**Supplementary Materials for**

**Negative association between the anterior insula and resilience during a continuous performance task: an fMRI twin study**

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**Supplementary Methods**

*S1 Analysis including errors as a regressor*

Performance accuracy / motor responses were not included in the first level main analysis. However, we ran confirmatory analysis including the onsets of participants’ errors as an additional regressor (along with targets, non-targets and baselines, and the six movement regressors) in the first level analysis. After excluding missing data and participants whose number of errors was 2 standard deviations (SD) above the mean (mean error = 9.37; SD = 9.87, exclusion threshold = 29 errors), the final sample for this analysis consisted of 197 participants, including 142 trauma exposed participants. The results of the linear mixed models of the associations between wellbeing and resilience and all the ROIs are presented in Tables S1 and S2. Including Performance accuracy / motor responses in the analysis allowed us to investigate associations between task performance (reaction times and number of errors) and wellbeing and resilience, and between task performance and all ROIs using spearman correlations tests. The results of these analysis are presented in tables S3 to S5.

**Supplementary Results**

*S2 Demographic characteristics*

Using a linear mixed model and controlling for relatedness and zygosity, we found no difference in age (t(130.26) = -0.778, p = 0.438) and sex (t(130.53) = -0.910, p = 0.365) for wellbeing. We also found no sex differences for depression/anxiety scores (t(129.58) = 1.79, p = 0.076) using a similar linear mixed model, but we did find a significant negative association between age and depression/anxiety scores (t(129.28) = -2.228, p = 0.028) in that older participants had significantly less depression and anxiety symptoms.

Using a linear mixed model and controlling for age, sex and zygosity, we found no significant differences between categorical ELS presence/absence groups in wellbeing (t(247.89) = -0.374, p = 0.709) or depression/anxiety scores (t(246.58) = 1.278, p = 0.203). We also found no associations between wellbeing and number of ELS events (t(247.95) = -0.326, p=0.744), but we did find a significant positive association between depression/anxiety scores and number of ELS events (t(244.44) = 3.347, p < 0.001). As expected, using a similar linear mixed model, we found a large negative association between wellbeing and depression/anxiety scores (t(247.07) = -9.563, p < 0.001).

Regarding early-life stress (ELS), premature birth complications was the most common (46%) event reported. The next five most frequent ELS events were sustained bullying (17%), sustained family conflict (14%), major surgery or repeated hospitalization (9%), witness domestic violence in family (9%) and life-threatening illness or injury (9%) (Table S1).

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| Table S1. Linear mixed model results of the associations between all ROIs and the COMPAS-W scores from the sustained attention contrast, including an error regressor in 1st level analyses. |
| ROI | Estimate (β) | Std.Error | df | t-value | *p*-value | Bonferroni corrected *p* |  |
| Whole sample (n = 196) |  |  |  |  |  |  |  |
| Left insula | -0.015 | 0.006 | 187.659 | -2.525 | 0.012\* | 0.087 |  |
| Right insula | -0.017 | 0.006 | 185.727 | -2.593 | 0.010\* | 0.072 |  |
| Left aIPL | -0.003 | 0.006 | 189.956 | -0.516 | 0.607 | NA |  |
| Right aIPL | -0.005 | 0.007 | 189.140 | -0.660 | 0.510 | NA |  |
| Left Precuneus | -0.004 | 0.007 | 188.019 | -0.566 | 0.572 | NA |  |
| Right Precuneus | -0.001 | 0.007 | 190.000 | -0.160 | 0.873 | NA |  |
| msPFC | -0.012 | 0.007 | 187.819 | -1.625 | 0.106 | NA |  |
| Trauma-exposed sample (n = 142) |  |  |  |  |  |  |  |
| Left insula | -0.016 | 0.006 | 136.000 | -2.617 | 0.010\*\* | 0.069 |  |
| Right insula | -0.019 | 0.006 | 136.000 | -2.657 | 0.004\*\*\* | 0.026\* |  |
| Left aIPL | -2.54e-04 | 0.007 | 135.957 | -0.036 | 0.971 | NA |  |
| Right aIPL | -0.007 | 0.007 | 135.661 | -0.925 | 0.357 | NA |  |
| Left Precuneus | -0.008 | 0.007 | 136.000 | -1.088 | 0.279 | NA |  |
| Right Precuneus | -0.005 | 0.009 | 136.000 | -0.638 | 0.525 | NA |  |
| msPFC | -0.012 | 0.008 | 136.000 | -1.469 | 0.144 | NA |  |
| Non-trauma-exposed sample (n = 54) |  |  |  |  |  |  |  |
| Left insula  | -0.012 | 0.014 | 48.000 | -0.817 | 0.418 | NA |  |
| Right insula | -0.013 | 0.016 | 48.000 | -0.782 | 0.438 | NA |  |
| Left aIPL | -0.012 | 0.016 | 47.236 | -0.787 | 0.435 | NA |  |
| Right aIPL | 0.005 | 0.019 | 46.065 | 0.267 | 0.791 | NA |  |
| Left Precuneus | 0.017 | 0.016 | 46.901 | 1.115 | 0.270 | NA |  |
| Right Precuneus | 0.021 | 0.016 | 48.000 | 1.320 | 0.193\* | NA |  |
| msPFC | -0.017 | 0.017 | 48.000 | -0.990 | 0.328 | NA |  |
| Note: ROI = Region of interest; N = Sample size; df = degrees of freedom; COMPAS-W = composite measure of wellbeing; aIPL = anterior Inferior Parietal Lobule; msPFC = bilateral medial superior Prefrontal Cortex; p-values were derived via the Satterthwaite's degrees of freedom method (Luke, 2017) |

