**Supplementary results for Gray matter atrophy is constrained by normal structural brain network architecture in depression**

**Figure S1**. Interindividual variation in the distribution and number of disease epicenters and topological characteristics of disease epicenters significantly shared by depression in the replication dataset. (A) The distribution of disease epicenters. The node size represents the number of patients sharing this disease epicenter. The orange nodes represent disease epicenters significantly shared by depression (permutation testing *p* < 0.05, FDR corrected). (B) Disease epicenters shared by depression exhibit higher participation coefficient than randomly selected other brain regions (*p* < 0.001). The orange line represents the mean PC of shared disease epicenters and the histogram represents the distribution of mean PC of randomly selected other brain regions.



**Figure S2**. The association between brain connectome architecture and gray matter atrophy uncovers 2 homogeneous subgroups in the replication dataset. (A) The silhouette values for number of subgroups. (B) The distribution of disease epicenters for each subgroup. The node size represents the number of patients sharing this disease epicenter. The orange nodes represent disease epicenters significantly shared by depression (permutation testing *p* < 0.05, Bonferroni corrected). (C) Difference in terms of age of onset between these 2 subgroups.



**Table S1**. The shared disease epicenters across patients with OCD. Region names are following the definition of the 246 brain atlas. Percent represented the percent of patients sharing this disease epicenter. ‘\*’ represents significantly shared disease epicenters (permutation testing *p* < 0.05, Bonferroni corrected).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions | Percent | Regions | Percent | Regions | Percent | Regions | Percent | Regions | Percent |
| 'SFG\_L\_7\_1' | 14.29\*  | 'PrG\_L\_6\_1' | 3.81  | 'FuG\_L\_3\_1' | 1.90  | 'Pcun\_R\_4\_4' | 3.81  | 'OcG\_R\_4\_3' | 2.86  |
| 'SFG\_R\_7\_1' | 4.76  | 'PrG\_R\_6\_1' | 5.71  | 'FuG\_R\_3\_1' | 0.95  | 'PoG\_L\_4\_1' | 3.81  | 'OcG\_L\_4\_4' | 2.86  |
| 'SFG\_L\_7\_2' | 0.95  | 'PrG\_L\_6\_2' | 3.81  | 'FuG\_L\_3\_2' | 0.95  | 'PoG\_R\_4\_1' | 3.81  | 'OcG\_R\_4\_4' | 3.81  |
| 'SFG\_R\_7\_2' | 0.00  | 'PrG\_R\_6\_2' | 7.62  | 'FuG\_R\_3\_2' | 1.90  | 'PoG\_L\_4\_2' | 0.95  | 'sOcG\_L\_2\_1' | 5.71  |
| 'SFG\_L\_7\_3' | 0.00  | 'PrG\_L\_6\_3' | 7.62  | 'FuG\_L\_3\_3' | 1.90  | 'PoG\_R\_4\_2' | 0.95  | 'sOcG\_R\_2\_1' | 5.71  |
| 'SFG\_R\_7\_3' | 0.00  | 'PrG\_R\_6\_3' | 4.76  | 'FuG\_R\_3\_3' | 1.90  | 'PoG\_L\_4\_3' | 3.81  | 'sOcG\_L\_2\_2' | 6.67  |
