Supplementary Material

**Supplementary Table 1** Pairwise comparison of cognitive assessment

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| --- | --- | --- |
| **Cognitive score** | **ANCOVA** | **Pairwise comparison** |
| ***P* value** | ***P1*** | ***P2*** | ***P3*** | ***P4*** | ***P5*** | ***P6*** |
| MMSE | <0.001\*\*\* | 1.000  | 1.000  | <0.001\*\*\* | 1.000  | 0.007\*\* | 0.001\*\* |
| CANTAB\_VRM | <0.001\*\*\* | 1.000  | 1.000  | <0.001\*\*\* | 1.000  | <0.001\*\*\* | 0.001\*\* |
| HOP immediate recall | 0.001\*\* | 1.000  | 0.276  | 0.001\*\* | 1.000  | 0.065  | 0.454  |
| HOP delayed recall | 0.028\* | 1.000  | 1.000  | 0.094  | 1.000  | 0.585  | 0.091  |
| HOP delayed recognition | 0.310  | 1.000  | 1.000  | 0.628  | 1.000  | 0.964  | 1.000  |

Note: *P1*: young vs middle-early; *P2*: young vs middle-late; *P3*: young vs old; *P4*: middle-early vs middle-late; *P5*: middle-early vs old; *P6*: middle-late vs old; \**P* < 0.05, \*\**P* < 0.01, \*\*\**P* < 0.001.

Abbreviations: MMSE: Mini-Mental State Examination; CANTAB\_VRM: Cambridge Neuropsychological Test Automated Battery verbal recognition memory; HOP: Hopkins.

**Supplementary Table 2** Pairwise comparison of cerebral compartment volumes

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| **Cognitive score** | **ANCOVA** | **Pairwise comparison** |
| ***P* valuea/b** | ***P1b*** | ***P2b*** | ***P3b*** | ***P4b*** | ***P5b*** | ***P6b*** |
| eTIV | 0.099a | n.d.  | n.d. | n.d. | n.d. | n.d. | n.d. |
| cerebrospinal fluid | <0.001\*\*\* | 0.055 | <0.001\*\*\* | <0.001\*\*\* | 0.001 | <0.001\*\*\* | <0.001\*\*\* |
| grey matter | <0.001\*\*\* | <0.001\*\*\* | <0.001\*\*\* | <0.001\*\*\* | 0.007 | <0.001\*\*\* | <0.001\*\*\* |
| White matter | <0.001\*\*\* | 1.000  | 1.000  | <0.001\*\*\* | 1.000  | <0.001\*\*\* | <0.001\*\*\* |

Note: n.d., not done; aANCOVA, controlling for gender and education years; bANCOVA, controlling for gender, education years and eTIV. *P1*: young vs middle-early; *P2*: young vs middle-late; *P3*: young vs old; *P4*: middle-early vs middle-late; *P5*: middle-early vs old; *P6*: middle-late vs old; \**P* < 0.05, \*\**P* < 0.01, \*\*\**P* < 0.001.

Abbreviations: eTIV, evaluated total intracranial volume.

**Supplementary Table 3** Pairwise comparison of amygdala nuclei volume

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| --- | --- | --- |
| **Amygdala nuclei** | **ANCOVA** | **Pairwise comparison** |
| ***P* value** | ***P1*** | ***P2*** | ***P3*** | ***P4*** | ***P5*** | ***P6*** |
| L | La | <0.001\*\*\* | 1.000 | 1.000 | <0.001\*\*\* | 1.000 | 0.001\*\* | <0.001\*\*\* |
| Ba | <0.001\*\*\* | 1.000 | 0.488 | <0.001\*\*\* | 1.000 | <0.001\*\*\* | 0.001\*\* |
| AB | <0.001\*\*\* | 1.000 | 0.043\* | <0.001\*\*\* | 0.417 | <0.001\*\*\* | <0.001\*\*\* |
| AAA | <0.001\*\*\* | 1.000 | 0.481 | <0.001\*\*\* | 1.000 | 0.004\*\* | 0.010\* |
| Ce | <0.001\*\*\* | 1.000 | 1.000 | 0.005\*\* | 0.231 | <0.001\*\*\* | 0.128 |
| Me | 0.016\* | 1.000 | 1.000 | 0.205 | 1.000 | 0.021\* | 0.621 |
| Co | <0.001\*\*\* | 1.000 | 0.055 | <0.001\*\*\* | 0.414 | <0.001\*\*\* | 0.063 |
| CAT | <0.001\*\*\* | 0.464 | 0.003\*\* | <0.001\*\*\* | 0.802 | <0.001\*\*\* | <0.001\*\*\* |
| PL | 0.004\*\* | 1.000 | 0.888 | 0.003\*\* | 1.000 | 0.206 | 0.306 |
| Whole | <0.001\*\*\* | 1.000 | 0.353 | <0.001\*\*\* | 1.000 | <0.001\*\*\* | <0.001\*\*\* |
| R | La | <0.001\*\*\* | 1.000 | 1.000 | <0.001\*\*\* | 1.000 | 0.005\*\* | <0.001\*\*\* |
| Ba | <0.001\*\*\* | 1.000 | 1.000 | <0.001\*\*\* | 1.000 | <0.001\*\*\* | <0.001\*\*\* |
| AB | <0.001\*\*\* | 1.000 | 1.000 | <0.001\*\*\* | 1.000 | <0.001\*\*\* | <0.001\*\*\* |
| AAA | <0.001\*\*\* | 1.000 | 1.000 | <0.001\*\*\* | 1.000 | 0.001\*\* | <0.001\*\*\* |
| Ce | <0.001\*\*\* | 1.000 | 1.000 | 0.003\*\* | 1.000 | <0.001\*\*\* | 0.003\*\* |
| Me | 0.003\*\* | 1.000 | 1.000 | 0.031\* | 1.000 | 0.016\* | 0.055 |
| Co | <0.001\*\*\* | 1.000 | 1.000 | <0.001\*\*\* | 0.905 | <0.001\*\*\* | <0.001\*\*\* |
| CAT | <0.001\*\*\* | 1.000 | 0.144 | <0.001\*\*\* | 1.000 | <0.001\*\*\* | <0.001\*\*\* |
| PL | 0.004\*\* | 1.000 | 1.000 | 0.023\* | 0.977 | 1.000 | 0.010\* |
| Whole | <0.001\*\*\* | 1.000 | 1.000 | <0.001\*\*\* | 1.000 | <0.001\*\*\* | <0.001\*\*\* |

