Supplementary Material

**The Five-Pattern Personality Inventory (FPPI) , a Chinese localized personality scale, relates to** **topological properties of resting-state brain networks**

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**1. Mathematical Definitions of Nodal Metrics**

Unless otherwise mentioned, all formulas introduced below are based on G = (N,K), a network G with N nodes and K edges. Formally, the degree of node i is defined as:

 $ K\_{i}=\sum\_{j\in G}^{}a\_{ij}$ (1)

where aij is the element (i,j) in the network. Degree is a simple measurement of connectivity of a node with the rest of nodes in a network.

The betweenness centrality of node is measured as [1]:

 $BC\_{i}=\sum\_{m\ne i\ne n\in G}^{}\frac{σ\_{mn}(i)}{σ\_{mn}}$ (2)

where σmn is the total number of shortest paths (paths with the shortest path length) from node m to node n, and σmn(i) is the number of shortest paths from node m to node n that pass through the node i. Betweenness centrality of a node captures the influence of the node over information flow between all the other nodes in the network.

The Clustering coefficient of node is measured as [2]:

 $C\_{i}=\frac{ei}{Ki(Ki−1)/2}$ (3)

where ei is the number of edges in the subgraph G. The clustering coefﬁcient of the network C is the mean of Ci of all the nodes in the network.

The Minimum path length is measured as [3]:

$L\_{i}=\frac{1}{N−1}\sum\_{i\ne j\in G}^{}min\left\{L\_{i,j}\right\}$ (4)

where min {Li,j} is the shortest absolute path length between node i and node j,and the absolute path length is the number of edges included in the path connecting two nodes. The characteristic path length L is the mean of Li of all the nodes in the network.

Crand and Lrand were calculated as the averaged clustering coefﬁcient and characteristic path length of a set of 100 random networks with the same degree distribution as that of the examined functional connectivity network [2]. The random networks were generated based on a Markov-chain algorithm.

**2. Associations between the ShaoYin scores and global network metrics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Personality dimension | Global metrics | Sparsity% | r | Adjusted p-value |
| 1 | Shao Yin | γ | 11 | 0.209 | 0.044 |
| 2 |  | γ | 12 | 0.199 | 0.044 |
| 3 |  | γ | 13 | 0.197 | 0.044 |

Abbreviations: γ represents normalized cluster coefficient.

**3. Small-wordness in different sparsities**



Abbreviations: σ represents small-wordness. The sparsity was computed over the range of 0.05 ≤ T ≤ 0.40 (interval=0.01).

**References**

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