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| Table S2. Linear mixed model results of the associations between all ROIs and the COMPAS-W scores from the working memory contrast, including an error regressor in 1st level analyses. |  |
| ROI | Estimate (β) | Std.Error | df | t-value | *p*-value | Bonferroni corrected *p* |  |
| Whole sample (n = 196) |  |  |  |  |  |  |  |
| Left PCG | 0.007 | 0.004 | 190.000 | 1.529 | 0.128 | NA |  |
| Right PCG | 0.003 | 0.005 | 190.000 | 0.632 | 0.528 | NA |  |
| Left DLPFC | 0.010 | 0.005 | 190.000 | 2.141 | 0.034\* | 0.235 |  |
| Right DLPFC | 0.007 | 0.005 | 190.000 | 1.327 | 0.186 | NA |  |
| Left DPC | 4.38e-04 | 0.005 | 190.000 | 0.083 | 0.934 | NA |  |
| Right DPC | 0.004 | 0.005 | 190.000 | 0.805 | 0.422 | NA |  |
| dACC | 0.002 | 0.005 | 190.000 | 0.462 | 0.645 | NA |  |
| Trauma-exposed sample (n = 141) |  |  |  |  |  |  |  |
| Left PCG | 0.002 | 0.005 | 135.000 | 0.389 | 0.698 | NA |  |
| Right PCG | 5.66e-04 | 0.005 | 130.052 | 0.121 | 0.903 | NA |  |
| Left DLPFC | 0.008 | 0.005 | 135.000 | 1.601 | 0.011 | NA |  |
| Right DLPFC | 0.003 | 0.006 | 133.979 | 0.602 | 0.548 | NA |  |
| Left DPC | -0.002 | 0.006 | 135.000 | -0.292 | 0.771 | NA |  |
| Right DPC | 0.001 | 0.005 | 135.000 | 0.119 | 0.906 | NA |  |
| dACC | 0.001 | 0.006 | 135.000 | 0.245 | 0.807 | NA |  |
| Non-trauma-exposed sample (n = 55) |  |  |  |  |  |  |  |
| Left PCG | 0.026 | 0.011 | 49.000 | 2.472 | 0.017\* | 0.119 |  |
| Right PCG | 0.022 | 0.013 | 46.993 | 1.662 | 0.103 | NA |  |
| Left DLPFC | 0.015 | 0.011 | 49.000 | 1.425 | 0.161 | NA |  |
| Right DLPFC | 0.023 | 0.013 | 49.000 | 1.744 | 0.087 | NA |  |
| Left DPC | 0.008 | 0.013 | 49.000 | 0.626 | 0.534 | NA |  |
| Right DPC | 0.002 | 0.013 | 46.993 | 1.662 | 0.103 | NA |  |
| dACC | 0.013 | 0.012 | 47.115 | 1.068 | 0.291 | NA |  |
| Note: ROI = Region of interest; N = Sample size; df = degrees of freedom; COMPAS-W = composite measure of wellbeing; PCG = Precentral Gyrus; DLPFC = Dorso-Lateral Prefrontal Cortex; DPC = Dorsal Parietal Cortex; dACC = bilateral dorsal Anterior Cingulate Cortex; p-values were derived via the Satterthwaite's degrees of freedom method (Luke, 2017). |

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| Table S3. Spearman correlations results of the associations between COMPAS-W scores and reaction times and accuracy, including an error regressor in 1st level analyses. |
|  | Mean reaction time |  | Accuracy (Number of errors) |
|  | Estimate (rho) | *p*-value |  | Estimate (rho) | *p*-value |
| Whole sample (n = 196) | -0.101 | 0.160 |  | -0.096 | 0.180 |
| Trauma-exposed sample (n = 142) | 0.021 | 0.879 |  | -0.085 | 0.549 |
| Non-trauma-exposed sample (n = 54) | -0.137 | 0.103 |  | -0.101 | 0.230 |
| Note: COMPAS-W = composite measure of wellbeing; Accuracy represents the number of errors (commission and omission combined), such that a higher value means lower accuracy. |

