The Association Between Executive Functions and Quality of Life in Multiple Sclerosis

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Introduction

- Multiple sclerosis is a progressive disease that causes significant impairments in cognition, mood, vision, speech, and extremity function that negatively affect the individual's quality of life (QoL).
- Cognitive impairments affect approximately half of the population with MS.
- Studies showed that in individuals with MS, deficits in memory highly predicted low QoL but the impact of executive function (EF) deficits on QoL has not been fully studied.
- Cognitive impairments are also not routinely assessed despite its potential to predict disability and negatively affect QoL earlier than physical limitations.
- Most cognitive tests used to assess individuals with MS are neuropsychological-based which often fail to identify the actual performance of people in a more natural environment.
- In this study, both a functional-based and a neuropsychological assessment tools were used to assess EF.

Objectives

- To determine the association between EF and QoL in individuals with MS.
- To determine which of the two EF assessment tools, a neuropsychological test (i.e. D-KEFS) and a functional-based test (i.e. WCPA), is better predictor of QoL.

Methods

- Participants: 36 with 18 MS and HC.
- Age (years): 46.76 ± 10.42
- Education (years): 15.28 ± 3.4
- Female %: 19.00 ± 7.0
- Type of MS (%): Relapsing Remitting (RR): 80.5%, Progressive Relapsing (PR): 15.28, Unclassified: 4.19

Methods (cont.)

Materials and Procedures

Weekly Calendar Planning Activity (WCPA)

The WCPA is a functional-based assessment tool which assesses the factors that impact an individual's performance in everyday activities. The participants were tasked to organize 17 appointments in a week's schedule. The variables that were observed in this task were the number of rules followed, number of appointments entered, and strategy use. Higher scores correspond to better performance.

Delis-Kaplan Executive Function System (D-KEFS)

The D-KEFS is a neuropsychological tool for measuring EF. The participants were evaluating using the Letter Sequencing and Number-Letter Switching components of the Trail-Making subtest. They were scored based on the total time to complete the subtest. Lower scores on the test correspond to better performance.

Multiple Sclerosis Quality of Life-54 (MSQOL-54)

The MSQOL-54 is a self-report QoL questionnaire that combines the SF-36 with 18 MS-specific questions. Both the mental and physical components of the questionnaire were assessed. Higher scores were considered to better perceive QoL.

Results

Q1. Relationship between WCPA and D-KEFS and QoL

Table 1: Pearson Correlation

<table>
<thead>
<tr>
<th>Variable</th>
<th>WCPA</th>
<th>D-KEFS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MSQOL</td>
<td>MSQOL</td>
</tr>
<tr>
<td></td>
<td>Physical</td>
<td>Mental</td>
</tr>
<tr>
<td>WCPA Rules Followed</td>
<td>0.52**</td>
<td>0.38*</td>
</tr>
<tr>
<td>D-KEFS Letter seq.</td>
<td>0.50*</td>
<td>0.19</td>
</tr>
<tr>
<td>D-KEFS Letter Switch</td>
<td>0.37*</td>
<td>-0.10</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Q2. Which tool is better predictor of QoL?

Table 2: Linear Regression

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Beta</th>
<th>p</th>
<th>R Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-KEFS Composite Score</td>
<td>0.25</td>
<td>0.21</td>
<td>0.31</td>
</tr>
<tr>
<td>WCPA Rules Followed</td>
<td>0.37</td>
<td>0.06</td>
<td>0.31</td>
</tr>
</tbody>
</table>

Discussion

The results of this study show that:

a) The two EF assessment tools each have specific components (Table 1) that showed significant association with the QoL in both MS and HC. EF predicted almost 31% of the variance associated with QoL. However, it is not a significant predictor of overall QoL.

b) The WCPA-Rules Followed is the only variable significantly associated with both the physical and mental MSQOL. While the D-KEFS Letter Sequence and Number-Letter Switch components are only associated with the physical MSQOL.

c) The overall WCPA and D-KEFS assessment tools are not significant predictors of QoL. However, the WCPA-Rules Followed variable was a better predictor of QoL than the D-KEFS Composite. It shows that a functional assessment tool may have a slight advantage in predicting the QoL as the tasks performed actually mimic real life activities.

d) Results are comparable to other research studies reporting that there are no significant differences between the association of cognitive abilities and QoL in MS and HC. Because the study looked at EF as an isolated component of cognition, it is also not sufficient to predict overall QoL.

Acknowledgements

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