Measurement & Prediction of Mood Recovery in the 1st year after Traumatic Brain Injury (TBI): initial anxiety and depression scores & clinical & demographic variables

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Background

The Hospital Anxiety and Depression Scale (HADS) questionnaire is often used to assess mood in physical illness

Our research on the structure of the HADS in 370 TBI patients using Exploratory Factor Analysis & Confirmatory FA suggests a 3-Factor model:
Anxiety, Depression, Psychomotor
HADS ITEMS

Anxiety Factor
I get a sort of frightened feeling as if something awful is about to happen
Worrying thoughts go through my mind
I get a sort of frightened feeling like ‘butterflies’ in the stomach
I get sudden feelings of panic

Depression Factor
I still enjoy the things I used to enjoy
I can laugh and see the funny side of things
I have lost interest in my appearance
I look forward with enjoyment to things

Psychomotor Factor
I feel tense or wound up (A)
I can sit at ease and feel relaxed (A)
I feel restless as if I have to be on the move (A)
I feel as if I am slowed down (D)
I can enjoy a good book or TV programme (D)
I feel cheerful (D)
Tasmanian Neurotrauma Research Group (NTR)

- Funded by MAIB
- Population Study for Southern Tasmania
- All new adult cases in ED, Dec 2003–June 2007
- Follow-up: Initial, 14day, 28day, 3m, 6m, 12m, (24m, 36m, 48m)
- Staffed by Clin Psych Interns
  - 2 part-time Coordinators, 8 part-time assessors
  - 2 admin/data entry

Tasmanian NTR: Assessment Data

- **Demographic**
- **Clinical Background**
- **Functional**
- **Physical**
- **Psychosocial**
- **Cognitive**
Current Study: Aims

1. Examine mood recovery post-injury
2. Examine effects of Age, Sex, TBI severity on mood

Current Study: Sample Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Median</th>
<th>s.d.</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>35.3</td>
<td>30.0</td>
<td>17.8</td>
<td>16-90</td>
</tr>
<tr>
<td>Years of Ed</td>
<td>10.9</td>
<td>10.0</td>
<td>2.2</td>
<td>6-20</td>
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<tr>
<td>NART IQ</td>
<td>98.7</td>
<td>100.0</td>
<td>11.0</td>
<td>73-122</td>
</tr>
<tr>
<td>PTA (days)</td>
<td>2.1</td>
<td>0.04</td>
<td>11.8</td>
<td>0-15</td>
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</tbody>
</table>
## Current Study: Sample Sizes & Time Post-TBI

<table>
<thead>
<tr>
<th>Severity (PTA)</th>
<th>1wk</th>
<th>2wk</th>
<th>1m</th>
<th>3m</th>
<th>6m</th>
<th>12m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Mild (&lt;=1 hr)</td>
<td>53</td>
<td>55</td>
<td>67</td>
<td>66</td>
<td>59</td>
<td>48</td>
</tr>
<tr>
<td>Mild (1+hr - 1 day)</td>
<td>105</td>
<td>93</td>
<td>103</td>
<td>114</td>
<td>98</td>
<td>91</td>
</tr>
<tr>
<td>Mod/Sev (&gt;1 day)</td>
<td>20</td>
<td>31</td>
<td>34</td>
<td>46</td>
<td>42</td>
<td>38</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>1wk</th>
<th>2wk</th>
<th>1m</th>
<th>3m</th>
<th>6m</th>
<th>12m</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=25</td>
<td>85</td>
<td>71</td>
<td>82</td>
<td>95</td>
<td>81</td>
<td>76</td>
</tr>
<tr>
<td>26-40</td>
<td>18</td>
<td>16</td>
<td>19</td>
<td>30</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>41-60</td>
<td>55</td>
<td>56</td>
<td>63</td>
<td>59</td>
<td>53</td>
<td>40</td>
</tr>
<tr>
<td>60+</td>
<td>39</td>
<td>50</td>
<td>54</td>
<td>57</td>
<td>47</td>
<td>43</td>
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</tbody>
</table>

## Current Study: Hypotheses

1. Patients will improve up to 12 months post-TBI

2. Women will show poorer initial mood scores than men & up to 12 months post-injury

3. Older TBI patients (60+) will show poorer mood scores, both initially & to 12 months post-TBI

4. Patients sustaining more severe TBIs will show poorer initial mood scores & a slower recovery to 12 months

5. Mood scores at later follow-up points will be predictable from initial demographic and clinical data
Current Study: Method

- **Participants.**
  n<=430 patients (65% male) presenting with TBI at the ED, Royal Hobart Hospital

- **Procedure.**
  Assessment with HADS within 7 days of TBI, & then at 14 days, 1m, 3m, 6m & 12m FUs

- **Design and Analysis.**
  ANOVAs with post-hocs
  Multiple Regression

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Hypothesis 1

Patients’ will show poor mood scores soon after TBI, but their scores will improve to the 12 months post-TBI
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Patients’ will show poor mood scores soon after TBI, but their scores will improve to 12 months post-TBI

Confirmed:
- Initial scores on all 3 variables reflect considerable symptomatology compared with Norms
- Very early significant recovery (1wk – 2wk) is seen for each mood variable
- Compared with initial scores each mood variable shows significant recovery by 6m & 12m post-injury
- No significant recovery is noted between 6m & 12m
Hypothesis 2

