Hippocampal volume and integrity as predictors of cognitive decline in intact elderly

http://researchonline.ljmu.ac.uk/3682/


Abstract

Objective: To determine the role of hippocampal volume and integrity for predicting future cognitive decline in intact elderly individuals.

Methods: 100 cognitively intact elderly individuals were longitudinally followed over a 3-year period. Using Structural Equation Modelling, the association between hippocampal volume changes and cognitive decline was investigated.

Results: Changes in volume were associated with cognitive decline in all domains studied (memory, language, visuospatial, and executive function), with effect sizes ranging from medium to large (Cohen’s d = 0.6–1.8). Using a threshold of 0.6 to define “significant” change, 65% of the elderly had a detectable change in hippocampal volume over the 3-year period. Each 1 standard deviation change in hippocampal volume was associated with a 0.8–1.2 standard deviation change in cognitive performance.

Conclusions: Changes in hippocampal volume and integrity are associated with cognitive decline in intact elderly individuals. These findings have potential clinical implications for the future targeting of interventions to mitigate pathological hippocampal change and thereby reverse cognitive decline.

Keywords: Hippocampus, volume, integrity, cognitive decline, longitudinal study, structural equation modeling.
Table 2. Adjusted effect estimates, pseudo $R^2_{WLS}$, and $R^2$ from OLS for fitted models.

<table>
<thead>
<tr>
<th>Model</th>
<th>Adjusted* Effect Estimates (p-value)</th>
<th>pseudo $R^2_{WLS}$</th>
<th>$R^2$</th>
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<tbody>
<tr>
<td><strong>Right Side</strong></td>
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</table>
| (1R) HV + HI + HI*LLMD        | HV: 0.21 (0.35)  
HI, Control: 0.13 (0.61)  
HI, Depressed: 0.88 (0.003) | 0.5388             | 0.5535 |
| (2R) HV                       | 0.35 (0.07)                      | 0.4582             | 0.4843 |
| (3R) HI + HI*LLMD             | HI, Control: 0.19 (0.42)  
HI, Depressed: 0.99 (0.0003) | 0.5292             | 0.5419 |
| **Left Side**                 |                                     |                    |        |
| (1L) HV + HI                  | HV: 0.11 (0.62)  
HI, Control: 0.13 (0.60)  
HI, Depressed: 0.76 (0.002) | 0.5062             | 0.5223 |
| (2L) HV                       | 0.16 (0.39)                     | 0.4317             | 0.4611 |
| (3L) HI                       | HI, Control: 0.15 (0.52)  
HI, Depressed: 0.77 (0.0007) | 0.5003             | 0.5152 |

* Adjusting for baseline Composite score, sex, LLMD status, e4 status, and TIV.