**Supplementary**

Table S1. Structural, diffusion and rsfMRI imaging acquisition parameters for 3 datasets

|  |  |  |  |
| --- | --- | --- | --- |
| Dataset | Structural Acquisition | Diffusion Acquisition | rsfMRI Acquisition |
| Human Connectome Project | T1w (3D MPRAGE): Acquisition time = 7:40, TR = 2400, TE = 2.14, FA = 8 o, FoV = 224x224mm, voxel size = 0.7mm, BW = 210Hz/Px  T2w (3D T2-SPACE): Acquisition time = 8:24, TR = 3200, TE = 565, FA = variable, FoV = 224x224, 0.7mm isotropic voxels, BW = 744Hz/Px | Spin-echo EPI, TR = 5520ms, TE = 89.5, FA = 78 o, refocused FA = 160 o, FoV = 210x180, matrix = 168x144, slice thickness 1.25mm, 111 slices, 1.25mm isotropic voxels, multiband factor = 3, echo spacing = 0.78ms, BW = 1488 Hz/Px, b-values 1000, 2000, 3000 s/mm2 | Sequence = Gradient-echo EPI, Acquisition time = 14:33 mins, TR (repetition time) = 720 ms, TE (echo time) = 33.1 ms, flip angle (FA) = 52o  field of view (FoV) = 208 x 180mm, 72 slices, 2mm isotropic voxels, Multiband = 8, echo spacing = 0.58ms, BW = 2290Hz/Px |
| Acquisition References: Van Essen et al. (2013), Ugurbil et al (2013), Sotiropoulos it et al (2013) |
| Scanner:  3T Siemens Skyra scanner, 32-channel head coil |
| Berlin | T1w (MPRAGE):  TR = 1900 ms, TE = 2.25ms, FA = 98 o, FoV 230, 192 sagittal slices, 0.9x0.9x0.9mm voxel slize, 1mm slice thickness  T2w:  Acquisition time = 5:52, TR = 5000ms, TE = 502ms, voxel size 1x1x1mm, FoV = 256mm | 61 transversal (2 mm thick) slices, TR = 7500ms, TE = 86ms, FoV = 220mm, 96 matrix, 2.3 x 2.3 x 2.3 mm voxels, 64 diffusion gradient directions with b-values of 1000 s/mm2, | Sequence = EPI, Acquisition time = 22 mins, 661 volumes acquired consisted of 32 transversal (3 mm thick) slices, TR = 1940 ms, TE = 30 ms, FA = 78o, FoV = 192 mm, 64 matrix, 3x3x3 mm isotropic voxels |
| Acquisition References:  Ritter et al. (2013), Zimmermann et al., (2016) |
| Scanner:  3 T Siemens Tim Trio Scanner MR, 12-channel head coil |
| NKI Rockland | T1w (MPRAGE):  Scan with either longer sequence (scanning time 10:42, TR = 2500, TE = 3.5, 192 slices with voxel size 1x1x1mm3 ) or a shorter sequence (scanning time 5:49 TR = 2500ms, TE = 3.5ms, 192 slices with voxel size 1x1x1mm3)  T2w:  Acquisition time = 0:15, TR = 2500ms, TE = 11ms, FoV = 216mm, slice thickness = 3mm, 38 transversal slices, voxel size = 3x3x3mm | Acquisition time = 13:32, TR = 10000 ms, TE = 91ms, 58 slices with voxel size 2x2x2mm along 64 diffusion weighted gradients, b = 1000 s/mm2 | Sequence = EPI, Acquisition time = 10:55, TR = 2500 ms, TE = 30 ms, 38 slices with 3x3x3mm voxel size |
| Acquisition References:  Brown et al. (2012), http://fcon\_1000.  projects.nitrc.org  /indi/pro/nki.html |
| Scanner:  Siemens Trio 3T |

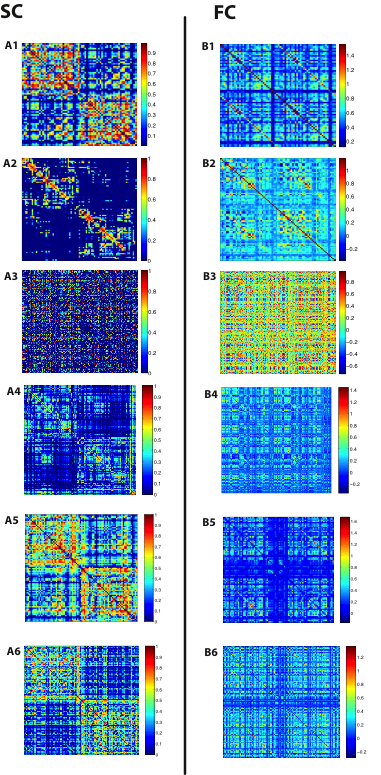


Figure S1. Representative A1) Berlin SC A2) HCP Lausanne SC A3) NKI SC, A4) HCP Glasser SC A5) HCP DK A6) HCP Destrieux, B1) Berlin FC B2) HCP Lausanne FC B3) NKI FC B4) HCP Glasser FC, B5) HCP DK B6) HCP Destrieux, for a sample subject

