Supplementary Materials for

Graph theory approaches to functional network organization in brain disorders: A critique for a brave new small-world

Table S1. Parameters used in network simulations

Simulation	Parameter	Description	Value
Whack-a-node	σ_b	Between-person variation in mean FC	.2
	σ_w	Within-person variation in FC	.2
	σ_e	Edge noise	.2
	$\mu_{a_i}, i \in P$	Mean shift in Positive node targets in patient group	.14
	$\sigma_{a_i}, i \in P$	Between-person variation in FC shifts for Positive targets	.07
	$\sigma_{v_i}, i \in P$	Within-person variation in FC variation of Positive node *i* across its neighbors, *j*	.07
	$\mu_{a_i}, i \in N$	Mean shift in Negative node targets in patient group	-.04
	$\sigma_{a_i}, i \in N$	Between-person variation in FC shifts for Negative targets	.02
	$\sigma_{v_i}, i \in N$	Within-person variation in FC variation of Positive node *i* across its neighbors, *j*	.02
Global insensitivity	σ_b	Between-person variation in mean FC	.2
	σ_w	Within-person variation in FC	.2
	σ_e	Edge noise	.2
	$\mu_{a_i}, i \in$ FP, DAN	Mean shift in between-module connectivity of F-P and DAN nodes in control group	.1
	$\sigma_{a_i}, i \in$ FP, DAN	Between-person variation in between-module connectivity of FP and DAN nodes in control group	.05
	$\sigma_{v_i}, i \in$ FP, DAN	Within-person variation in between-module connectivity of FP and DAN nodes in control group	.05
	$\mu_{a_i}, i \in$ FP, DAN	Mean shift in within-module connectivity of F-P and DAN nodes in control group	.2
	$\sigma_{a_i}, i \in$ FP, DAN	Between-person variation in within-module connectivity of FP and DAN nodes in control group	.1
	$\sigma_{v_i}, i \in$ FP, DAN	Within-person variation in within-module connectivity of FP and DAN nodes in control group	.1
	$\mu_{a_i}, i \in$ DMN	Mean shift in between-module connectivity of DMN nodes in patient group	.1
	$\sigma_{a_i}, i \in$ DMN	Between-person variation in between-module connectivity of DMN nodes in patient group	.05
	$\sigma_{v_i}, i \in$ DMN	Within-person variation in between-module connectivity of DMN nodes in patient group	.05
	$\mu_{a_i}, i \in$ DMN	Mean shift in within-module connectivity of DMN nodes in patient group	.2
	$\sigma_{a_i}, i \in$ DMN	Between-person variation in within-module connectivity of DMN nodes in patient group	.1
	$\sigma_{v_i}, i \in$ DMN	Within-person variation in within-module connectivity of DMN nodes in patient group	.1

Note. P = Positive targets (3 per simulation); *N* = Negative targets (3 per simulation); FP = frontoparietal network; DAN = dorsal attention network; DMN = default mode network.

Clinical Network Neuroscience Studies Reviewed (*N* = 106)

Achard, S., Delon-Martin, C., Vértes, P. E., Renard, F., Schenck, M., Schneider, F., … Bullmore, E. T. (2012). Hubs of brain functional networks are radically reorganized in comatose patients. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(50), 20608–20613. https://doi.org/10.1073/pnas.1208933109

Agosta, F., Sala, S., Valsasina, P., Meani, A., Canu, E., Magnani, G., … Filippi, M. (2013). Brain network connectivity assessed using graph theory in frontotemporal dementia. *Neurology*, *81*(2), 134–143. https://doi.org/10.1212/WNL.0b013e31829a33f8

Alexander-Bloch, A. F., Gogtay, N., Meunier, D., Birn, R., Clasen, L., Lalonde, F., … Bullmore, E. T. (2010). Disrupted modularity and local connectivity of brain functional networks in childhood-onset schizophrenia. *Frontiers in Systems Neuroscience*, *4*, 147. https://doi.org/10.3389/fnsys.2010.00147

Alexander-Bloch, A. F., Vértes, P. E., Stidd, R., Lalonde, F., Clasen, L., Rapoport, J., … Gogtay, N. (2013). The anatomical distance of functional connections predicts brain network topology in health and schizophrenia. *Cerebral Cortex (New York, N.Y.: 1991)*, *23*(1), 127–138. https://doi.org/10.1093/cercor/bhr388

