Total Reasoning**: Score for verbal reasoning
Research Question 1

FAVRES
• Total Reasoning

Neuropsych. Cognitive Ax
• Total cognitive score

\[ \rho = 0.6, p < 0.001 \]
Research Question 2

FAVRES
- Time
- Accuracy
- Rationale

Neuropsych. Cognitive Ax
Subtest 1
Subtest 2
Subtest 3
Subtest 4
Total cognitive score
## Results: research question 2

<table>
<thead>
<tr>
<th>Task 1</th>
<th>Total cognitive score</th>
<th>Accuracy score</th>
<th>Analysis score</th>
<th>Time score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning a event</td>
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<table>
<thead>
<tr>
<th>Task 2</th>
<th>Total cognitive score</th>
<th>Accuracy score</th>
<th>Analysis score</th>
<th>Time score</th>
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<tbody>
<tr>
<td>Scheduling</td>
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<table>
<thead>
<tr>
<th>Task 3</th>
<th>Total cognitive score</th>
<th>Accuracy score</th>
<th>Analysis score</th>
<th>Time score</th>
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<tbody>
<tr>
<td>Choosing a gift</td>
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<table>
<thead>
<tr>
<th>Task 4</th>
<th>Total cognitive score</th>
<th>Accuracy score</th>
<th>Analysis score</th>
<th>Time score</th>
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<tbody>
<tr>
<td>Written complaint</td>
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</table>
Results

Research Question 3

FAVRES
- Time
- Accuracy
- Rationale

Neuropsych. Cognitive Ax
- Attention score
- Memory score
- EF score

Subtest 1
Subtest 2
Subtest 3
Subtest 4
## Results: research question 3

<table>
<thead>
<tr>
<th>Task</th>
<th>Event Planning</th>
<th>Attention</th>
<th>Memory</th>
<th>EF</th>
<th>Task</th>
<th>Scheduling</th>
<th>Attention</th>
<th>Memory</th>
<th>EF</th>
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<tbody>
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<td>Accuracy</td>
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<td>Rationale</td>
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<td>Time</td>
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<th>Attention</th>
<th>Memory</th>
<th>EF</th>
<th>Task</th>
<th>Writing a complaint</th>
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<tr>
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</table>
Results

Post-hoc analysis of Task 4:
Strategies of Observed Learning Outcomes (SOLO) taxonomy

<table>
<thead>
<tr>
<th>SOLO level</th>
<th>SOLO description</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prestructural</td>
<td>No logical interrelation between question and answer, e.g. denial, tautology, transduction</td>
</tr>
<tr>
<td>2</td>
<td>Unistructural</td>
<td>Only one relevant aspect is mentioned</td>
</tr>
<tr>
<td>3</td>
<td>Multistructural</td>
<td>Several relevant features mentioned, but are not linked up</td>
</tr>
<tr>
<td>4</td>
<td>Relational</td>
<td>Correctly drawing a general conclusion from particular instances</td>
</tr>
<tr>
<td>5</td>
<td>Extended abstract</td>
<td>Elaborating and extrapolating beyond the given situation, incorporating all relevant data</td>
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Penn, C., Jones, D., & Joffe, V. (1997)
Task 4: SOLO taxonomy

› Example 1: Multi-structural (level 3)

“My roof is leaking and has not been fixed. Lack of response is not good. Why has the roof leaked? The roof needs to be repaired.”
Example 2: Relational (level 4)

“Hello Mr. Porter, I’m sorry but I won’t be paying for the roofing job by Klaus because he didn’t turn up when he promised and I had a chair belonging to my brother Dan which is now ruined and rotten.

I won’t be paying any extra for the job because of your error in hiring Klaus who obviously wasn’t suitable for the job you gave him.

My house interior is ruined and I think you have to reconsider your secretary too because she couldn’t find my contract. I was very disappointed not to have heard from you sooner as the rain has been ongoing with no word of apology from you with regards to the delays in completing my job.”
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Conclusions

› **Lack** of associations between **Task 1** and **cognitive scores**

- Participants perform well in Task 1 but demonstrate difficulty in subsequent tasks

- Task 1 not strongly correlated with Tasks 2, 3 and 4 (Rietdijk et al., 2013)

- Reduced cognitive demand required

- May not be as sensitive to the detection of cognitive communication disorder

- But important entry-level task
Conclusions

- **Tasks 2 and Task 4** were **strongly** associated with **cognitive scores**
  - Opportunities for further Ax
    - e.g. SOLO taxonomy

- Potentially focus on administration of **Task 2 and Task 4**
  - Reduce administration time
    - ↓ fatigue and ↓ frustration
Conclusions

There is an **association** between performance on the FAVRES and **cognitive performance**

- FAVRES **robust measure** for assessment of cognitive communication

- 24 receiving Rx **BUT 31** diagnosed with CCD
  - Other measures can **miss** people with cognitive communication disorder
  - Significant implications upon reintegration

- **Functional** and **interdisciplinary** approach
References