Note: *P1*: young vs middle-early; *P2*: young vs middle-late; *P3*: young vs old; *P4*: middle-early vs middle-late; *P5*: middle-early vs old; *P6*: middle-late vs old; \**P* < 0.05, \*\* *P* < 0.01, \*\*\**P* < 0.001.

Abbreviations: L, left hemisphere; R, right hemisphere; La: lateral nucleus; Ba: basal nucleus; AB: accessory basal nucleus; Ce: central nucleus; Me: medial nucleus; Co: cortical nucleus; AAA: anterior amygdaloid area; CAT: cortico-amygdaloid transition area; PL: paralaminar nucleus; Whole: whole amygdala.

**Supplementary Table 4** Correlation analysis between amygdala nuclei volumes and memory scores

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| --- | --- | --- |
| **Characteristics** | **CANTAB\_VRM** | **HOP immediate recall** |
| ***R*** | ***P*** | ***R*** | ***P*** |
| L | La | 0.2469 | 0.0089\*\* | 0.2654 | 0.0079\*\* |
| Ba | 0.2297 | 0.0141\* | 0.2502 | 0.0088\*\* |
| AB | 0.2604 | 0.0079\*\* | 0.2685 | 0.0079\*\* |
| AAA | 0.2504 | 0.0088\*\* | 0.2485 | 0.0088\*\* |
| Ce | 0.0951 | 0.2921  | 0.1601 | 0.0765  |
| Me | 0.0851 | 0.3458  | 0.0501 | 0.5625  |
| Co | 0.2072 | 0.0250\* | 0.1488 | 0.0943  |
| CAT | 0.2120 | 0.0224\* | 0.2143 | 0.0221\* |
| PL | 0.1725 | 0.0575 | 0.1827 | 0.0437\* |
| Whole | 0.2510 | 0.0088\*\* | 0.2640 | 0.0079\*\* |
| R | La | 0.1707 | 0.0591 | 0.1478 | 0.0953  |
| Ba | 0.2115 | 0.0224\* | 0.2280 | 0.0146\* |
| AB | 0.2997 | 0.0079\*\* | 0.2708 | 0.0079\*\* |
| AAA | 0.2337 | 0.0125\* | 0.2339 | 0.0125\* |
| Ce | 0.1945 | 0.0318\* | 0.0947 | 0.2921  |
| Me | 0.0708 | 0.4276 | 0.1353 | 0.1295  |
| Co | 0.2611 | 0.0079\*\* | 0.2122 | 0.0224\* |
| CAT | 0.2797 | 0.0079\*\* | 0.3389 | 0.0023\*\* |
| PL | 0.0470 | 0.5808  | 0.1619 | 0.0741  |
| Whole | 0.2398 | 0.0105\* | 0.2255 | 0.0015\*\* |

*R*, correlation coefficient. \**P* < 0.05, \*\**P* < 0.01. All data was Z-score normalized.

Abbreviations: L, left hemisphere; R, right hemisphere; La, lateral nucleus; Ba, basal nucleus; AB, accessory basal nucleus; Ce, central nucleus; Me, medial nucleus; Co, cortical nucleus; AAA, anterior amygdaloid area; CAT, cortico-amygdaloid transition area; PL, paralaminar nucleus; Whole, whole amygdala; CANTAB\_VRM, Cambridge Neuropsychological Test Automatic Battery Verbal Recognition Memory; HOP immediate recall, Hopkins immediate recall.

**Supplementary Table 5.** Mediation effect analysis results.

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| Dependent variable | Independent variable  | Mediating variable | Mediation effect |
| coefficient | P value |
| CANTAB\_VRM | L Amygdala | L hippocampus | .0004 | .4373 |
| R Amygdala | R hippocampus | .0005 | .3298 |
| HOP\_immediaterecall | L Amygdala | L hippocampus | .0003 | .6001 |
| R Amygdala | R hippocampus | .0003 | .4978 |
| CANTAB\_VRM | L hippocampus | L Amygdala | .0018 | .1405 |
| R hippocampus | R Amygdala | .0011 | .3641 |
| HOP\_immediaterecall | L hippocampus | L Amygdala | .0018 | .1242 |
| R hippocampus | R Amygdala | .0015 | .1914 |

Abbreviations: L, left hemisphere; R, right hemisphere; CANTAB\_VRM, Cambridge Neuropsychological Test Automatic Battery Verbal Recognition Memory; HOP\_immediaterecall, Hopkins immediate recall.

 **Supplementary Figure 1**. Scatter plots of the Pearson partial correlation between cerebral compartments and age.

Abbreviations: eTIV, evaluated total intracranial volume; CSF, cerebrospinal fluid; GM, grey matter; WM, white matter.