| 'SFG\_L\_7\_4' | 1.90  | 'PrG\_L\_6\_4' | 4.76  | 'PhG\_L\_6\_1' | 0.95  | 'PoG\_R\_4\_3' | 3.81  | 'sOcG\_R\_2\_2' | 4.76  |
| 'SFG\_R\_7\_4' | 2.86  | 'PrG\_R\_6\_4' | 3.81  | 'PhG\_R\_6\_1' | 7.62  | 'PoG\_L\_4\_4' | 4.76  | 'Amyg\_L\_2\_1' | 4.76  |
| 'SFG\_L\_7\_5' | 1.90  | 'PrG\_L\_6\_5' | 0.95  | 'PhG\_L\_6\_2' | 2.86  | 'PoG\_R\_4\_4' | 5.71  | 'Amyg\_R\_2\_1' | 0.95  |
| 'SFG\_R\_7\_5' | 1.90  | 'PrG\_R\_6\_5' | 0.95  | 'PhG\_R\_6\_2' | 10.48  | 'INS\_L\_6\_1' | 3.81  | 'Amyg\_L\_2\_2' | 7.62  |
| 'SFG\_L\_7\_6' | 1.90  | 'PrG\_L\_6\_6' | 0.00  | 'PhG\_L\_6\_3' | 2.86  | 'INS\_R\_6\_1' | 0.95  | 'Amyg\_R\_2\_2' | 0.00  |
| 'SFG\_R\_7\_6' | 1.90  | 'PrG\_R\_6\_6' | 5.71  | 'PhG\_R\_6\_3' | 4.76  | 'INS\_L\_6\_2' | 1.90  | 'Hipp\_L\_2\_1' | 1.90  |
| 'SFG\_L\_7\_7' | 0.95  | 'PCL\_L\_2\_1' | 5.71  | 'PhG\_L\_6\_4' | 5.71  | 'INS\_R\_6\_2' | 0.95  | 'Hipp\_R\_2\_1' | 1.90  |
| 'SFG\_R\_7\_7' | 0.95  | 'PCL\_R\_2\_1' | 6.67  | 'PhG\_R\_6\_4' | 2.86  | 'INS\_L\_6\_3' | 3.81  | 'Hipp\_L\_2\_2' | 6.67  |
| 'MFG\_L\_7\_1' | 0.95  | 'PCL\_L\_2\_2' | 6.67  | 'PhG\_L\_6\_5' | 0.95  | 'INS\_R\_6\_3' | 1.90  | 'Hipp\_R\_2\_2' | 9.52\*  |
| 'MFG\_R\_7\_1' | 0.95  | 'PCL\_R\_2\_2' | 3.81  | 'PhG\_L\_6\_6' | 3.81  | 'INS\_L\_6\_4' | 2.86  | 'Str\_L\_6\_1' | 4.76  |
| 'MFG\_L\_7\_2' | 0.95  | 'STG\_L\_6\_1' | 2.86  | 'PhG\_R\_6\_6' | 3.81  | 'INS\_R\_6\_4' | 5.71  | 'Str\_R\_6\_1' | 6.67  |
| 'MFG\_R\_7\_2' | 2.86  | 'STG\_R\_6\_1' | 3.81  | 'pSTS\_L\_2\_1' | 5.71  | 'INS\_L\_6\_5' | 1.90  | 'Str\_L\_6\_2' | 10.48  |
| 'MFG\_L\_7\_3' | 0.00  | 'STG\_L\_6\_2' | 3.81  | 'pSTS\_R\_2\_1' | 9.52\*  | 'INS\_R\_6\_5' | 1.90  | 'Str\_R\_6\_2' | 11.43\*  |
| 'MFG\_R\_7\_3' | 0.00  | 'STG\_R\_6\_2' | 7.62  | 'pSTS\_L\_2\_2' | 2.86  | 'INS\_L\_6\_6' | 3.81  | 'Str\_L\_6\_3' | 3.81  |
| 'MFG\_L\_7\_4' | 1.90  | 'STG\_L\_6\_3' | 7.62  | 'pSTS\_R\_2\_2' | 10.48\*  | 'INS\_R\_6\_6' | 0.95  | 'Str\_R\_6\_3' | 4.76  |
| 'MFG\_R\_7\_4' | 4.76  | 'STG\_R\_6\_3' | 3.81  | 'SPL\_L\_5\_1' | 1.90  | 'CG\_L\_7\_1' | 2.86  | 'Str\_L\_6\_4' | 3.81  |
| 'MFG\_L\_7\_5' | 1.90  | 'STG\_L\_6\_4' | 8.57\*  | 'SPL\_R\_5\_1' | 3.81  | 'CG\_R\_7\_1' | 3.81  | 'Str\_R\_6\_4' | 5.71  |
| 'MFG\_R\_7\_5' | 3.81  | 'STG\_R\_6\_4' | 7.62  | 'SPL\_L\_5\_2' | 3.81  | 'CG\_L\_7\_2' | 5.71  | 'Str\_L\_6\_5' | 4.76  |
| 'MFG\_L\_7\_6' | 1.90  | 'STG\_L\_6\_5' | 3.81  | 'SPL\_R\_5\_2' | 0.00  | 'CG\_R\_7\_2' | 10.48\*  | 'Str\_R\_6\_5' | 5.71  |
| 'MFG\_R\_7\_6' | 0.95  | 'STG\_R\_6\_5' | 1.90  | 'SPL\_L\_5\_3' | 10.48\*  | 'CG\_L\_7\_3' | 2.86  | 'Str\_L\_6\_6' | 1.90  |
| 'MFG\_L\_7\_7' | 1.90  | 'STG\_L\_6\_6' | 1.90  | 'SPL\_R\_5\_3' | 5.71  | 'CG\_R\_7\_3' | 9.52\*  | 'Str\_R\_6\_6' | 3.81  |