Baggio, H.-C., Sala-Llonch, R., Segura, B., Marti, M.-J., Valldeoriola, F., Compta, Y., … Junqué, C. (2014). Functional brain networks and cognitive deficits in Parkinson's disease. *Human Brain Mapping*, *35*(9), 4620–4634. https://doi.org/10.1002/hbm.22499

Barttfeld, P., Wicker, B., Cukier, S., Navarta, S., Lew, S., Leiguarda, R., & Sigman, M. (2012). State-dependent changes of connectivity patterns and functional brain network topology in autism spectrum disorder. *Neuropsychologia*, *50*(14), 3653–3662. https://doi.org/10.1016/j.neuropsychologia.2012.09.047

Bassett, D. S., Bullmore, E., Verchinski, B. A., Mattay, V. S., Weinberger, D. R., & Meyer-Lindenberg, A. (2008). Hierarchical organization of human cortical networks in health and schizophrenia. *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience*, *28*(37), 9239–9248. https://doi.org/10.1523/JNEUROSCI.1929-08.2008

Binnewijzend, M. A. A., Adriaanse, S. M., Van der Flier, W. M., Teunissen, C. E., de Munck, J. C., Stam, C. J., … Wink, A. M. (2014). Brain network alterations in Alzheimer's disease measured by eigenvector centrality in fMRI are related to cognition and CSF biomarkers. *Human Brain Mapping*, *35*(5), 2383–2393. https://doi.org/10.1002/hbm.22335

Bohr, I. J., Kenny, E., Blamire, A., O'Brien, J. T., Thomas, A. J., Richardson, J., & Kaiser, M. (2012). Resting-state functional connectivity in late-life depression: higher global connectivity and more long distance connections. *Frontiers in Psychiatry*, *3*, 116. https://doi.org/10.3389/fpsyt.2012.00116

Brier, M. R., Thomas, J. B., Fagan, A. M., Hassenstab, J., Holtzman, D. M., Benzinger, T. L., … Ances, B. M. (2014). Functional connectivity and graph theory in preclinical Alzheimer's disease. *Neurobiology of Aging*, *35*(4), 757–768. https://doi.org/10.1016/j.neurobiolaging.2013.10.081

Bruno, J., Hosseini, S. M. H., & Kesler, S. (2012). Altered resting state functional brain network topology in chemotherapy-treated breast cancer survivors. *Neurobiology of Disease*, *48*(3), 329–338. https://doi.org/10.1016/j.nbd.2012.07.009

Cabral, J., Kringelbach, M. L., & Deco, G. (2012). Functional graph alterations in schizophrenia: a result from a global anatomic decoupling? *Pharmacopsychiatry*, *45 Suppl 1*, S57-64. https://doi.org/10.1055/s-0032-1309001

Carmona, S., Hoekzema, E., Castellanos, F. X., García-García, D., Lage-Castellanos, A., Van Dijk, K. R. A., … Sepulcre, J. (2015). Sensation-to-cognition cortical streams in attention-deficit/hyperactivity disorder. *Human Brain Mapping*, *36*(7), 2544–2557. https://doi.org/10.1002/hbm.22790

Chanraud, S., Pitel, A.-L., Pfefferbaum, A., & Sullivan, E. V. (2011). Disruption of functional connectivity of the default-mode network in alcoholism. *Cerebral Cortex (New York, N.Y.: 1991)*, *21*(10), 2272–2281. https://doi.org/10.1093/cercor/bhq297

Chiang, S., Stern, J. M., Engel, J., Levin, H. S., & Haneef, Z. (2014). Differences in graph theory functional connectivity in left and right temporal lobe epilepsy. *Epilepsy Research*, *108*(10), 1770–1781. https://doi.org/10.1016/j.eplepsyres.2014.09.023

Ciftçi, K. (2011). Minimum spanning tree reflects the alterations of the default mode network during Alzheimer's disease. *Annals of Biomedical Engineering*, *39*(5), 1493–1504. https://doi.org/10.1007/s10439-011-0258-9

Cisler, J. M., James, G. A., Tripathi, S., Mletzko, T., Heim, C., Hu, X. P., … Kilts, C. D. (2013). Differential functional connectivity within an emotion regulation neural network among individuals resilient and susceptible to the depressogenic effects of early life stress. *Psychological Medicine*, *43*(03), 507–518. https://doi.org/10.1017/S0033291712001390

Crone, J. S., Soddu, A., Höller, Y., Vanhaudenhuyse, A., Schurz, M., Bergmann, J., … Kronbichler, M. (2014).