**Eigenvector correlations**

To examine the SC-FC relationship, in addition to Pearson’s correlations between SC and FC, we use a second (“eigenvector correlation”) method where we decompose individual connectomes and compare the components of the structural and functional connectomes that share the greatest amount of common variance between the modalities. This is particularly important because the patterns of similarity between individual SC and FC may not be manifested across the whole connectome (as is assumed by the Pearson’s correlation method), but rather in particular components of the connectome.

The approach we used is similar to that visualized by Deco and colleagues for model prediction of empirical data in their Figure 4 (G. Deco et al., 2014). That is, each individual’s SC was first decomposed via PCA (Matlab pcacov). The same was done for each individual’s FC. Thus, for each individual SC and each individual FC we obtained PC eigenvalues and corresponding eigenvectors (Matlab output COEFF from function pcacov). We used permutation testing to select significant PCs for further analysis. This was done by permuting the SC matrix and the FC matrix 100 times (scrambled across connections) and performed PCA of the resulting matrices to generate null distributions of eigenvalues for each PC. A p-value for each PC eigenvalue was obtained as the proportion of times that the permuted eigenvalue exceeded the obtained eigenvalue for a component in that ordinal position. Significant PCs (*p* < 0.05) were retained for further analysis. The retained eigenvectors from the individual SC (vector NPC\_SC) were correlated with all retained eigenvectors from the individual FC (vector NPC\_FC), resulting in a NPC\_SC \* NPC\_FC matrix. The maximum correlation was then selected (i.e., the maximum of the NPC\_SC \* NPC\_FC eigenvector correlation matrix). The eigenvectors that produced this maximum correlation therefore represented the aspects of the SC and FC connectomes from the decomposition that were maximally correlated. This analysis was done for all within-subject SC-FC and between subject SC-FC; that is, all subject SCs were compared against all subject FCs. The resulting correlations were plotted, constructing a NSC x NFC, with the diagonal representing SC-FC correlations where SC and FC were from the same subject.

The results from Table S2 and Figure S2, where associations between SC-SelfFC and SC-OtherFC were calculated as eigenvector correlations were consistent with the findings using Pearson’s correlations. The distribution of SC-SelfFC correlations exceeded SC-OtherFC correlations only within the Glasser dataset.

Table S2. Mean and 95% CIs of the difference distribution calculated as the difference between the SC-SelfFC distribution and SC-OtherFC distribution, where SC-FC are calculated as eigenvector correlations. The \* indicates a significant subject-specificity so that the distribution of intra-subject SC-FC is higher than the distribution of inter-subject SC-FC.

|  |  |  |
| --- | --- | --- |
| **Dataset** | **Eigenvector correlation** | |
| **Mean** | **CI** |
| **Berlin** | M = 0.0098 | [-0.0152, 0.0345] |
| **HCP, Lausanne** | M = 0.003 | [-0.0023, 0.0081] |
| **NKI Rockland** | M = -0.0015 | [-0.0217, 0.0165] |
| **HCP, Glasser** | M = 0.015 | [0.012, 0.019] **\*** |
| **HCP, Destrieux** | M = 0.002 | [-0.0047, 0.0091] |
| **HCP, DK** | M = 0.0012 | [-0.0044, 0.0071] |

Fig2-adjusted-eigen.eps

Figure S2. Eigenvector SC-FC correlations. These are the maximum correlations between individual SC eigenvectors and individual FC eigenvectors for all combinations of SC and FC within and between subjects (See Methods). Shown here for **A1)** Berlin dataset **B1)** HCP Lausanne dataset **C1)** Rockland dataset **D1)** HCP Glasser dataset. **E1)** HCP Destrieux, **F1)** HCP DK dataset.On the right are the distribution histograms of bootstrapped means of intra (SC-SelfFC) and inter (SC-OtherFC) correlations for the **A2)** Berlin dataset **B2)** HCP Lausanne dataset **C2)** Rockland dataset **D2)** Glasser HCP dataset **E2)** HCP Destrieux dataset **F2)** HCP DK dataset. SC-SelfFC correlations are those where SC and FC are from the same subject. SC-OtherFC correlations are those where SC and FC are from different subjects. Significance of the difference of these two distributions is calculated via CIs on the difference distribution.