| 'MFG\_R\_7\_7' | 0.00  | 'STG\_R\_6\_6' | 1.90  | 'SPL\_L\_5\_4' | 5.71  | 'CG\_L\_7\_4' | 1.90  | 'Tha\_L\_8\_1' | 2.86  |
| 'IFG\_L\_6\_1' | 2.86  | 'MTG\_L\_4\_1' | 2.86  | 'SPL\_R\_5\_4' | 5.71  | 'CG\_R\_7\_4' | 4.76  | 'Tha\_R\_8\_1' | 2.86  |
| 'IFG\_R\_6\_1' | 1.90  | 'MTG\_R\_4\_1' | 3.81  | 'SPL\_L\_5\_5' | 2.86  | 'CG\_L\_7\_5' | 6.67  | 'Tha\_L\_8\_2' | 16.19\*  |
| 'IFG\_L\_6\_2' | 3.81  | 'MTG\_L\_4\_2' | 1.90  | 'SPL\_R\_5\_5' | 4.76  | 'CG\_R\_7\_5' | 7.62  | 'Tha\_R\_8\_2' | 5.71  |
| 'IFG\_R\_6\_2' | 2.86  | 'MTG\_R\_4\_2' | 2.86  | 'IPL\_L\_6\_1' | 1.90  | 'CG\_L\_7\_6' | 2.86  | 'Tha\_L\_8\_3' | 2.86  |
| 'IFG\_L\_6\_3' | 6.67\*  | 'MTG\_L\_4\_3' | 1.90  | 'IPL\_R\_6\_1' | 3.81  | 'CG\_R\_7\_6' | 1.90  | 'Tha\_R\_8\_3' | 0.00  |
| 'IFG\_R\_6\_3' | 4.76  | 'MTG\_R\_4\_3' | 0.00  | 'IPL\_L\_6\_2' | 0.95  | 'CG\_L\_7\_7' | 1.90  | 'Tha\_L\_8\_4' | 7.62\*  |
| 'IFG\_L\_6\_4' | 2.86  | 'MTG\_L\_4\_4' | 0.95  | 'IPL\_R\_6\_2' | 3.81  | 'CG\_R\_7\_7' | 5.71  | 'Tha\_L\_8\_5' | 0.95  |
| 'IFG\_R\_6\_4' | 7.62  | 'MTG\_R\_4\_4' | 0.00  | 'IPL\_L\_6\_3' | 1.90  | 'Cun\_L\_5\_1' | 3.81  | 'Tha\_R\_8\_5' | 0.00  |
| 'IFG\_L\_6\_5' | 1.90  | 'ITG\_L\_7\_1' | 4.76  | 'IPL\_R\_6\_3' | 5.71  | 'Cun\_R\_5\_1' | 3.81  | 'Tha\_L\_8\_6' | 0.95  |
| 'IFG\_R\_6\_5' | 0.95  | 'ITG\_R\_7\_1' | 0.00  | 'IPL\_L\_6\_4' | 2.86  | 'Cun\_L\_5\_2' | 0.95  | 'Tha\_R\_8\_6' | 0.95  |
| 'IFG\_L\_6\_6' | 1.90  | 'ITG\_L\_7\_2' | 4.76  | 'IPL\_R\_6\_4' | 4.76  | 'Cun\_R\_5\_2' | 2.86  | 'Tha\_L\_8\_7' | 0.95  |
| 'IFG\_R\_6\_6' | 2.86  | 'ITG\_R\_7\_2' | 0.95  | 'IPL\_L\_6\_5' | 2.86  | 'Cun\_L\_5\_3' | 7.62\*  | 'Tha\_R\_8\_7' | 1.90  |
| 'OrG\_L\_6\_1' | 0.95  | 'ITG\_L\_7\_3' | 0.95  | 'IPL\_R\_6\_5' | 2.86  | 'Cun\_R\_5\_3' | 4.76  | 'Tha\_L\_8\_8' | 3.81  |
| 'OrG\_R\_6\_1' | 1.90  | 'ITG\_R\_7\_3' | 0.95  | 'IPL\_L\_6\_6' | 0.95  | 'Cun\_L\_5\_4' | 0.00  | 'Tha\_R\_8\_8' | 0.00  |
| 'OrG\_L\_6\_2' | 1.90  | 'ITG\_L\_7\_4' | 5.71  | 'IPL\_R\_6\_6' | 2.86  | 'Cun\_R\_5\_4' | 1.90  |  |  |
| 'OrG\_R\_6\_2' | 4.76  | 'ITG\_R\_7\_4' | 1.90  | 'Pcun\_L\_4\_1' | 1.90  | 'Cun\_L\_5\_5' | 2.86  |  |  |
| 'OrG\_L\_6\_3' | 0.00  | 'ITG\_L\_7\_5' | 2.86  | 'Pcun\_R\_4\_1' | 3.81  | 'Cun\_R\_5\_5' | 1.90  |  |  |
| 'OrG\_R\_6\_3' | 1.90  | 'ITG\_R\_7\_5' | 1.90  | 'Pcun\_L\_4\_2' | 1.90  | 'OcG\_L\_4\_1' | 2.86  |  |  |
| 'OrG\_L\_6\_5' | 2.86  | 'ITG\_L\_7\_6' | 5.71  | 'Pcun\_R\_4\_2' | 2.86  | 'OcG\_R\_4\_1' | 2.86  |  |  |
| 'OrG\_R\_6\_5' | 1.90  | 'ITG\_R\_7\_6' | 2.86  | 'Pcun\_L\_4\_3' | 5.71  | 'OcG\_L\_4\_2' | 3.81  |  |  |
| 'OrG\_L\_6\_6' | 0.95  | 'ITG\_L\_7\_7' | 0.00  | 'Pcun\_R\_4\_3' | 4.76  | 'OcG\_R\_4\_2' | 1.90  |  |  |