Altered network properties of the fronto-parietal network and the thalamus in impaired consciousness. *NeuroImage. Clinical*, *4*, 240–248. https://doi.org/10.1016/j.nicl.2013.12.005

Dacosta-Aguayo, R., Graña, M., Iturria-Medina, Y., Fernández-Andújar, M., López-Cancio, E., Cáceres, C., … Mataró, M. (2015). Impairment of functional integration of the default mode network correlates with cognitive outcome at three months after stroke. *Human Brain Mapping*, *36*(2), 577–590. https://doi.org/10.1002/hbm.22648

Dey, S., Rao, A. R., & Shah, M. (2014). Attributed graph distance measure for automatic detection of attention deficit hyperactive disordered subjects. *Frontiers in Neural Circuits*, *8*, 64. https://doi.org/10.3389/fncir.2014.00064

Ding, J.-R., An, D., Liao, W., Li, J., Wu, G.-R., Xu, Q., … Chen, H. (2013). Altered functional and structural connectivity networks in psychogenic non-epileptic seizures. *PloS One*, *8*(5), e63850. https://doi.org/10.1371/journal.pone.0063850

dos Santos Siqueira, A., Junior, B., Eduardo, C., Comfort, W. E., Rohde, L. A., & Sato, J. R. (2014). Abnormal Functional Resting-State Networks in ADHD: Graph Theory and Pattern Recognition Analysis of fMRI Data. *BioMed Research International*, *2014*, Article ID 380531. https://doi.org/10.1155/2014/380531

Doucet, G. E., Rider, R., Taylor, N., Skidmore, C., Sharan, A., Sperling, M., & Tracy, J. I. (2015). Presurgery resting-state local graph-theory measures predict neurocognitive outcomes after brain surgery in temporal lobe epilepsy. *Epilepsia*, *56*(4), 517–526. https://doi.org/10.1111/epi.12936

Doucet, G. E., Sharan, A., Pustina, D., Skidmore, C., Sperling, M. R., & Tracy, J. I. (2015). Early and late age of seizure onset have a differential impact on brain resting-state organization in temporal lobe epilepsy. *Brain Topography*, *28*(1), 113–126. https://doi.org/10.1007/s10548-014-0366-6

Dyrba, M., Grothe, M., Kirste, T., & Teipel, S. J. (2015). Multimodal analysis of functional and structural disconnection in Alzheimer's disease using multiple kernel SVM. *Human Brain Mapping*, *36*(6), 2118–2131. https://doi.org/10.1002/hbm.22759

Fekete, T., Zach, N., Mujica-Parodi, L. R., & Turner, M. R. (2013). Multiple kernel learning captures a systems-level functional connectivity biomarker signature in amyotrophic lateral sclerosis. *PloS One*, *8*(12), e85190. https://doi.org/10.1371/journal.pone.0085190

Gamboa, O. L., Tagliazucchi, E., von Wegner, F., Jurcoane, A., Wahl, M., Laufs, H., & Ziemann, U. (2014).

Working memory performance of early MS patients correlates inversely with modularity increases in resting state functional connectivity networks. *NeuroImage*, *94*, 385–395. https://doi.org/10.1016/j.neuroimage.2013.12.008

Göttlich, M., Krämer, U. M., Kordon, A., Hohagen, F., & Zurowski, B. (2014). Decreased limbic and increased fronto-parietal connectivity in unmedicated patients with obsessive-compulsive disorder. *Human Brain Mapping*, *35*(11), 5617–5632. https://doi.org/10.1002/hbm.22574

Guo, H., Cao, X., Liu, Z., Li, H., Chen, J., & Zhang, K. (2012). Machine learning classifier using abnormal brain network topological metrics in major depressive disorder. *Neuroreport*, *23*(17), 1006–1011. https://doi.org/10.1097/WNR.0b013e32835a650c

Han, K., Mac Donald, C. L., Johnson, A. M., Barnes, Y., Wierzechowski, L., Zonies, D., … Brody, D. L. (2014). Disrupted modular organization of resting-state cortical functional connectivity in U.S. military personnel following concussive "mild" blast-related traumatic brain injury. *NeuroImage*, *84*, 76–96. https://doi.org/10.1016/j.neuroimage.2013.08.017

