**Supplementary Materials**

**Methods**

To confirm that our primary results were not influenced by our data screening procedure, we re-tested our path model with univariate statistical outliers included. To further examine the specificity of the present results at the brain level, we tested the proposed model with comparison brain regions. A test with nearby regions was conducted to assess whether adjacent brain areas show the same patterns of prediction (i.e., right frontal pole, left pars triangularis, left medial OFC). A test with regions that perform similar roles in the context of the targeted processes (e.g., maintaining goal-relevant information, monitoring and assessing outcomes, reward and pleasure processing; right superior parietal cortex, left rostral anterior cingulate, left accumbens area) was conducted to assess whether the lateral PFC is of particular importance for the current findings. A test with bilateral MFC, IFC, and OFC regions was conducted to see whether considering the regions bilaterally is more appropriate than the hypothesized lateralized ROIs. For the purpose of comparison at the personality level, we also tested the proposed model with neuroticism included as an additional personality trait in the resilience factor. For comparison at the symptom level, we tested the proposed model with state anxiety.

***Structural MRI Data Acquisition and Preprocessing***

Volume measures from additional regions of interest (ROIs) were extracted using the parcellation from Desikan et al. ([2006](#_ENREF_2)). Specifically, the right frontal pole, left pars triangularis, left medial orbital frontal cortex, right superior parietal cortex, left rostral anterior cingulate, and left accumbens area were targeted. Consistent with the primary analyses, brain region volumes were scaled to account for overall brain size differences.

***Individual Differences Measures***

Neuroticism was measured with Neuroticism-Extraversion-Openness Five-Factor Inventory, Neuroticism subscale (**NEO\_N**) ([Costa & McCrae, 1992](#_ENREF_1)). The questionnaire consists of 12 statements, such as “*I often feel tense and jittery*”. Subjects rated how much they agreed with each statement, using a 1-5 Likert scale (1 = strongly disagree or the statement is definitely false, 3 = neutral or undecided or the statement is about equally true and false, 5 = strongly agree or the statement is definitely true). The ratings were summed to obtain a score of for each subject. Higher scores were taken to indicate higher level of neuroticism. Cronbach’s alpha for neuroticism was .82 in this sample (extraversion Cronbach’s alpha = .84; openness Cronbach’s alpha = .71; agreeableness Cronbach’s alpha = .77; conscientiousness Cronbach’s alpha = .86; *n* = 81).

The **STAI** provides measures of the temporary condition of “state anxiety” and the more general and long-standing quality of “trait anxiety” in adults ([Spielberger, Gorsuch, & Lushene, 1970](#_ENREF_4)). The total state anxiety measure was used for additional comparison with the analyses targeting trait anxiety. Cronbach’s alpha was .89 in this sample (*n* = 81).

***Analytic Overview***

Data for the targeted brain regions, traits, and symptoms, as well as comparison brain regions, neuroticism, and state anxiety were assessed for potential outlier cases at a univariate level using a criterion of 3 SDs ([Osborne & Overbay, 2004](#_ENREF_3)). Besides the cases identified in the main analyses, one participant was identified because of an outlier scaled ROI volume (left pars triangularis). Hence, analyses relating to the targeted variables excluded the identified outliers for the targeted brain regions, traits, and symptoms, and comparison analyses excluded the outlier cases for the relevant brain regions, traits, and symptoms. Supplementary Materials Figure 1 shows the ROIs targeted in the primary analyses, and Supplementary Materials Figure 2 displays the questionnaire data after outlier removal.

**Supplementary Figure 1. The regions of interest selected for prefrontal cortex volumes.** The Desikan-Killany atlas was used to extract volumes for the MFC, IFC, and OFC for each participant. L, Left; R, Right; MFC, middle frontal cortex; IFC, inferior frontal cortex; OFC, orbital frontal cortex.



**Supplementary Figure 2.** **Scatterplots of the variables included for the latent construct of resilience, and the symptom measures of anxiety and depression.** Note that the scatterplots depict the distributions after outlier removal.

Correlation analyses were carried out to examine bivariate associations among the variables of interest and with the control variable of age. Since some variables had fewer observations than others, correlations were assessed using pairwise deletion for missing observations. Correlation results are described using two-sided significance tests unless otherwise specified. Path analyses were conducted consistent with procedures described for the primary analyses.