| 'OrG\_R\_6\_6' | 5.71  | 'ITG\_R\_7\_7' | 3.81  | 'Pcun\_L\_4\_4' | 4.76  | 'OcG\_L\_4\_3' | 0.95  |  |  |

**Table S2**. The shared disease epicenters across patients with OCD in subgroup 1. Region names are following the definition of the 246 brain atlas. Percent represented the percent of patients sharing this disease epicenter. ‘\*’ represents significantly shared disease epicenters (permutation testing *p* < 0.05, Bonferroni corrected).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions | Percent | Regions | Percent | Regions | Percent | Regions | Percent | Regions | Percent |
| SFG\_L\_7\_1' | 0.16\*  | 'PrG\_L\_6\_1' | 0.02  | 'FuG\_L\_3\_1' | 0.00  | 'Pcun\_R\_4\_4' | 0.05  | 'OcG\_R\_4\_3' | 0.02  |
| 'SFG\_R\_7\_1' | 0.09  | 'PrG\_R\_6\_1' | 0.07  | 'FuG\_R\_3\_1' | 0.00  | 'PoG\_L\_4\_1' | 0.05  | 'OcG\_L\_4\_4' | 0.00  |
| 'SFG\_L\_7\_2' | 0.02  | 'PrG\_L\_6\_2' | 0.02  | 'FuG\_L\_3\_2' | 0.02  | 'PoG\_R\_4\_1' | 0.02  | 'OcG\_R\_4\_4' | 0.07  |
| 'SFG\_R\_7\_2' | 0.00  | 'PrG\_R\_6\_2' | 0.05  | 'FuG\_R\_3\_2' | 0.00  | 'PoG\_L\_4\_2' | 0.02  | 'sOcG\_L\_2\_1' | 0.00  |
| 'SFG\_L\_7\_3' | 0.00  | 'PrG\_L\_6\_3' | 0.12  | 'FuG\_L\_3\_3' | 0.02  | 'PoG\_R\_4\_2' | 0.02  | 'sOcG\_R\_2\_1' | 0.07  |
| 'SFG\_R\_7\_3' | 0.00  | 'PrG\_R\_6\_3' | 0.09  | 'FuG\_R\_3\_3' | 0.00  | 'PoG\_L\_4\_3' | 0.02  | 'sOcG\_L\_2\_2' | 0.07  |
| 'SFG\_L\_7\_4' | 0.02  | 'PrG\_L\_6\_4' | 0.05  | 'PhG\_L\_6\_1' | 0.02  | 'PoG\_R\_4\_3' | 0.05  | 'sOcG\_R\_2\_2' | 0.05  |
| 'SFG\_R\_7\_4' | 0.02  | 'PrG\_R\_6\_4' | 0.02  | 'PhG\_R\_6\_1' | 0.12\*  | 'PoG\_L\_4\_4' | 0.05  | 'Amyg\_L\_2\_1' | 0.02  |
| 'SFG\_L\_7\_5' | 0.00  | 'PrG\_L\_6\_5' | 0.00  | 'PhG\_L\_6\_2' | 0.02  | 'PoG\_R\_4\_4' | 0.05  | 'Amyg\_R\_2\_1' | 0.00  |
| 'SFG\_R\_7\_5' | 0.00  | 'PrG\_R\_6\_5' | 0.00  | 'PhG\_R\_6\_2' | 0.16\*  | 'INS\_L\_6\_1' | 0.07  | 'Amyg\_L\_2\_2' | 0.09  |
| 'SFG\_L\_7\_6' | 0.02  | 'PrG\_L\_6\_6' | 0.00  | 'PhG\_L\_6\_3' | 0.05  | 'INS\_R\_6\_1' | 0.00  | 'Amyg\_R\_2\_2' | 0.00  |
| 'SFG\_R\_7\_6' | 0.00  | 'PrG\_R\_6\_6' | 0.02  | 'PhG\_R\_6\_3' | 0.05  | 'INS\_L\_6\_2' | 0.02  | 'Hipp\_L\_2\_1' | 0.00  |
| 'SFG\_L\_7\_7' | 0.00  | 'PCL\_L\_2\_1' | 0.07  | 'PhG\_L\_6\_4' | 0.09  | 'INS\_R\_6\_2' | 0.02  | 'Hipp\_R\_2\_1' | 0.02  |
| 'SFG\_R\_7\_7' | 0.02  | 'PCL\_R\_2\_1' | 0.07  | 'PhG\_R\_6\_4' | 0.02  | 'INS\_L\_6\_3' | 0.00  | 'Hipp\_L\_2\_2' | 0.07  |
| 'MFG\_L\_7\_1' | 0.00  | 'PCL\_L\_2\_2' | 0.07  | 'PhG\_L\_6\_5' | 0.02  | 'INS\_R\_6\_3' | 0.05  | 'Hipp\_R\_2\_2' | 0.09  |
| 'MFG\_R\_7\_1' | 0.02  | 'PCL\_R\_2\_2' | 0.05  | 'PhG\_L\_6\_6' | 0.02  | 'INS\_L\_6\_4' | 0.00  | 'Str\_L\_6\_1' | 0.02  |
| 'MFG\_L\_7\_2' | 0.00  | 'STG\_L\_6\_1' | 0.02  | 'PhG\_R\_6\_6' | 0.02  | 'INS\_R\_6\_4' | 0.05  | 'Str\_R\_6\_1' | 0.05  |
