**Supplementary Materials**

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| **Supplementary Table 1** |  |  |  |  |
| **Associations of individual lobar and global GM volume, age, the BPF and sex with the score of the TMT B** |
|  |  |  |  |  |
| **Independent Variable** | **Dependent variable** | **Estimate** | **Standard error** | **p-value** |
|  |  |  |  |  |
| **Frontal GM volume (mm³)a** | **TMT B** | -0.228 | <0.001 | 0.006 |
| **Age (years)** | **TMT B** | 0.190 | 0.806 | 0.014 |
| **BPF (BPV/ICV)** | **TMT B** | -0.148 | 45.657 | 0.062 |
| **Sex (female)** | **TMT B** | -0.121 | 8.671 | 0.152 |
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|  |  |  |  |  |
| **Parietal GM volume (mm³)b** | **TMT B** | -0.256 | <0.001 | 0.002 |
| **Age (years)** | **TMT B** | 0.199 | 0.793 | 0.009 |
| **BPF (BPV/ICV)** | **TMT B** | -0.156 | 45.407 | 0.048 |
| **Sex (female)** | **TMT B** | -0.102 | 8.717 | 0.228 |
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|  |  |  |  |  |
| **Temporal GM volume (mm³)** | **TMT B** | -0.263 | 0.001 | 0.002 |
| **Age (years)** | **TMT B** | 0.190 | 0.797 | 0.013 |
| **BPF (BPV/ICV)** | **TMT B** | -0.146 | 45.368 | 0.065 |
| **Sex (female)** | **TMT B** | -0.095 | 8.805 | 0.270 |
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|  |  |  |  |  |
| **Occipital GM volume (mm³)** | **TMT B** | -0.201 | 0.001 | 0.012 |
| **Age (years)** | **TMT B** | 0.209 | 0.799 | 0.007 |
| **BPF (BPV/ICV)** | **TMT B** | -0.124 | 46.220 | 0.121 |
| **Sex (female)** | **TMT B** | -0.139 | 8.551 | 0.096 |
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|  |  |  |  |  |
| **Global GM volume (mm³)a,b** | **TMT B** | -0.268 | <0.001 | 0.002 |
| **Age (years)** | **TMT B** | 0.187 | 0.797 | 0.015 |
| **BPF (BPV/ICV)** | **TMT B** | -0.145 | 45.329 | 0.065 |
| **Sex (female)** | **TMT B** | -0.090 | 8.845 | 0.298 |
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| a including primary motor cortex b including sensory cortex |
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| The model consists of the specific grey matter volumes, age, the BPF and sex entered as independent variables and the TMT B score (sec) as dependent variable. Estimates are standardized regression coefficients of this model. The reference of the standardized regression coefficient of sex is female. |
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| Key: BPF, Brain Parenchymal Fraction; BPV, Brain Parenchymal Volume; GM, Grey Matter; ICV, Intracranial Volume; mm, millimeters; sec, seconds; TMT, Trail Making Test |
| **Supplementary Table 2** |  |  |  |  |
| **Associations of individual lobar and global GM volume, age, the BPF and sex with the TMT B – TMT A score (TMTDIFF score)** |
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| **Independent Variable** | **Dependent variable** | **Estimate** | **Standard error** | **p-value** |
|  |  |  |  |  |
| **Frontal GM volume (mm³)a** | **TMT B – TMT A** | -0.238 | <0.001 | 0.004 |
| **Age (years)** | **TMT B – TMT A** | 0.155 | 0.691 | 0.046 |
| **BPF (BPV/ICV)** | **TMT B – TMT A** | -0.183 | 39.227 | 0.022 |
| **Sex (female)** | **TMT B – TMT A** | -0.092 | 7.451 | 0.281 |
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| **Parietal GM volume (mm³)b** | **TMT B – TMT A** | -0.244 | <0.001 | 0.004 |
| **Age (years)** | **TMT B – TMT A** | 0.167 | 0.685 | 0.030 |
| **BPF (BPV/ICV)** | **TMT B – TMT A** | -0.189 | 39.208 | 0.018 |
| **Sex (female)** | **TMT B – TMT A** | -0.084 | 7.528 | 0.330 |
|  |  |  |  |  |
|  |  |  |  |  |
| **Temporal GM volume (mm³)** | **TMT B – TMT A** | -0.284 | 0.001 | 0.001 |
| **Age (years)** | **TMT B – TMT A** | 0.152 | 0.683 | 0.048 |
| **BPF (BPV/ICV)** | **TMT B – TMT A** | -0.177 | 38.875 | 0.026 |
| **Sex (female)** | **TMT B – TMT A** | -0.059 | 7.545 | 0.491 |