**Results**

Analyses were conducted on brain, personality, and distress measures first using bivariate correlations and then using the hypothetical structural equation model. The structural equation model included confirmatory factor analysis of the manifest brain and personality variables into latent variable constructs, which then were tested for predicted associations among each other and anxiety and depression measures using regression and mediation analyses. As expected, the inter-correlations of the variables of interest showed that the scaled PFC volume measures were positively associated with each other, the resilience personality traits were positively associated with each other, and the distress measures of anxiety and depression were also positively associated with each other. Table 1 shows the inter-correlations between the variables considered in the primary analyses. At a bivariate level, right MFC volume was positively associated optimism, marginally positively associated with reappraisal (*p* = .032 one-tailed), and marginally negatively associated with anxiety (*p* = .026 one-tailed). Left IFC volume was negatively associated with anxiety. Left OFC volume was positively associated with optimism, and negatively associated with anxiety. Anxiety was negatively associated with positive affect and optimism, and marginally negatively associated with reappraisal (*p* = .031 one-tailed). Depression was negatively associated with positive affect and optimism. Age was not significantly associated with any of the variables of interest (*p*s > .1).

**Supplementary Table 1*. Means, standard deviations, and correlations.***

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable | *n* | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Age |  | 23.40 | 3.98 |  |  |  |  |  |  |  |  |  |
| *n* | 81 |  |  |  |  |  |  |  |  |  |  |  |
| 2. Right MFC |  | 181.36 | 27.62 | -.00 |  |  |  |  |  |  |  |  |
| *n* | 81 |  |  | 81 |  |  |  |  |  |  |  |  |
| 3. Left IFC |  | 41.59 | 8.73 | .10 | .53\*\* | |  |  |  |  |  |  |
| *n* | 81 |  |  | 81 | 81 |  |  |  |  |  |  |  |
| 4. Left OFC |  | 59.04 | 8.27 | -.04 | .75\*\* .60\*\* | | |  |  |  |  |  |
| *n* | 81 |  |  | 81 | 81 | 81 |  |  |  |  |  |  |
| 5. Reappraisal |  | 30.66 | 5.48 | -.17 | .21 | .12 | .14 |  |  |  |  |  |
| *n* | 80 |  |  | 80 | 80 | 80 | 80 |  |  |  |  |  |
| 6. Positive Affectivity | | 32.36 | 7.52 | .09 | .11 | .15 | .15 | .33\*\* | |  |  |  |
| *n* | 78 |  |  | 78 | 78 | 78 | 78 | 78 |  |  |  |  |
| 7. Optimism |  | 16.29 | 3.92 | .06 | .27\* | .13 | .26\* | .31\* | .37\*\* | |  |  |
| *n* | 58 |  |  | 58 | 58 | 58 | 58 | 58 | 58 |  |  |  |
| 8. Anxiety |  | 38.09 | 8.72 | -.05 | -.22 | -.23\* | -.26\* | -.21 | -.42\*\* -.42\*\* | | |  |
| *n* | 81 |  |  | 81 | 81 | 81 | 81 | 80 | 78 | 58 |  |  |
| 9. Depression |  | 4.35 | 4.17 | .03 | -.08 | -.12 | -.13 | -.11 | -.28\* | -.46\*\* .53\*\* | | |
| *n* | 79 |  |  | 79 | 79 | 79 | 79 | 79 | 78 | 58 | 79 |  |

*Note.* \* indicates *p* < .05; \*\* indicates *p* < .01. *N*, *M*, and *SD* are used to represent sub-sample size, mean, and standard deviation, respectively.

To check for sex differences in the variables of interest, independent sample *t* tests were performed. There were no significant differences between females and males for age, scaled PFC volumes, reappraisal, positive affectivity, or anxiety (*p*s > .406). Results showed that females had greater trait optimism (*M* = 17.14, *SD* = 3.39, *n* = 36) compared to males (*M* = 14.91, *SD* = 4.39, *n* = 22; *t*[36.24] = 2.04, *p* = .049), and lower depression (*M* = 3.38, *SD* = 3.48, *n* = 45) compared to males (*M* = 5.65, *SD* = 4.68, *n* = 34; *t*[58.62] = -2.37, *p* = .021). To control for the possible influences of sex and age on the variables of interest, these variables were included within the following path model analyses as variables of no interest.