| 'MFG\_R\_7\_2' | 0.05  | 'STG\_R\_6\_1' | 0.00  | 'pSTS\_L\_2\_1' | 0.09  | 'INS\_L\_6\_5' | 0.00  | 'Str\_L\_6\_2' | 0.07  |
| 'MFG\_L\_7\_3' | 0.00  | 'STG\_L\_6\_2' | 0.05  | 'pSTS\_R\_2\_1' | 0.14\*  | 'INS\_R\_6\_5' | 0.00  | 'Str\_R\_6\_2' | 0.14  |
| 'MFG\_R\_7\_3' | 0.00  | 'STG\_R\_6\_2' | 0.05  | 'pSTS\_L\_2\_2' | 0.00  | 'INS\_L\_6\_6' | 0.00  | 'Str\_L\_6\_3' | 0.05  |
| 'MFG\_L\_7\_4' | 0.00  | 'STG\_L\_6\_3' | 0.09  | 'pSTS\_R\_2\_2' | 0.09  | 'INS\_R\_6\_6' | 0.02  | 'Str\_R\_6\_3' | 0.07  |
| 'MFG\_R\_7\_4' | 0.05  | 'STG\_R\_6\_3' | 0.07  | 'SPL\_L\_5\_1' | 0.02  | 'CG\_L\_7\_1' | 0.05  | 'Str\_L\_6\_4' | 0.05  |
| 'MFG\_L\_7\_5' | 0.02  | 'STG\_L\_6\_4' | 0.12\*  | 'SPL\_R\_5\_1' | 0.05  | 'CG\_R\_7\_1' | 0.02  | 'Str\_R\_6\_4' | 0.07  |
| 'MFG\_R\_7\_5' | 0.07  | 'STG\_R\_6\_4' | 0.07  | 'SPL\_L\_5\_2' | 0.05  | 'CG\_L\_7\_2' | 0.05  | 'Str\_L\_6\_5' | 0.09  |
| 'MFG\_L\_7\_6' | 0.02  | 'STG\_L\_6\_5' | 0.05  | 'SPL\_R\_5\_2' | 0.00  | 'CG\_R\_7\_2' | 0.05  | 'Str\_R\_6\_5' | 0.12  |
| 'MFG\_R\_7\_6' | 0.00  | 'STG\_R\_6\_5' | 0.02  | 'SPL\_L\_5\_3' | 0.12  | 'CG\_L\_7\_3' | 0.05  | 'Str\_L\_6\_6' | 0.00  |
| 'MFG\_L\_7\_7' | 0.05  | 'STG\_L\_6\_6' | 0.05  | 'SPL\_R\_5\_3' | 0.09  | 'CG\_R\_7\_3' | 0.12\*  | 'Str\_R\_6\_6' | 0.05  |
| 'MFG\_R\_7\_7' | 0.00  | 'STG\_R\_6\_6' | 0.02  | 'SPL\_L\_5\_4' | 0.05  | 'CG\_L\_7\_4' | 0.00  | 'Tha\_L\_8\_1' | 0.02  |
| 'IFG\_L\_6\_1' | 0.00  | 'MTG\_L\_4\_1' | 0.00  | 'SPL\_R\_5\_4' | 0.05  | 'CG\_R\_7\_4' | 0.09  | 'Tha\_R\_8\_1' | 0.05  |
| 'IFG\_R\_6\_1' | 0.05  | 'MTG\_R\_4\_1' | 0.02  | 'SPL\_L\_5\_5' | 0.05  | 'CG\_L\_7\_5' | 0.09  | 'Tha\_L\_8\_2' | 0.14\*  |
| 'IFG\_L\_6\_2' | 0.05  | 'MTG\_L\_4\_2' | 0.00  | 'SPL\_R\_5\_5' | 0.05  | 'CG\_R\_7\_5' | 0.12  | 'Tha\_R\_8\_2' | 0.09  |
| 'IFG\_R\_6\_2' | 0.05  | 'MTG\_R\_4\_2' | 0.05  | 'IPL\_L\_6\_1' | 0.02  | 'CG\_L\_7\_6' | 0.02  | 'Tha\_L\_8\_3' | 0.05  |
| 'IFG\_L\_6\_3' | 0.09  | 'MTG\_L\_4\_3' | 0.00  | 'IPL\_R\_6\_1' | 0.02  | 'CG\_R\_7\_6' | 0.02  | 'Tha\_R\_8\_3' | 0.00  |
| 'IFG\_R\_6\_3' | 0.05  | 'MTG\_R\_4\_3' | 0.00  | 'IPL\_L\_6\_2' | 0.02  | 'CG\_L\_7\_7' | 0.02  | 'Tha\_L\_8\_4' | 0.09  |
| 'IFG\_L\_6\_4' | 0.05  | 'MTG\_L\_4\_4' | 0.00  | 'IPL\_R\_6\_2' | 0.05  | 'CG\_R\_7\_7' | 0.05  | 'Tha\_L\_8\_5' | 0.00  |
| 'IFG\_R\_6\_4' | 0.12  | 'MTG\_R\_4\_4' | 0.00  | 'IPL\_L\_6\_3' | 0.00  | 'Cun\_L\_5\_1' | 0.05  | 'Tha\_R\_8\_5' | 0.00  |
| 'IFG\_L\_6\_5' | 0.02  | 'ITG\_L\_7\_1' | 0.05  | 'IPL\_R\_6\_3' | 0.07  | 'Cun\_R\_5\_1' | 0.05  | 'Tha\_L\_8\_6' | 0.02  |
| 'IFG\_R\_6\_5' | 0.00  | 'ITG\_R\_7\_1' | 0.00  | 'IPL\_L\_6\_4' | 0.02  | 'Cun\_L\_5\_2' | 0.00  | 'Tha\_R\_8\_6' | 0.00  |