Table S3. Eigenvalues of the first 30 principal components from PCA of all subjects’ SC and FC. Results of the analyses from the logarithmized and resampled to Gaussian SCs are shown for completeness (SC log & gaus). Significant (determined by permutation, see Methods) eigenvalues are shown in bold. Note that the first PC in all datasets represents the component of SC that is common across subjects. The remaining PCs show variance across subjects.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Berlin** | | | **HCP Lausanne** | | | | **NKI** | | | |
| **PC** | **SC** | **SC log & gaus** | **FC** | **SC** | **SC log & gaus** | **FC** | **SC** | | **SC log & gaus** | **FC** |
| **Common** | **43.53** | **42.47** | **27.33** | **503.68** | **501.22** | **437.86** | **135.74** | | **134.60** | **56.29** |
| **Variance** | 0.56 | 0.53 | **2.73** | **10.91** | **11.90** | **29.35** | **2.29** | | **1.97** | **4.50** |
| 0.40 | 0.39 | **1.84** | **4.98** | **4.78** | **13.15** | 1.08 | | 0.91 | **3.63** |
| 0.23 | 0.29 | **1.23** | **4.49** | **4.50** | **7.47** | 1.00 | | 0.86 | **3.46** |
| 0.21 | 0.25 | **1.18** | **3.53** | **3.33** | **4.93** | 0.92 | | 0.77 | **2.84** |
| 0.20 | 0.23 | 0.95 | **3.10** | **3.11** | **4.55** | 0.71 | | 0.63 | **2.42** |
| 0.19 | 0.21 | 0.82 | **1.75** | **1.90** | **3.83** | 0.69 | | 0.61 | **2.08** |
| 0.15 | 0.20 | 0.75 | 1.48 | 1.44 | **3.26** | 0.66 | | 0.58 | **1.90** |
| 0.14 | 0.18 | 0.73 | 1.39 | 1.40 | **3.03** | 0.61 | | 0.52 | **1.84** |
| 0.13 | 0.16 | 0.64 | 1.27 | 1.28 | **2.97** | 0.54 | | 0.50 | **1.75** |
| 0.12 | 0.15 | 0.58 | 1.16 | 1.20 | **2.90** | 0.51 | | 0.48 | **1.73** |
| 0.11 | 0.14 | 0.53 | 0.99 | 1.00 | **2.59** | 0.50 | | 0.45 | **1.57** |
| 0.11 | 0.13 | 0.51 | 0.95 | 0.99 | **2.56** | 0.48 | | 0.44 | **1.47** |
| 0.10 | 0.13 | 0.46 | 0.91 | 0.95 | **2.39** | 0.47 | | 0.43 | **1.43** |
| 0.09 | 0.12 | 0.43 | 0.87 | 0.90 | **2.26** | 0.44 | | 0.42 | **1.41** |
| 0.09 | 0.11 | 0.42 | 0.85 | 0.88 | **2.17** | 0.39 | | 0.37 | **1.28** |
| 0.09 | 0.11 | 0.40 | 0.84 | 0.85 | **2.05** | 0.38 | | 0.37 | **1.19** |
| 0.08 | 0.11 | 0.38 | 0.78 | 0.80 | **1.89** | 0.37 | | 0.36 | **1.19** |
| 0.08 | 0.10 | 0.35 | 0.77 | 0.78 | **1.85** | 0.37 | | 0.34 | **1.16** |
| 0.07 | 0.10 | 0.34 | 0.73 | 0.76 | **1.77** | 0.35 | | 0.34 | **1.14** |
| 0.07 | 0.10 | 0.34 | 0.72 | 0.74 | **1.69** | 0.34 | | 0.32 | 1.08 |
| 0.07 | 0.09 | 0.32 | 0.71 | 0.73 | **1.68** | 0.33 | | 0.32 | 1.05 |
| 0.07 | 0.09 | 0.30 | 0.70 | 0.71 | **1.58** | 0.32 | | 0.32 | 1.03 |
| 0.07 | 0.09 | 0.30 | 0.66 | 0.70 | 1.52 | 0.31 | | 0.31 | 1.03 |
| 0.06 | 0.08 | 0.28 | 0.66 | 0.69 | 1.47 | 0.30 | | 0.30 | 1.01 |
| 0.06 | 0.08 | 0.28 | 0.65 | 0.67 | 1.45 | 0.30 | | 0.29 | 0.98 |
| 0.06 | 0.08 | 0.26 | 0.63 | 0.65 | 1.37 | 0.29 | | 0.29 | 0.95 |
| 0.06 | 0.08 | 0.24 | 0.60 | 0.63 | 1.34 | 0.28 | | 0.29 | 0.93 |