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| Table S4. Spearman correlations results of the associations between all ROIs and reaction times and accuracy from the sustained attention contrast, including an error regressor in 1st level analyses. |  |
| ROI / Performance | Mean reaction time |  | Accuracy (Number of errors) |
| Whole sample (n = 196) | Estimate (rho) | *p*-value |  | Estimate (rho) | *p*-value | Bonferroni corrected *p* |
| Left insula | -0.090 | 0.208 |  | 0.221 | 0.002\*\* | 0.013\* |
| Right insula | -0.050 | 0.483 |  | 0.213 | 0.003\*\* | 0.019\* |
| Left aIPL | 0.094 | 0.188 |  | 0.083 | 0.250 | NA |
| Right aIPL | <0.001 | 0.996 |  | 0.297 | <0.001\*\*\* | <0.001\*\*\* |
| Left Precuneus | 0.047 | 0.514 |  | 0.051 | 0.481 | NA |
| Right Precuneus | 0.005 | 0.950 |  | 0.224 | 0.002\*\* | 0.011\* |
| msPFC | -0.030 | 0.676 |  | 0.212 | 0.003\*\* | 0.020\* |
| Trauma-exposed sample (n = 142) |  |  |  |  |  |  |
| Left insula | -0.106 | 0.208 |  | 0.247 | 0.003\*\* | 0.021\* |
| Right insula | -0.102 | 0.227 |  | 0.269 | 0.001\*\* | 0.009\*\* |
| Left aIPL | 0.117 | 0.166 |  | 0.073 | 0.387 | NA |
| Right aIPL | -0.004 | 0.962 |  | 0.276 | 0.001\*\*\* | 0.006\*\* |
| Left Precuneus | -0.014 | 0.869 |  | 0.133 | 0.115 | NA |
| Right Precuneus | -0.002 | 0.981 |  | 0.321 | <0.001\*\*\* | <0.001\*\*\* |
| msPFC | -0.081 | 0.336 |  | 0.298 | <0.001\*\*\* | 0.002\*\* |
| Non-trauma-exposed sample (n = 54) |  |  |  |  |  |  |
| Left insula  | -0.050 | 0.721 |  | 0.179 | 0.196 | NA |
| Right insula | 0.084 | 0.543 |  | 0.118 | 0.396 | NA |
| Left aIPL | 0.028 | 0.841 |  | 0.100 | 0.471 | NA |
| Right aIPL | -0.004 | 0.979 |  | 0.356 | 0.008\*\* | 0.058 |
| Left Precuneus | 0.208 | 0.130 |  | -0.193 | 0.161 | NA |
| Right Precuneus | 0.040 | 0.774 |  | -0.043 | 0.760 | NA |
| msPFC | 0.106 | 0.445 |  | 0.034 | 0.810 | NA |
| Note: COMPAS-W = composite measure of wellbeing; aIPL = anterior Inferior Parietal Lobule; msPFC = bilateral medial superior Prefrontal Cortex; Accuracy represents the number of errors (commission and omission combined), such as a higher value means lower accuracy. |

