Predicting Changes in Employment Status using the Brief International Cognitive Assessment for Multiple Sclerosis (BICAMS)

Kristen A. Milleville, Lauren N. Irwin, Allison S. Drake, Seth E. Frndak, Ralph H.B. Benedict
UBMD Neurology, Departments of Neurology and Psychology, State University of New York at Buffalo

Results

0.58
Deteriorated Employment Status (DES)

Discussion

DES (n=35)
29 (82.9%)
< 0.001*
Supports the utility of the BICAMS measures to detect SDMT Scores are influenced by both the time point and
Time 2
42.7 (9.1)
To evaluate cognitive function in employed and who deteriorate in
Time 1
57.62
215 (77.3%)
4.5 (2.6)
Our preliminary findings suggest the SES group
Time 2
4.7 (2.8)
Future studies examining cognitive function in patients

Participants were administered the BICAMS battery at two separate time points on average 4.8 (± 2.8) years
The Brief Visuospatial Memory Test-Revised (BVMT-R) is a test of visuospatial learning and memory where patients recall and recognize visual displays at different times. (Sample shown in Fig. 3)
The California Verbal Learning Test, second edition (CVLT-II) is a test of verbal learning and memory where patients list to a word of lists and are asked to recall and recognize them at different times. (Sample shown in Fig. 4)
The Symbol Digit Modalities Test (SDMT) is a test of processing speed and working memory where patients state numbers corresponding to matching symbols. (Sample shown in Fig. 5)

Participants were categorized into three groups based on their employment status:

Stable Employment Status (SES)

Unemployed

Unemployed/Disabled Objectively

Full Time/Reduced Capacity

10-20 hr/week/ Reduced Capacity

Future Research

Future studies examining cognitive function in patients
with MS and their implications on employment are
warranted

Apply this model to other measures of mood, fatigue, and
task function, which are other clinically relevant
variables

Apply this model to a more liberal definition of
Deterioration in employment status, allowing for any
reduction in hours or responsibilities to be considered

Table 2: Mean Scores for each group on BICAMS Measures

<table>
<thead>
<tr>
<th>Time Point</th>
<th>SES Mean Score</th>
<th>SES Mean Score</th>
<th>SES Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVLT-2</td>
<td>53.54</td>
<td>45.86</td>
<td>43.62</td>
</tr>
<tr>
<td>BVMT-R</td>
<td>23.89</td>
<td>19.48</td>
<td>17.98</td>
</tr>
<tr>
<td>SDMT</td>
<td>57.62</td>
<td>48.21</td>
<td>41.68</td>
</tr>
</tbody>
</table>

Objectives

To validate BICAMS as a method for detecting change in vocational status
To evaluate cognitive function in employed and un
To characterize what constitutes a clinically meaningful change in cognition with respect to vocational status

Figure 2: DES Grouping Criteria

Conservative Definition of Unchanged Employment Status

Full Time/Unchanged Capacity
Unemployed/Disability or Objectively

Using SPSS 22.0

The differences in performance on BICAMS measures
among employment groups were examined using a two
way mixed-model ANOVA with employment status (DES, SES, and unemployment) as between-subjects factors and time as a within-subjects factors.

Future mixed-model ANOVAs were performed using a
sub-sample of participants with EDSS, T25FW and BDI-FS data, respectively.

See Table 2 for more details.

References

Langdon et al. Multiple Sclerosis Journal; 20(1): 1-6
Uccelli et al. Journal of Neurology; 256 (12); 1999-96

Table 3: F and p values of the General Linear Model, with significant p-values in red

<table>
<thead>
<tr>
<th>Test</th>
<th>Time</th>
<th>Employment Status</th>
<th>Time x Employment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVLT-2</td>
<td>1</td>
<td>0.58</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.447</td>
<td>0.001*</td>
</tr>
<tr>
<td>BVMT-R</td>
<td>1</td>
<td>7.74</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>7.05</td>
<td>0.001*</td>
</tr>
<tr>
<td>SDMT</td>
<td>1</td>
<td>0.001*</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.002*</td>
<td>0.001*</td>
</tr>
<tr>
<td>EDSS</td>
<td>1</td>
<td>4.73</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4.73</td>
<td>0.001*</td>
</tr>
<tr>
<td>T25FW</td>
<td>1</td>
<td>3.73</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3.73</td>
<td>0.001*</td>
</tr>
<tr>
<td>BDIFS</td>
<td>1</td>
<td>0.77</td>
<td>3.71</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-0.001*</td>
<td>0.001*</td>
</tr>
</tbody>
</table>

* Statistical Significance at p < 0.05

Figure 6, 7, and 8: Graphs of the mean test scores for each group longitudinally