| 'IFG\_L\_6\_6' | 0.02  | 'ITG\_L\_7\_2' | 0.07  | 'IPL\_R\_6\_4' | 0.02  | 'Cun\_R\_5\_2' | 0.02  | 'Tha\_L\_8\_7' | 0.02  |
| 'IFG\_R\_6\_6' | 0.05  | 'ITG\_R\_7\_2' | 0.02  | 'IPL\_L\_6\_5' | 0.02  | 'Cun\_L\_5\_3' | 0.09  | 'Tha\_R\_8\_7' | 0.02  |
| 'OrG\_L\_6\_1' | 0.00  | 'ITG\_L\_7\_3' | 0.02  | 'IPL\_R\_6\_5' | 0.05  | 'Cun\_R\_5\_3' | 0.05  | 'Tha\_L\_8\_8' | 0.02  |
| 'OrG\_R\_6\_1' | 0.02  | 'ITG\_R\_7\_3' | 0.00  | 'IPL\_L\_6\_6' | 0.02  | 'Cun\_L\_5\_4' | 0.00  | 'Tha\_R\_8\_8' | 0.00  |
| 'OrG\_L\_6\_2' | 0.00  | 'ITG\_L\_7\_4' | 0.07  | 'IPL\_R\_6\_6' | 0.02  | 'Cun\_R\_5\_4' | 0.00  |  |  |
| 'OrG\_R\_6\_2' | 0.07  | 'ITG\_R\_7\_4' | 0.02  | 'Pcun\_L\_4\_1' | 0.00  | 'Cun\_L\_5\_5' | 0.05  |  |  |
| 'OrG\_L\_6\_3' | 0.00  | 'ITG\_L\_7\_5' | 0.05  | 'Pcun\_R\_4\_1' | 0.07  | 'Cun\_R\_5\_5' | 0.05  |  |  |
| 'OrG\_R\_6\_3' | 0.02  | 'ITG\_R\_7\_5' | 0.02  | 'Pcun\_L\_4\_2' | 0.00  | 'OcG\_L\_4\_1' | 0.05  |  |  |
| 'OrG\_L\_6\_5' | 0.02  | 'ITG\_L\_7\_6' | 0.02  | 'Pcun\_R\_4\_2' | 0.02  | 'OcG\_R\_4\_1' | 0.05  |  |  |
| 'OrG\_R\_6\_5' | 0.02  | 'ITG\_R\_7\_6' | 0.05  | 'Pcun\_L\_4\_3' | 0.02  | 'OcG\_L\_4\_2' | 0.02  |  |  |
| 'OrG\_L\_6\_6' | 0.00  | 'ITG\_L\_7\_7' | 0.00  | 'Pcun\_R\_4\_3' | 0.05  | 'OcG\_R\_4\_2' | 0.02  |  |  |
| 'OrG\_R\_6\_6' | 0.12  | 'ITG\_R\_7\_7' | 0.07  | 'Pcun\_L\_4\_4' | 0.05  | 'OcG\_L\_4\_3' | 0.00  |  |  |

**Table S3**. The shared disease epicenters across patients with OCD in subgroup 2. Region names are following the definition of the 246 brain atlas. Percent represented the percent of patients sharing this disease epicenter. ‘\*’ represents significantly shared disease epicenters (permutation testing *p* < 0.05, Bonferroni corrected).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Regions | Percent | Regions | Percent | Regions | Percent | Regions | Percent | Regions | Percent |
| 'SFG\_L\_7\_1' | 0.13\*  | 'PrG\_L\_6\_1' | 0.05  | 'FuG\_L\_3\_1' | 0.03  | 'Pcun\_R\_4\_4' | 0.03  | 'OcG\_R\_4\_3' | 0.03  |
| 'SFG\_R\_7\_1' | 0.02  | 'PrG\_R\_6\_1' | 0.05  | 'FuG\_R\_3\_1' | 0.02  | 'PoG\_L\_4\_1' | 0.03  | 'OcG\_L\_4\_4' | 0.05  |
| 'SFG\_L\_7\_2' | 0.00  | 'PrG\_L\_6\_2' | 0.05  | 'FuG\_L\_3\_2' | 0.00  | 'PoG\_R\_4\_1' | 0.05  | 'OcG\_R\_4\_4' | 0.02  |
| 'SFG\_R\_7\_2' | 0.00  | 'PrG\_R\_6\_2' | 0.10\*  | 'FuG\_R\_3\_2' | 0.03  | 'PoG\_L\_4\_2' | 0.00  | 'sOcG\_L\_2\_1' | 0.10  |
| 'SFG\_L\_7\_3' | 0.00  | 'PrG\_L\_6\_3' | 0.05  | 'FuG\_L\_3\_3' | 0.02  | 'PoG\_R\_4\_2' | 0.00  | 'sOcG\_R\_2\_1' | 0.05  |
| 'SFG\_R\_7\_3' | 0.00  | 'PrG\_R\_6\_3' | 0.02  | 'FuG\_R\_3\_3' | 0.03  | 'PoG\_L\_4\_3' | 0.05  | 'sOcG\_L\_2\_2' | 0.06  |