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| Table S5. Spearman correlations results of the associations between all ROIs and reaction times and accuracy from the working memory contrast, including an error regressor in 1st level analyses. |
| ROI / Performance | Mean reaction time |  | Accuracy (Number of errors) |
| Whole sample (n = 196) | Estimate (rho) | *p*-value | Bonferroni corrected *p* | Estimate (rho) | *p*-value | Bonferroni corrected *p* |
| Left PCG | -0.059 | 0.413 | NA | 0.183 | 0.010\* | 0.073 |
| Right PCG | -0.074 | 0.304 | NA | 0.292 | <0.001\*\*\* | <0.001\*\*\* |
| Left DLPFC | -0.026 | 0.714 | NA | 0.149 | 0.037 | 0.261 |
| Right DLPFC | 0.005 | 0.940 | NA | 0.158 | 0.027\* | 0.190 |
| Left DPC | -0.018 | 0.808 | NA | 0.294 | <0.001\*\*\* | <0.001\*\*\* |
| Right DPC | 0.03 | 0.676 | NA | 0.333 | <0.001\*\*\* | <0.001\*\*\* |
| dACC | -0.091 | 0.203 | NA | 0.240 | 0.001 | 0.005\*\* |
| Trauma-exposed sample (n = 141) |  |  |  |  |  |  |
| Left PCG | -0.014 | 0.867 | NA | 0.222 | 0.008\*\* | 0.058 |
| Right PCG | 0.017 | 0.844 | NA | 0.272 | 0.001\*\* | 0.008\*\* |
| Left DLPFC | 0.002 | 0.982 | NA | 0.172 | 0.041\* | 0.290 |
| Right DLPFC | 0.061 | 0.472 | NA | 0.123 | 0.147 | NA |
| Left DPC | 0.055 | 0.513 | NA | 0.297 | <0.001\*\*\* | 0.002\*\* |
| Right DPC | 0.088 | 0.297 | NA | 0.325 | <0.001\*\*\* | 0.001\*\*\* |
| dACC | -0.040 | 0.636 | NA | 0.253 | 0.002 | 0.017\* |
| Non-trauma-exposed sample (n = 55) |  |  |  |  |  |  |
| Left PCG | -0.127 | 0.355 |  NA | 0.107 | 0.438 | NA |
| Right PCG | -0.296 | 0.029\* | 0.201 | 0.314 | 0.019\* | 0.136 |
| Left DLPFC | -0.073 | 0.595 | NA | 0.101 | 0.464 | NA |
| Right DLPFC | -0.156 | 0.255 | NA | 0.205 | 0.133 | NA |
| Left DPC | -0.198 | 0.148 | NA | 0.272 | 0.045\* | 0.315 |
| Right DPC | -0.109 | 0.426 | NA | 0.318 | 0.0179\* | 0.125 |
| dACC | -0.201 | 0.141 | NA | 0.188 | 0.170 | NA |
| Note: COMPAS-W = composite measure of wellbeing; PCG = Precentral Gyrus; DLPFC = Dorso-Lateral Prefrontal Cortex; DPC = Dorsal Parietal Cortex; dACC = bilateral dorsal Anterior Cingulate Cortex; Accuracy represents the number of errors (commission and omission combined), such as a higher value means lower accuracy. |

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| Table S6: Early life stress categories |
| Characteristics | Whole Sample (n = 253) | MZ (n = 168) | DZ (n = 85) |
| Premature birth or other birth complications  | 46% | 46% | 45% |
| Adoption  | 0% | 0% | 0% |
| Major surgery or repeated hospitalization | 13% | 12% | 16% |
| Life-threatening illness or injury | 9% | 10% | 8% |
| Sustained bullying | 17% | 18% | 13% |
| Physical abuse  | 4% | 4% | 1% |
| Sexual abuse  | 5% | 5% | 5% |
| Emotional abuse  | 8% | 10% | 6% |
| Poverty or neglect | 2% | 3% | 0% |
| Natural disaster | 3% | 5% | 0% |
| House destroyed by fire or other means  | 0% | 1% | 0% |
| Witness of warfare  | 0% | 0% | 0% |
| Parents divorced or separated | 8% | 8% | 6% |
| Long period of separation from immediate family | 6% | 7% | 5% |
| Sustained family conflict | 14% | 13% | 14% |
| Death of immediate family | 4% | 4% | 4% |
| Life-threatening illness in immediate family | 7% | 8% | 5% |
| Witness domestic violence in family | 9% | 12% | 2% |
| Witness or experience some other traumatic event | 6% | 6% | 6% |
| *Note:* DZ = dizygotic; MZ = monozygotic. |

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| Table S7. Linear mixed model results of the interaction between COMPAS-W and ELS in the left and right anterior insula activation from the sustained attention contrast. |
| ROI | Estimate (β) | Std.Error | df | t-value | *p*-value |
| Left Insula | -0.025 | 0.011 | 242.936 | -2.365 | 0.019\* |
| Right Insula | -0.031 | 0.011 | 242.437 | -2.680 | 0.008\*\* |
| Note: ROI = Region of interest; df = degrees of freedom; COMPAS-W = composite measure of wellbeing; ELS = Early-Life Stress (categorical: presence/absence); p-values were derived via the Satterthwaite's degrees of freedom method (Luke, 2017) |

Figure S1: Left and right anterior insula activity from the sustained attention contrast was significantly negatively associated COMPAS-W scores in the trauma group only (i.e., resilience), with a significant interaction between COMPAS-W scores and Early-Life Stress (presence vs absence of trauma).



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| Table S8. Linear mixed model results for the associations between the anterior insula ROIs and COMPAS-W scores in the trauma exposed group from the sustained attention contrast, excluding participants with birth complications as the only trauma exposure. |
| ROI (n = 145) | Estimate (β) | Std.Error | df | t-value | *p*-value | Bonferroni corrected *p* |
| Left Insula | -0.013 | 0.006 | 135.801 | -2.348 | 0.020\* | 0.142 |
| Right Insula | -0.016 | 0.006 | 139.000 | -2.923 | 0.004\*\* | 0.028\* |
| Note: ROI = Region of interest; df = degrees of freedom; COMPAS-W = composite measure of wellbeing; p-values were derived via the Satterthwaite's degrees of freedom method (Luke, 2017) |