Haneef, Z., Chiang, S., Yeh, H. J., Engel, J., & Stern, J. M. (2015). Functional connectivity homogeneity correlates with duration of temporal lobe epilepsy. *Epilepsy & Behavior: E&B*, *46*, 227–233. https://doi.org/10.1016/j.yebeh.2015.01.025

Haneef, Z., Levin, H. S., & Chiang, S. (2015). Brain Graph Topology Changes Associated with Anti-Epileptic Drug Use. *Brain Connectivity*, *5*(5), 284–291. https://doi.org/10.1089/brain.2014.0304

Harrington, D. L., Rubinov, M., Durgerian, S., Mourany, L., Reece, C., Koenig, K., … Rao, S. M. (2015). Network topology and functional connectivity disturbances precede the onset of Huntington's disease. *Brain: A Journal of Neurology*, *138*(Pt 8), 2332–2346. https://doi.org/10.1093/brain/awv145

Hillary, F. G., Rajtmajer, S. M., Roman, C. A., Medaglia, J. D., Slocomb-Dluzen, J. E., Calhoun, V. D., … Wylie, G. R. (2014). The Rich Get Richer: Brain Injury Elicits Hyperconnectivity in Core Subnetworks. *PLoS ONE*, *9*(8), e104021–e104021. https://doi.org/10.1371/journal.pone.0104021

Hou, J.-M., Zhao, M., Zhang, W., Song, L.-H., Wu, W.-J., Wang, J., … Li, H.-T. (2014). Resting-state functional connectivity abnormalities in patients with obsessive-compulsive disorder and their healthy first-degree relatives. *Journal of Psychiatry & Neuroscience: JPN*, *39*(5), 304–311.

Hsu, T.-W., Wu, C. W., Cheng, Y.-F., Chen, H.-L., Lu, C.-H., Cho, K.-H., … Lin, C.-P. (2012). Impaired small-

world network efficiency and dynamic functional distribution in patients with cirrhosis. *PloS One*, *7*(5), e35266. https://doi.org/10.1371/journal.pone.0035266

Huang, Q., Zhang, R., Hu, X., Ding, S., Qian, J., Lei, T., … Liu, H. (2014). Disturbed small-world networks and neurocognitive function in frontal lobe low-grade glioma patients. *PloS One*, *9*(4), e94095. https://doi.org/10.1371/journal.pone.0094095

Hyett, M. P., Breakspear, M. J., Friston, K. J., Guo, C. C., & Parker, G. B. (2015). Disrupted effective connectivity of cortical systems supporting attention and interoception in melancholia. *JAMA Psychiatry*, *72*(4), 350–358. https://doi.org/10.1001/jamapsychiatry.2014.2490

Ibrahim, G. M., Cassel, D., Morgan, B. R., Smith, M. L., Otsubo, H., Ochi, A., … Doesburg, S. (2014). Resilience of developing brain networks to interictal epileptiform discharges is associated with cognitive outcome. *Brain: A Journal of Neurology*, *137*(Pt 10), 2690–2702. https://doi.org/10.1093/brain/awu214

Itahashi, T., Yamada, T., Watanabe, H., Nakamura, M., Jimbo, D., Shioda, S., … Hashimoto, R. (2014). Altered network topologies and hub organization in adults with autism: a resting-state fMRI study. *PloS One*, *9*(4), e94115. https://doi.org/10.1371/journal.pone.0094115

James, G. A., Tripathi, S. P., Ojemann, J. G., Gross, R. E., & Drane, D. L. (2013). Diminished default mode network recruitment of the hippocampus and parahippocampus in temporal lobe epilepsy. *Journal of Neurosurgery*, *119*(2), 288–300. https://doi.org/10.3171/2013.3.JNS121041

Jiang, G., Wen, X., Qiu, Y., Zhang, R., Wang, J., Li, M., … Huang, R. (2013). Disrupted topological organization in whole-brain functional networks of heroin-dependent individuals: a resting-state FMRI study. *PloS One*, *8*(12), e82715. https://doi.org/10.1371/journal.pone.0082715

Jin, C., Gao, C., Chen, C., Ma, S., Netra, R., Wang, Y., … Li, D. (2011). A preliminary study of the dysregulation of the resting networks in first-episode medication-naive adolescent depression. *Neuroscience Letters*, *503*(2), 105–109. https://doi.org/10.1016/j.neulet.2011.08.017