|  |  |  |  |  |
|  |  |  |  |  |
| **Occipital GM volume (mm³)** | **TMT B – TMT A** | -0.145 | 0.001 | 0.075 |
| **Age (years)** | **TMT B – TMT A** | 0.181 | 0.694 | 0.021 |
| **BPF (BPV/ICV)** | **TMT B – TMT A** | -0.163 | 40.151 | 0.046 |
| **Sex (female)** | **TMT B – TMT A** | -0.140 | 7.429 | 0.099 |
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|  |  |  |  |  |
| **Global GM volume (mm³)a,b** | **TMT B – TMT A** | -0.269 | <0.001 | 0.002 |
| **Age (years)** | **TMT B – TMT A** | 0.154 | 0.687 | 0.046 |
| **BPF (BPV/ICV)** | **TMT B – TMT A** | -0.178 | 39.040 | 0.025 |
| **Sex (female)** | **TMT B – TMT A** | -0.064 | 7.643 | 0.426 |
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| a excluding primary motor cortexb excluding sensory cortex |
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| The model consists of the specific grey matter volumes, age, the BPF and sex entered as independent variables and the TMT B – TMT A scores (sec) as dependent variable. Estimates are standardized regression coefficients of this model. The reference of the standardized regression coefficient of sex is female. |
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| Key: BPF, Brain Parenchymal Fraction; BPV, Brain Parenchymal Volume; GM, Grey Matter; ICV, Intracranial Volume; mm, millimeters; sec, seconds; TMT, Trail Making Test |

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| **Supplementary Table 3** |  |  |  |  |
| **Associations of individual lobar and global GM volume, age, the GMF and sex with the score of the TMT B** |
|  |  |  |  |  |
| **Independent Variable** | **Dependent variable** | **Estimate** | **Standard error** | **p-value** |
|  |  |  |  |  |
| **Frontal GM volume (mm³)a** | **TMT B** | -0.215 | <0.001 | 0.010 |
| **Age (years)** | **TMT B** | 0.214 | 0.786 | 0.005 |
| **GMF (GMV a,b/ICV)** | **TMT B** | -0.113 | 148.112 | 0.160 |
| **Sex (female)** | **TMT B** | -0.122 | 9.076 | 0.169 |
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|  |  |  |  |  |
| **Parietal GM volume (mm³)b** | **TMT B** | -0.248 | <0.001 | 0.003 |
| **Age (years)** | **TMT B** | 0.223 | 0.775 | 0.003 |
| **GMF (GMV a,b/ICV)** | **TMT B** | -0.116 | 146.782 | 0.147 |
| **Sex (female)** | **TMT B** | -0.100 | 9.109 | 0.260 |
|  |  |  |  |  |
|  |  |  |  |  |
| **Temporal GM volume (mm³)** | **TMT B** | -0.254 | 0.001 | 0.003 |
| **Age (years)** | **TMT B** | 0.209 | 0.781 | 0.005 |
| **GMF (GMV a,b/ICV)** | **TMT B** | -0.114 | 146.724 | 0.151 |
| **Sex (female)** | **TMT B** | -0.096 | 9.139 | 0.281 |
|  |  |  |  |  |
|  |  |  |  |  |
| **Occipital GM volume (mm³)** | **TMT B** | -0.195 | 0.001 | 0.017 |
| **Age (years)** | **TMT B** | 0.228 | 0.782 | 0.003 |
| **GMF (GMV a,b/ICV)** | **TMT B** | -0.088 | 152.304 | 0.288 |
| **Sex (female)** | **TMT B** | -0.135 | 9.005 | 0.125 |
|  |  |  |  |  |
|  |  |  |  |  |
| **Global GM volume (mm³)a,b** | **TMT B** | -0.263 | <0.001 | 0.002 |
| **Age (years)** | **TMT B** | 0.211 | 0.779 | 0.005 |
| **GMF (GMV a,b/ICV)** | **TMT B** | -0.103 | 147.356 | 0.199 |
| **Sex (female)** | **TMT B** | -0.084 | 9.304 | 0.356 |
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| a excluding primary motor cortex b excluding sensory cortex  |
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| The model consists of the specific grey matter volumes, age, the GMF and sex entered as independent variables and the TMT B score (sec) as dependent variable. Estimates are standardized regression coefficients of this model. The reference of the standardized regression coefficient of sex is female. |
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| Key: GM, Grey Matter; GMF, Grey Matter Fraction; GMV, Grey Matter Volume; ICV, Intracranial Volume; mm, millimeters; sec, seconds; TMT, Trail Making Test |