| 'SFG\_L\_7\_4' | 0.02  | 'PrG\_L\_6\_4' | 0.05  | 'PhG\_L\_6\_1' | 0.00  | 'PoG\_R\_4\_3' | 0.03  | 'sOcG\_R\_2\_2' | 0.05  |
| 'SFG\_R\_7\_4' | 0.03  | 'PrG\_R\_6\_4' | 0.05  | 'PhG\_R\_6\_1' | 0.05  | 'PoG\_L\_4\_4' | 0.05  | 'Amyg\_L\_2\_1' | 0.06  |
| 'SFG\_L\_7\_5' | 0.03  | 'PrG\_L\_6\_5' | 0.02  | 'PhG\_L\_6\_2' | 0.03  | 'PoG\_R\_4\_4' | 0.06  | 'Amyg\_R\_2\_1' | 0.02  |
| 'SFG\_R\_7\_5' | 0.03  | 'PrG\_R\_6\_5' | 0.02  | 'PhG\_R\_6\_2' | 0.06  | 'INS\_L\_6\_1' | 0.02  | 'Amyg\_L\_2\_2' | 0.06  |
| 'SFG\_L\_7\_6' | 0.02  | 'PrG\_L\_6\_6' | 0.00  | 'PhG\_L\_6\_3' | 0.02  | 'INS\_R\_6\_1' | 0.02  | 'Amyg\_R\_2\_2' | 0.00  |
| 'SFG\_R\_7\_6' | 0.03  | 'PrG\_R\_6\_6' | 0.08\*  | 'PhG\_R\_6\_3' | 0.05  | 'INS\_L\_6\_2' | 0.02  | 'Hipp\_L\_2\_1' | 0.03  |
| 'SFG\_L\_7\_7' | 0.02  | 'PCL\_L\_2\_1' | 0.05  | 'PhG\_L\_6\_4' | 0.03  | 'INS\_R\_6\_2' | 0.00  | 'Hipp\_R\_2\_1' | 0.02  |
| 'SFG\_R\_7\_7' | 0.00  | 'PCL\_R\_2\_1' | 0.06  | 'PhG\_R\_6\_4' | 0.03  | 'INS\_L\_6\_3' | 0.06  | 'Hipp\_L\_2\_2' | 0.06  |
| 'MFG\_L\_7\_1' | 0.02  | 'PCL\_L\_2\_2' | 0.06  | 'PhG\_L\_6\_5' | 0.00  | 'INS\_R\_6\_3' | 0.00  | 'Hipp\_R\_2\_2' | 0.10\*  |
| 'MFG\_R\_7\_1' | 0.00  | 'PCL\_R\_2\_2' | 0.03  | 'PhG\_L\_6\_6' | 0.05  | 'INS\_L\_6\_4' | 0.05  | 'Str\_L\_6\_1' | 0.06  |
| 'MFG\_L\_7\_2' | 0.02  | 'STG\_L\_6\_1' | 0.03  | 'PhG\_R\_6\_6' | 0.05  | 'INS\_R\_6\_4' | 0.06  | 'Str\_R\_6\_1' | 0.08  |
| 'MFG\_R\_7\_2' | 0.02  | 'STG\_R\_6\_1' | 0.06  | 'pSTS\_L\_2\_1' | 0.03  | 'INS\_L\_6\_5' | 0.03  | 'Str\_L\_6\_2' | 0.13\*  |
| 'MFG\_L\_7\_3' | 0.00  | 'STG\_L\_6\_2' | 0.03  | 'pSTS\_R\_2\_1' | 0.06  | 'INS\_R\_6\_5' | 0.03  | 'Str\_R\_6\_2' | 0.10  |
| 'MFG\_R\_7\_3' | 0.00  | 'STG\_R\_6\_2' | 0.10\*  | 'pSTS\_L\_2\_2' | 0.05  | 'INS\_L\_6\_6' | 0.06  | 'Str\_L\_6\_3' | 0.03  |
| 'MFG\_L\_7\_4' | 0.03  | 'STG\_L\_6\_3' | 0.06  | 'pSTS\_R\_2\_2' | 0.11\*  | 'INS\_R\_6\_6' | 0.00  | 'Str\_R\_6\_3' | 0.03  |
| 'MFG\_R\_7\_4' | 0.05  | 'STG\_R\_6\_3' | 0.02  | 'SPL\_L\_5\_1' | 0.02  | 'CG\_L\_7\_1' | 0.02  | 'Str\_L\_6\_4' | 0.03  |
| 'MFG\_L\_7\_5' | 0.02  | 'STG\_L\_6\_4' | 0.06  | 'SPL\_R\_5\_1' | 0.03  | 'CG\_R\_7\_1' | 0.05  | 'Str\_R\_6\_4' | 0.05  |
| 'MFG\_R\_7\_5' | 0.02  | 'STG\_R\_6\_4' | 0.08  | 'SPL\_L\_5\_2' | 0.03  | 'CG\_L\_7\_2' | 0.06  | 'Str\_L\_6\_5' | 0.02  |
| 'MFG\_L\_7\_6' | 0.02  | 'STG\_L\_6\_5' | 0.03  | 'SPL\_R\_5\_2' | 0.00  | 'CG\_R\_7\_2' | 0.15\*  | 'Str\_R\_6\_5' | 0.02  |
| 'MFG\_R\_7\_6' | 0.02  | 'STG\_R\_6\_5' | 0.02  | 'SPL\_L\_5\_3' | 0.10  | 'CG\_L\_7\_3' | 0.02  | 'Str\_L\_6\_6' | 0.03  |
| 'MFG\_L\_7\_7' | 0.00  | 'STG\_L\_6\_6' | 0.00  | 'SPL\_R\_5\_3' | 0.03  | 'CG\_R\_7\_3' | 0.08\*  | 'Str\_R\_6\_6' | 0.03  |
| 'MFG\_R\_7\_7' | 0.00  | 'STG\_R\_6\_6' | 0.02  | 'SPL\_L\_5\_4' | 0.06  | 'CG\_L\_7\_4' | 0.03  | 'Tha\_L\_8\_1' | 0.03  |