| 0.05 | 0.08 | 0.23 | 0.59 | 0.58 | 1.30 | 0.27 | | 0.28 | 0.90 |
| 0.05 | 0.07 | 0.21 | 0.58 | 0.57 | 1.26 | 0.27 | | 0.27 | 0.89 |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **HCP Glasser** | | | **HCP Destrieux** | | | **HCP DK** | | |
| **PC** | **SC** | **SC log & gaus** | **FC** | **SC** | **SC log & gaus** | **FC** | **SC** | **SC log & gaus** | **FC** |
| **Common** | **666.90** | **617.94** | **529.08** | **685.18** | **661.38** | **559.80** | **703.08** | **696.19** | **605.20** |
| **Variance** | **3.37** | **3.78** | **35.21** | **2.97** | **3.23** | **30.14** | **2.34** | **2.23** | **30.04** |
| **3.04** | **3.51** | **10.47** | **2.81** | **3.14** | **12.12** | **2.04** | **2.08** | **12.07** |
| **2.06** | **2.32** | **6.83** | **1.87** | **2.45** | **5.97** | **1.64** | **1.78** | **5.66** |
| **1.94** | **2.20** | **4.67** | **1.57** | **1.86** | **4.65** | **1.54** | **1.60** | **4.19** |
| **1.62** | **2.06** | **3.61** | **1.45** | **1.74** | **3.73** | **1.37** | **1.39** | **4.12** |
| **1.54** | **1.87** | **2.98** | **1.32** | **1.57** | **3.27** | **1.16** | **1.19** | **3.21** |
| **1.48** | **1.69** | **2.84** | **1.26** | **1.48** | **2.97** | 1.13 | 1.17 | **2.87** |
| **1.46** | **1.63** | **2.45** | 1.23 | 1.45 | **2.62** | 0.99 | 1.00 | **2.50** |
| **1.37** | **1.58** | **2.26** | 1.12 | 1.31 | **2.49** | 0.90 | 0.93 | **2.30** |
| **1.24** | **1.48** | **2.08** | 1.09 | 1.22 | **2.15** | 0.87 | 0.90 | **2.06** |
| **1.15** | **1.32** | **2.00** | 0.98 | 1.09 | **1.94** | 0.79 | 0.79 | **1.94** |
| 1.03 | **1.28** | 1.90 | 0.94 | 1.05 | **1.84** | 0.77 | 0.77 | **1.81** |
| 0.98 | 1.17 | 1.82 | 0.92 | 1.02 | **1.73** | 0.70 | 0.72 | **1.71** |
| 0.96 | 1.11 | 1.76 | 0.88 | 0.99 | **1.70** | 0.69 | 0.70 | **1.58** |
| 0.89 | 1.08 | 1.70 | 0.76 | 0.94 | **1.64** | 0.64 | 0.67 | **1.53** |
| 0.84 | 0.96 | 1.66 | 0.73 | 0.87 | **1.58** | 0.60 | 0.66 | **1.46** |
| 0.80 | 0.92 | 1.60 | 0.66 | 0.77 | **1.55** | 0.57 | 0.60 | **1.37** |
| 0.76 | 0.90 | 1.54 | 0.62 | 0.75 | **1.45** | 0.56 | 0.57 | **1.33** |
| 0.75 | 0.88 | 1.49 | 0.60 | 0.71 | **1.38** | 0.54 | 0.55 | **1.26** |
| 0.69 | 0.83 | 1.43 | 0.57 | 0.67 | **1.34** | 0.52 | 0.54 | **1.22** |
| 0.67 | 0.81 | 1.40 | 0.55 | 0.65 | **1.29** | 0.48 | 0.50 | **1.19** |
| 0.64 | 0.78 | 1.31 | 0.54 | 0.63 | **1.24** | 0.47 | 0.49 | **1.17** |
| 0.62 | 0.74 | 1.31 | 0.54 | 0.59 | **1.20** | 0.43 | 0.47 | **1.10** |
| 0.60 | 0.74 | 1.24 | 0.48 | 0.58 | **1.16** | 0.42 | 0.44 | **1.06** |
| 0.59 | 0.70 | 1.22 | 0.47 | 0.53 | **1.14** | 0.41 | 0.44 | 0.99 |
| 0.57 | 0.69 | 1.19 | 0.45 | 0.52 | 1.10 | 0.40 | 0.42 | 0.98 |
| 0.56 | 0.67 | 1.16 | 0.43 | 0.51 | 1.08 | 0.40 | 0.40 | 0.97 |
| 0.53 | 0.66 | 1.14 | 0.41 | 0.50 | 1.04 | 0.38 | 0.39 | 0.90 |
| 0.53 | 0.65 | 1.08 | 0.40 | 0.47 | 1.02 | 0.37 | 0.38 | 0.88 |