Women will show poorer initial mood scores than men & up to 12 months post-injury
Gender Differences: Depression Factor

Gender Differences: Psychomotor
Hypothesis 2

Women will show poorer initial mood scores than men, & up to 12 months post-injury

Largely Confirmed:
- At each FU to 6 months women scored more poorly on the 3 mood variables.
- At 12m FU only ‘Anxiety’ reached statistical significance
- Generally, significance levels for the ‘Psychomotor’ variable were lower

Hypothesis 3

Older TBI patients will show poorer mood scores, both initially & to 12 months post-TBI
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Older TBI patients will show poorer mood scores, both initially & to 12 months post-TBI

**Confirmed:**
- 60+ patients show greater mood disturbance, for all 3 variables, initially & to the 12m FU
- 60+ group show little improvement in mood to 12m FU
- 41-60 age group shows high mood disturbance to the 1m/3m FUs, but then large mood improvement
Hypothesis 4

Patients sustaining more severe TBIs will show poorer initial mood scores & a slower recovery to 12 months
Hypothesis 4

Patients sustaining more severe TBIs will show poorer initial mood scores & a slower recovery to 12 months

*Partly Confirmed:*
- Patients with longer PTAs show poorer HADS ‘Depression’ & ‘Psychomotor’ scores at 2wk, 1m, 6m, 12m post-injury
- However, no significant ‘Anxiety’ score differences are noted

Hypothesis 5

Mood scores at later follow-up points will be predictable from initial demographic and clinical data
# Prediction of Outcome - Anxiety

### At 3m post-TBI

Anxiety Factor Score =

\[(\text{Anxiety1} \times 0.69) + (\text{Age} \times 0.289) + (\text{Psychomotor} \times 0.18) - 0.32\]

\[(R = 0.693)\]

### At 12m post-TBI

Anxiety Factor Score =

\[(\text{Anxiety1} \times 0.49) + (\text{Psychomotor} \times 0.18) + (\text{Age} \times 0.25) - 0.42\]

\[(R = 0.685)\]

# Prediction of Outcome - Depression

### At 3m post-TBI

Depression Factor Score =

\[(\text{Depression} \times 0.35) + (\text{Anxiety} \times 0.17) + (\text{Age} \times 0.23) - 0.42\]

\[(R = 0.644)\]

### At 12m post-TBI

Depression Factor Score =

\[(\text{Depression} \times 0.24) + (\text{Anxiety} \times 0.17) + (\text{Age} \times 0.26) - 1.18\]

\[(R = 0.685)\]
Prediction of Outcome - Psychomotor

At 3m post-TBI

Psychomotor Factor Score = 

\[(Psychomotor1 \times 0.31) + (Anxiety1 \times 0.24) + (Age \times 0.19) + 0.18\]

\[(R = 0.616)\]

At 12m post-TBI

Psychomotor Factor Score = 

\[(Psychomotor1 \times 0.29) + (Anxiety1 \times 0.21) + (PTA \times 0.478) - 0.33\]

\[(R = 0.579)\]

Hypothesis 5

Mood scores at later follow-up points will be predictable from initial demographic and clinical data

Confirmed:
- Good predictions are noted for the 3 HADS Factors scores at 3m & 12m
- The predictors are very simple, in each case involving the Factor score within 1 week of TBI
- Initial ‘Anxiety’ score and Age appear in all equations (except 12m Psychomotor has no ‘Age’)

**Summary/Discussion**

**Mood Recovery:**

- After TBI patients show significant recovery in psychomotor, anxiety and depression scores.

- There are differential recovery rates for the 3 variables – ‘Anxiety’: early improvement & between 3m & 6m, ‘Depression’: improvement only between 1m & 3m, ‘Psychomotor’: consistent improvement to 6m.

- Given these patterns can now be described, they provide a baseline against which to judge the effectiveness of early interventions.

**Gender:**

- Our findings confirm that women experience higher levels of mood symptoms disorder following TBI. These problems persist to at least 6 months post-injury.

- There are a number of possible reasons for this - including greater emotional openness in women, - & more severe physical &/or psychological traumatic responses from TBI.

- We will examine the finding in greater detail via analyses involving additional variables.
Summary/Discussion

Age:

- The finding of poorer mood states in our older patients was predicted & is consistent with the findings from other studies.

- However, given that little evidence of recovery was noted in the 3 mood variables to the 12m FU for older patients this group warrants further detailed study.

Summary/Discussion

TBI Severity:

- Patients suffering a TBI of moderate severity experience greater Depression & Psychomotor symptomatology compared with those who have a mild TBI.

- Although these findings were expected, it does reinforce the case that those sustaining a relatively mild TBI should not be overlooked in service planning.

- No significant differences in Anxiety were noted at any FU, which was not expected.
Prediction of Recovery:

- Good predictions are noted for the 3 HADS Factors scores at 3m & 12m

- The predictors are very simple, in each case involving the Factor score within 1 week of TBI. Initial ‘Anxiety’ score and Age appear in all equations

- Treating clinicians should be able to identify those patients requiring a psychological intervention from their initial assessment

- Future research will investigate additional variables as possible predictors

Any Questions or Comments.....?