Within the overall model, the comparison regions fit into common latent variables, but they did not appear to predict resilience or indirectly predict anxiety symptoms as well as the featured model. Specifically, when testing the regions selected based on nearby proximity, the overall model had reasonable fit, χ2(22) = 30.04, *ns*, χ2/*df* = 1.37, CFI = .94, RMSEA = .07, but the mediation did not show a significant indirect association between control and anxiety (a = .33, *p* = .062; b = -.66, *p* = .005; c = -.10, *p* = .411; c’ = -.32, *p* = .008; ab = -.22, *p* = .06). Similarly, when testing the regions selected based on similar roles, the overall model had good fit, χ2(22) = 18.66, *ns*, χ2/*df* = .85, CFI = 1.00, RMSEA = .00, but the latent variable of scaled brain volumes did not significantly predict resilience or indirectly predict anxiety (a = .36, *p* = .057; b = -.72, *p* = .004; c = .05, *p* = .721; c’ = -.21, *p* = .101; ab = -.26, *p* = .063). Testing the model with both left and right hemispheres of the MFC, IFC, and OFC showed similar but not increased significance of results. The overall model showed good fit, χ2(46) = 36.43, *ns*, χ2/*df* = .79, CFI = 1.00, RMSEA = .00, but the mediation did not improve in terms of predicting anxiety (a = .35, *p* = .050; b = -.66, *p* = .01; c = -.06, *p* = .649; c’ = -.29, *p* = .011; ab = -.23, *p* = .047). Together, these results are consistent with the idea that the right MFC, left IFC, and left OFC are particularly important in predicting resilience and indirectly predicting anxiety through resilience, but also suggest that the homologous regions and regions that play similar roles may help in similar ways that are not captured in the present model.

Similarly, we tested our model with the addition of neuroticism in the manifest variables associated with resilience. This model showed similar fit indices to our featured model, χ2(30) = 35.90, *ns*, χ2/*df* = 1.20, CFI = .97, RMSEA = .05, however the path from control to resilience became marginal (a = .40, *p* = .073; b = -.94, *p* = .031; c = .09, *p* = .440; c’ = -.29, *p* = .012; ab = -.38, *p* = .011), suggesting that neuroticism did not improve this leg of the path model. The test of the primary model with STAI-state as the symptom measure showed that the mediation did not significantly predict this measure, (χ2[22] = 24.17, *ns*, χ2/*df* = 1.10, CFI = .98, RMSEA = .04; a = .33, *p* = .061; b = -.66, *p* = .006; c = .11, *p* = .377; c’ = -.11, *p* = .370; ab = -.22, *p* = .060). Together, these results support the idea that the right MFC, left IFC, and left OFC are particularly relevant brain regions for control of emotion, and that reappraisal, positive affectivity, and optimism are particularly relevant for resilience. These results are also consistent with the idea that the current model captures more enduring aspects of symptom expression than state-like measures.

Consistent with the primary analyses, the results of the main model when tested with univariate statistical outliers included showed the same pattern of associations for anxiety. Specifically, the overall model had good fit, χ2(22) = 24.83, *ns*, χ2/*df* = 1.13, CFI = .98, RMSEA = .04, and the mediation significantly predicted anxiety (a = .42, *p* = .011; b = -.75, *p* = .001; c = -.03, *p* = .803; c’ = -.35, *p* = .002; ab = -.32, *p* = .012). Interestingly, when tested for depression with outliers included, the mediation for depression appeared to go from marginal to significant (χ2[22] = 24.39, *ns*, χ2/*df* = 1.11, CFI = .99, RMSEA = .04; a = .37, *p* = .018; b = -.65, *p* = .002; c = .11, *p* = .360; c’ = -.14, *p* = .228; ab = -.24, *p* = .017). We are cautious in interpreting this result as it appears to possibly be driven by particular outlier cases such as one participant that was a statistical outlier on multiple questionnaire measures, including depression. This might indicate that this person did not complete the measures accurately, or is potentially outside the spectrum of “typical healthy” individual differences. With this in mind, we focus on the more conservative set of results without these cases.

**References**

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