| 'IFG\_L\_6\_1' | 0.05  | 'MTG\_L\_4\_1' | 0.05  | 'SPL\_R\_5\_4' | 0.06  | 'CG\_R\_7\_4' | 0.02  | 'Tha\_R\_8\_1' | 0.02  |
| 'IFG\_R\_6\_1' | 0.00  | 'MTG\_R\_4\_1' | 0.05  | 'SPL\_L\_5\_5' | 0.02  | 'CG\_L\_7\_5' | 0.05  | 'Tha\_L\_8\_2' | 0.18\*  |
| 'IFG\_L\_6\_2' | 0.03  | 'MTG\_L\_4\_2' | 0.03  | 'SPL\_R\_5\_5' | 0.05  | 'CG\_R\_7\_5' | 0.05  | 'Tha\_R\_8\_2' | 0.03  |
| 'IFG\_R\_6\_2' | 0.02  | 'MTG\_R\_4\_2' | 0.02  | 'IPL\_L\_6\_1' | 0.02  | 'CG\_L\_7\_6' | 0.03  | 'Tha\_L\_8\_3' | 0.02  |
| 'IFG\_L\_6\_3' | 0.05  | 'MTG\_L\_4\_3' | 0.03  | 'IPL\_R\_6\_1' | 0.05  | 'CG\_R\_7\_6' | 0.02  | 'Tha\_R\_8\_3' | 0.00  |
| 'IFG\_R\_6\_3' | 0.05  | 'MTG\_R\_4\_3' | 0.00  | 'IPL\_L\_6\_2' | 0.00  | 'CG\_L\_7\_7' | 0.02  | 'Tha\_L\_8\_4' | 0.06  |
| 'IFG\_L\_6\_4' | 0.02  | 'MTG\_L\_4\_4' | 0.02  | 'IPL\_R\_6\_2' | 0.03  | 'CG\_R\_7\_7' | 0.06  | 'Tha\_L\_8\_5' | 0.02  |
| 'IFG\_R\_6\_4' | 0.05  | 'MTG\_R\_4\_4' | 0.00  | 'IPL\_L\_6\_3' | 0.03  | 'Cun\_L\_5\_1' | 0.03  | 'Tha\_R\_8\_5' | 0.00  |
| 'IFG\_L\_6\_5' | 0.02  | 'ITG\_L\_7\_1' | 0.05  | 'IPL\_R\_6\_3' | 0.05  | 'Cun\_R\_5\_1' | 0.03  | 'Tha\_L\_8\_6' | 0.00  |
| 'IFG\_R\_6\_5' | 0.02  | 'ITG\_R\_7\_1' | 0.00  | 'IPL\_L\_6\_4' | 0.03  | 'Cun\_L\_5\_2' | 0.02  | 'Tha\_R\_8\_6' | 0.02  |
| 'IFG\_L\_6\_6' | 0.02  | 'ITG\_L\_7\_2' | 0.03  | 'IPL\_R\_6\_4' | 0.06  | 'Cun\_R\_5\_2' | 0.03  | 'Tha\_L\_8\_7' | 0.00  |
| 'IFG\_R\_6\_6' | 0.02  | 'ITG\_R\_7\_2' | 0.00  | 'IPL\_L\_6\_5' | 0.03  | 'Cun\_L\_5\_3' | 0.06  | 'Tha\_R\_8\_7' | 0.02  |
| 'OrG\_L\_6\_1' | 0.02  | 'ITG\_L\_7\_3' | 0.00  | 'IPL\_R\_6\_5' | 0.02  | 'Cun\_R\_5\_3' | 0.05  | 'Tha\_L\_8\_8' | 0.05  |
| 'OrG\_R\_6\_1' | 0.02  | 'ITG\_R\_7\_3' | 0.02  | 'IPL\_L\_6\_6' | 0.00  | 'Cun\_L\_5\_4' | 0.00  | 'Tha\_R\_8\_8' | 0.00  |
| 'OrG\_L\_6\_2' | 0.03  | 'ITG\_L\_7\_4' | 0.05  | 'IPL\_R\_6\_6' | 0.03  | 'Cun\_R\_5\_4' | 0.03  |  |  |
| 'OrG\_R\_6\_2' | 0.03  | 'ITG\_R\_7\_4' | 0.02  | 'Pcun\_L\_4\_1' | 0.03  | 'Cun\_L\_5\_5' | 0.02  |  |  |
| 'OrG\_L\_6\_3' | 0.00  | 'ITG\_L\_7\_5' | 0.02  | 'Pcun\_R\_4\_1' | 0.02  | 'Cun\_R\_5\_5' | 0.00  |  |  |
| 'OrG\_R\_6\_3' | 0.02  | 'ITG\_R\_7\_5' | 0.02  | 'Pcun\_L\_4\_2' | 0.03  | 'OcG\_L\_4\_1' | 0.02  |  |  |
| 'OrG\_L\_6\_5' | 0.03  | 'ITG\_L\_7\_6' | 0.08\*  | 'Pcun\_R\_4\_2' | 0.03  | 'OcG\_R\_4\_1' | 0.02  |  |  |
| 'OrG\_R\_6\_5' | 0.02  | 'ITG\_R\_7\_6' | 0.02  | 'Pcun\_L\_4\_3' | 0.08  | 'OcG\_L\_4\_2' | 0.05  |  |  |
| 'OrG\_L\_6\_6' | 0.02  | 'ITG\_L\_7\_7' | 0.00  | 'Pcun\_R\_4\_3' | 0.05  | 'OcG\_R\_4\_2' | 0.02  |  |  |
| 'OrG\_R\_6\_6' | 0.02  | 'ITG\_R\_7\_7' | 0.02  | 'Pcun\_L\_4\_4' | 0.05  | 'OcG\_L\_4\_3' | 0.02  |  |  |