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| Table S9. Linear mixed model results of the associations between all ROIs and the COMPAS-W scores from the sustained attention contrast. |
| ROI | Estimate (β) | Std.Error | df | t-value | *p*-value | Bonferroni corrected *p* |  |
| Whole sample (n = 251) |  |  |  |  |  |  |  |
| Left insula | -0.012 | 0.005 | 230.801 | -2.410 | 0.017\* | 0.117 |  |
| Right insula | -0.013 | 0.005 | 223.283 | -2.560 | 0.011\* | 0.078 |  |
| Left aIPL | -3.807e-04 | 0.005 | 242.205 | -0.076 | 0.939 | NA |  |
| Right aIPL | -0.005 | 0.006 | 228.334 | -0.813 | 0.429 | NA |  |
| Left Precuneus | -0.001 | 0.006 | 224.916 | -0.234 | 0.815 | NA |  |
| Right Precuneus | 0.004 | 0.006 | 245.000 | 0.688 | 0.492 | NA |  |
| msPFC | -0.008 | 0.006 | 236.677 | -1.451 | 0.148 | NA |  |
| Trauma-exposed sample (n = 187) |  |  |  |  |  |  |  |
| Left insula | -0.015 | 0.005 | 169.316 | -2.871 | 0.005\*\* | 0.032\* |  |
| Right insula | -0.018 | 0.005 | 181.000 | -3.492 | 0.001\*\*\* | 0.004\*\* |  |
| Left aIPL | -0.001 | 0.006 | 179.125 | -0.153 | 0.879 | NA |  |
| Right aIPL | -0.011 | 0.006 | 169.130 | -1.881 | 0.062 | NA |  |
| Left Precuneus | -0.006 | 0.006 | 181.000 | -0.879 | 0.381 | NA |  |
| Right Precuneus | -0.001 | 0.007 | 181.000 | -0.138 | 0.891 | NA |  |
| msPFC | -0.010 | 0.006 | 174.479 | -1.701 | 0.091 | NA |  |
| Non-trauma-exposed sample (n = 64) |  |  |  |  |  |  |  |
| Left insula  | 0.003 | 0.011 | 58.000 | 0.299 | 0.766 | NA |  |
| Right insula | 0.004 | 0.014 | 58.000 | 0.267 | 0.790 | NA |  |
| Left aIPL | 0.007 | 0.011 | 56.369 | 0.635 | 0.528 | NA |  |
| Right aIPL | 0.023 | 0.015 | 58.000 | 1.506 | 0.138 | NA |  |
| Left Precuneus | 0.014 | 0.013 | 58.000 | 1.070 | 0.289 | NA |  |
| Right Precuneus | 0.027 | 0.012 | 58.000 | 2.195 | 0.032\* | 0.225 |  |
| msPFC | -0.001 | 0.015 | 58.000 | -0.048 | 0.962 | NA |  |
| Note: ROI = Region of interest; N = Sample size; df = degrees of freedom; COMPAS-W = composite measure of wellbeing; aIPL = anterior Inferior Parietal Lobule; msPFC = bilateral medial superior Prefrontal Cortex; p-values were derived via the Satterthwaite's degrees of freedom method (Luke, 2017) |

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| Table S10. Linear mixed model results of the associations between all ROIs and the COMPAS-W scores from the working memory contrast. |  |
| ROI | Estimate (β) | Std.Error | df | t-value | *p*-value | Bonferroni corrected *p* |  |
| Whole sample (n = 250) |  |  |  |  |  |  |  |
| Left PCG | 0.007 | 0.004 | 244.000 | 1.746 | 0.082 | NA |  |
| Right PCG | 0.003 | 0.004 | 244.000 | 0.653 | 0.515 | NA |  |
| Left DLPFC | 0.008 | 0.004 | 244.000 | 1.927 | 0.056 | NA |  |
| Right DLPFC | -4.63e-04 | 0.004 | 244.000 | -0.103 | 0.918 | NA |  |
| Left DPC | 0.001 | 0.005 | 244.000 | 0.150 | 0.881 | NA |  |
| Right DPC | -1.04e-04 | 0.005 | 244.000 | -0.023 | 0.982 | NA |  |
| dACC | 0.001 | 0.005 | 244.000 | 0.237 | 0.813 | NA |  |
| Trauma-exposed sample (n = 186) |  |  |  |  |  |  |  |
| Left PCG | 2.51e-04 | 0.005 | 180.000 | 0.049 | 0.961 | NA |  |
| Right PCG | 3.49e-04 | 0.004 | 180.000 | 0.084 | 0.933 | NA |  |
| Left DLPFC | 0.008 | 0.005 | 180.000 | 1.656 | 0.010 | NA |  |
| Right DLPFC | -0.004 | 0.005 | 180.000 | -0.913 | 0.362 | NA |  |
| Left DPC | -1.57e-04 | 0.005 | 180.000 | 0.684 | 0.974 | NA |  |
| Right DPC | -0.001 | 0.005 | 163.946 | -0.299 | 0.765 | NA |  |
| dACC | 2.51e-04 | 0.005 | 180.000 | 0.049 | 0.961 | NA |  |
| Non-trauma-exposed sample (n = 64) |  |  |  |  |  |  |  |
| Left PCG | 0.020 | 0.010 | 58.000 | 2.057 | 0.044\* | 0.309 |  |
| Right PCG | 0.011 | 0.011 | 58.000 | 1.030 | 0.307 | NA |  |
| Left DLPFC | 0.013 | 0.010 | 57.225 | 1.365 | 0.180 | NA |  |
| Right DLPFC | 0.013 | 0.010 | 58.000 | 1.225 | 0.226 | NA |  |
| Left DPC | 0.004 | 0.011 | 58.000 | 0.325 | 0.746 | NA |  |
| Right DPC | 0.009 | 0.012 | 57.593 | 0.770 | 0.445 | NA |  |
| dACC | 0.006 | 0.011 | 53.679 | 0.508 | 0.614 | NA |  |
| Note: ROI = Region of interest; N = Sample size; df = degrees of freedom; COMPAS-W = composite measure of wellbeing; PCG = Precentral Gyrus; DLPFC = Dorso-Lateral Prefrontal Cortex; DPC = Dorsal Parietal Cortex; dACC = bilateral dorsal Anterior Cingulate Cortex; p-values were derived via the Satterthwaite's degrees of freedom method (Luke, 2017) |

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| Table S11. Intra-class correlations, models comparison and heritability estimates from the whole sample (trauma and non-trauma exposed). |
| Phenotype | Model | ICC | Model fit | Parameter estimates |
| (Sample size) |   | MZ | DZ | Comparison | -2LL | AIC | *p*-value | A[CI] | C or D[CI] | E[CI] |
| COMPAS-W | ADE | 0.46 | 0.14 | vs. saturated | 1777.51 | 1317.51 | NA | 0.01 [<0.01 0.57] | <0.43 [<0.01 0.59] | 0.56 [0.41 0.75] |
| (n = 236) | **AE** |  |  | vs. ADE | 1777.88 | 1315.88 | 0.54 | **0.43** **[0.24 0.58]** | - | **0.57****[0.42 0.76]** |
|  | E |  |  | vs. AE | 1796.23 | 1332.23 | <0.01 | - | - | 1 |
| Depression/Anxiety  | ACE | 0.31 | 0.21 | vs. saturated | 246.77 | -213.23 | NA | 0.28 [<0.01 0.45] | <0.01[<0.01 0.39] | 0.72 [0.55 0.92] |
| symptoms | **AE** |  |  | vs. ACE | 246.77 | -21523 | 1 | **0.29** **[0.08 0.45]** | - | **0.72****[0.55 0.92]** |
| (n = 236) | E |  |  | vs. AE | 254.51 | -209.49 | <0.01 | - | - | 1 |
| Sustained attention contrast |  | MZ | DZ |  |  |  |  |  |  |  |
| Left Insula | ADE | 0.13 | 0.07 | vs. saturated | 520.01 | 64.01 | NA | 0.09 [<0.01 0.34] | 0.03 [<0.01 0.32] | 0.88 [0.68 1] |
| (n = 234) | AE |  |  | vs. ADE | 520.01 | 62.01 | 0.97 | 0.12[<0.01 0.31] | - | 0.88 [0.69 1] |
|  | **E** |  |  | vs. AE | 521.21 | 61.21 | 0.27 | **-** | - | **1** |
| Right Insula | ADE | 0.15 | -0.06 | vs. saturated | 547.28 | 95.27 | NA | <0.01 [<0.01 0.31] | 0.13 [<0.01 0.35] | 0.87 [0.65 1] |
| (n = 232) | AE |  |  | vs. ADE | 547.56 | 93.56 | 0.59 | 0.11 [<0.01 0.32] | - | 0.89 [0.68 1] |
|  | **E** |  |  | vs. AE | 548.55 | 92.55 | 0.32 | **-** | - | **1** |
| Left aIPL | ADE | 0.35 | 0.11 | vs. saturated | 521.61 | 65.61 | NA | 0.11[<0.01 0.50] | 0.22[<0.01 0.52] | 0.66[0.48 0.87] |
| (n = 234) | **AE** |  |  | vs. ADE | 521.74 | 63.74 | 0.72 | **0.33****[0.12 0.50]** | - | **0.67****[0.50 0.88]** |
|  | E |  |  | vs. AE | 531.21 | 71.21 | <0.01 | - | - | 1 |
| Right aIPL | ADE | 0.20 | -0.16 | vs. saturated | 589.51 | 149.51 | NA | <0.01[<0.01 0.32] | 0.16[<0.01 0.36] | 0.84[0.65 1] |
| (n = 226) | AE |  |  | vs. ADE | 590.04 | 148.04 | 1 | 0.14[<0.01 0.33] | - | 0.86[0.67 1] |
|  | **E** |  |  | vs. AE | 591.72 | 147.72 | 0.20 | - | - | **1** |
| Left Precuneus | ACE | 0.09 | 0.12 | vs. saturated | 487.10 | 119.10 | NA | 0.09[<0.01 0.31] | <0.01[<0.01 0.26] | 0.91[0.69 1] |
| (n = 190) | AE |  |  | vs. ACE | 487.10 | 117.10 | 1 | 0.09[<0.01 0.31] | - | 0.91[0.69 1] |
|  | **E** |  |  | vs. AE | 487.64 | 115.64 | 0.46 | - | - | **1** |
| Right Precuneus | ADE | 0.06 | -0.13 | vs. saturated | 421.62 | 133.62 | NA | <0.01[<0.01 0.26] | 0.04[<0.01 0.28] | 0.96[0.72 1] |
| (n = 150) | AE |  |  | vs. ADE | 421.68 | 131.68 | 0.80 | 0.02[<0.01 0.26] | - | 0.98[0.74 1] |
|  | **E** |  |  | vs. AE | 421.71 | 129.71 | 0.88 | - | - | **1** |
| msPFC | ACE | 0.25 | 0.24 | vs. saturated | 620.45 | 164.45 | NA | 0.15[<0.01 0.48] | 0.12[<0.01 0.40] | 0.73[0.52 0.93] |
| (n = 234) | **AE** |  |  | vs. ACE | 620.64 | 162.64 | 0.67 | **0.29****[0.08 0.48]**  | **-** | **0.71****[0.52 0.92]** |
|  | E |  |  | vs. AE | 627.52 | 167.52 | <0.01 | - | - | 1 |
| Working memory contrast |  | MZ | DZ |  |  |  |  |  |  |  |
| Left PCG | ADE | 0.04 | -0.25 | vs. saturated | 405.04 | -22.96 | NA | <0.01[<0.01 <0.01] | <0.01[<0.01 <0.01] | 1[1 1] |
| (n = 220) | AE |  |  | vs. ADE | 405.04 | -24.96 | 1 | <0.01[<0.01 0.16] | - | 1[0.84 1] |
|  | **E** |  |  | vs. AE | 405.04 | -26.96 | 1 | - | - | **1** |
| Right PCG | ACE | 0.07 | 0.07 | vs. saturated | 495.42 | 47.42 | NA | 0.05[<0.01 0.24] | <0.01[<0.01 <0.01] | 1[0.76 1] |
| (n = 228) | AE |  |  | vs. ACE | 495.42 | 45.42 | 1 | 0.05[<0.01 0.24] | - | 0.95[0.76 1] |
|  | **E** |  |  | vs. AE | 495.64 | 43.64 | 0.64 | - | - | **1** |
| Left DLPFC | ACE | -0.42 | -0.02 | vs. saturated | 324.13 | 20.13 | NA | <0.01[<0.01 0.16] | <0.01[<0.01 0.12] | 1[0.84 1] |
| (n = 158) | AE |  |  | vs. ACE | 324.13 | 18.13 | 1 | <0.01[<0.01 0.16] | - | 1[0.84 1] |
|  | **E** |  |  | vs. AE | 324.13 | 16.13 | 1 | - | - | **1** |
| Right DLPFC | ACE | -0.36 | <0.01 | vs. saturated | 146.99 | 22.99 | NA | <0.01[<0.01 0.26] | <0.01[<0.01 0.18] | 1[0.74 1] |
| (n = 68) | AE |  |  | vs. ACE | 146.99 | 20.99 | 1 | <0.01[<0.01 0.26] | - | 1[0.74 1] |
|  | **E** |  |  | vs. AE | 146.99 | 18.99 | 1 | - | - | **1** |
| Left DPC | ADE | -0.03 | -0.14 | vs. saturated | 504.87 | 56.87 | NA | <0.01[<0.01 0.13] | <0.01[<0.01 0.14] | 1[0.86 1] |
| (n = 230) | AE |  |  | vs. ADE | 504.87 | 54.87 | 1 | <0.01[<0.01 0.13] | - | 1[0.87 1] |
|  | **E** |  |  | vs. AE | 504.87 | 52.87 | 1 | - | - | **1** |
| Right DPC | ADE | 0.13 | 0.02 | vs. saturated | 406.71 | 62.71 | NA | <0.01[<0.01 0.32] | 0.12[<0.01 0.34] | 0.88[0.66 1] |
| (n = 178) | AE |  |  | vs. ADE | 406.92 | 60.92 | 0.64 | 0.10[<0.01 0.32] | - | 0.90[0.68 1] |
|  | **E** |  |  | vs. AE | 407.65 | 59.65 | 0.39 | - | - | **1** |
| dACC | ADE | 0.08 | -0.21 | vs. saturated | 497.78 | 49.78 | NA | <0.01[<0.01 0.19] | 0.01[<0.01 0.21] | 1[0.79 1] |
| (n = 230) | AE |  |  | vs. ADE | 497.79 | 47.79 | 0.92 | <0.01[<0.01 0.19] | - | 1[0.81 1] |
|  | **E** |  |  | vs. AE | 497.79 | 45.79 | 1 | - | - | **1** |
| *Note:* ICC = intra-class correlation, MZ = monozygotic twins, DZ = dizygotic twins, -2LL = minus twice the log likelihood, AIC = Akaike’s information criterion, CI = 95% confidence intervals. Starting models were either ADE or ACE, where A = additive genetic, D = dominant genetic, C = common environment, E = unique environment, aIPL = anterior Inferior Parietal Lobule, msPFC = bilateral medial superior Prefrontal Cortex, PCG = Precentral Gyrus, DLPFC = Dorso-Lateral Prefrontal Cortex, DPC = Dorsal Parietal Cortex, dACC = bilateral dorsal Anterior Cingulate Cortex. The ADE starting model was used if the ICC for MZ twins was greater than double the ICC for DZ twins. Squared model components indicate their contribution as a percentage of total variance. Models in bold letters represent the best fit. Wellbeing was measured using the COMPAS-W and depression/anxiety symptoms was measured using the Depression Anxiety Stress Scale (DASS-42). The sample sizes vary because of NAs results during extraction of t-values.  |

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| Table S12: Group brain activity means comparison for the left anterior insula and right anterior insula from the sustained attention contrast. |
|   |   |   | Pairwise t-test *p*-value |
| Left Insula | n | mean beta z-value | Languishing (-1) | Moderate (-1 to 1) | Flourishing (>1) |
| Languishing (-1) | 29 | 0.33 |  |  |  |
| Moderate (-1 to 1) | 129 | 0.021 | 0.127 |  |  |
| Flourishing (>1) | 29 | -0.423 | 0.012\* | 0.044\* |  |
|   |   |   | Pairwise t-test *p*-value |
| Right Insula | n | mean beta z-value | Languishing (-1) | Moderate (-1 to 1) | Flourishing (>1) |
| Languishing (-1) | 29 | 0.454 |  |  |  |
| Moderate (-1 to 1) | 129 | 0.007 | 0.026\* |  |  |
| Flourishing (>1) | 29 | -0.485 | 0.001\*\*\* | 0.022\* |   |
| Note: Groups are based on COMPAS-W z-scores in the trauma sample, n = Sample size, *p*-values are FDR-corrected. |

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| Table S13: Summary table for the correlated factors model for resilience |
| rph-a |  | rg |
| Phenotype | Left Insula | Right Insula | DASS-42 | COMPAS-W |  | Left Insula | Right Insula | DASS-42 | COMPAS-W |
| Left Insula | 0.42 |  |  |  |  |  |  |  |  |
| Right Insula |  | 0.39 |  |  |  | 0.96 (0.14) |  |  |  |
| DASS-42 |  |  | 0.59 |  |  | 0.21 (0.36) | 0.25 (0.39) |  |  |
| COMPAS-W |  |  |  | 0.68 |  | -0.69 (0.33) | -0.99 (0.41) | -0.39 (0.20) |  |
|  |  |  |  |  |  |  |  |  |  |
| rph-e |  | re |
| Phenotype | Left Insula | Right Insula | DASS-42 | COMPAS-W |  | Left Insula | Right Insula | DASS-42 | COMPAS-W |
| Left Insula | 0.91 |  |  |  |  |  |  |  |  |
| Right Insula |  | 0.92 |  |  |  | 0.83 (0.04) |  |  |  |
| DASS-42 |  |  | 0.81 |  |  | 0.18 (0.12) | 0.19 (0.13) |  |  |
| COMPAS-W |  |  |  | 0.73 |  | -0.12 (0.13) | -0.06 (0.13) | -0.42 (0.11) |  |
| Note: rph-a = Phenotypic correlation due to genetic effects; rph-e = Phenotypic correlation due to unique environmental effects |

**Reference**

Luke, S. G. (2017). Evaluating significance in linear mixed-effects models in R. *Behavior Research Methods, 49*(4), 1494-1502. doi:10.3758/s13428-016-0809-y