Jones, D. T., Vemuri, P., Murphy, M. C., Gunter, J. L., Senjem, M. L., Machulda, M. M., … Jack, C. R. (2012). Non-stationarity in the "resting brain's" modular architecture. *PloS One*, *7*(6), e39731. https://doi.org/10.1371/journal.pone.0039731

Khazaee, A., Ebrahimzadeh, A., & Babajani-Feremi, A. (2015). Identifying patients with Alzheimer's disease using resting-state fMRI and graph theory. *Clinical Neurophysiology: Official Journal of the International*

Federation of Clinical Neurophysiology, *126*(11), 2132–2141. https://doi.org/10.1016/j.clinph.2015.02.060

Li, W., Douglas Ward, B., Liu, X., Chen, G., Jones, J. L., Antuono, P. G., … Goveas, J. S. (2015). Disrupted small world topology and modular organisation of functional networks in late-life depression with and without amnestic mild cognitive impairment. *Journal of Neurology, Neurosurgery, and Psychiatry*, *86*(10), 1097–1105. https://doi.org/10.1136/jnnp-2014-309180

Li, Y., Qin, Y., Chen, X., & Li, W. (2013). Exploring the functional brain network of Alzheimer's disease: based on the computational experiment. *PloS One*, *8*(9), e73186. https://doi.org/10.1371/journal.pone.0073186

Lin, P., Sun, J., Yu, G., Wu, Y., Yang, Y., Liang, M., & Liu, X. (2014). Global and local brain network reorganization in attention-deficit/hyperactivity disorder. *Brain Imaging and Behavior*, *8*(4), 558–569. https://doi.org/10.1007/s11682-013-9279-3

Liu, F., Zhu, C., Wang, Y., Guo, W., Li, M., Wang, W., … Chen, H. (2015). Disrupted cortical hubs in functional brain networks in social anxiety disorder. *Clinical Neurophysiology: Official Journal of the International Federation of Clinical Neurophysiology*, *126*(9), 1711–1716. https://doi.org/10.1016/j.clinph.2014.11.014

Liu, H., Li, H., Wang, Y., & Lei, X. (2014). Enhanced brain small-worldness after sleep deprivation: a compensatory effect. *Journal of Sleep Research*, *23*(5), 554–563. https://doi.org/10.1111/jsr.12147

Liu, J., Liang, J., Qin, W., Tian, J., Yuan, K., Bai, L., … Gold, M. S. (2009). Dysfunctional connectivity patterns in chronic heroin users: an fMRI study. *Neuroscience Letters*, *460*(1), 72–77. https://doi.org/10.1016/j.neulet.2009.05.038

Liu, J., Qin, W., Yuan, K., Li, J., Wang, W., Li, Q., … Tian, J. (2011). Interaction between dysfunctional connectivity at rest and heroin cues-induced brain responses in male abstinent heroin-dependent individuals. *PloS One*, *6*(10), e23098. https://doi.org/10.1371/journal.pone.0023098

Liu, Y., Yu, C., Zhang, X., Liu, J., Duan, Y., Alexander-Bloch, A. F., … Bullmore, E. (2014). Impaired long distance functional connectivity and weighted network architecture in Alzheimer's disease. *Cerebral Cortex (New York, N.Y.: 1991)*, *24*(6), 1422–1435. https://doi.org/10.1093/cercor/bhs410

Liu, Z., Zhang, Y., Yan, H., Bai, L., Dai, R., Wei, W., … Tian, J. (2012). Altered topological patterns of brain networks in mild cognitive impairment and Alzheimer's disease: a resting-state fMRI study. *Psychiatry Research*, *202*(2), 118–125. https://doi.org/10.1016/j.pscychresns.2012.03.002

Lo, C.-Y. Z., Su, T.-W., Huang, C.-C., Hung, C.-C., Chen, W.-L., Lan, T.-H., … Bullmore, E. T. (2015).

Randomization and resilience of brain functional networks as systems-level endophenotypes of schizophrenia. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(29), 9123–9128. https://doi.org/10.1073/pnas.1502052112

Luo, C. Y., Guo, X. Y., Song, W., Chen, Q., Cao, B., Yang, J., … Shang, H.-F. (2015). Functional connectome assessed using graph theory in drug-naive Parkinson's disease. *Journal of Neurology*, *262*(6), 1557–1567. https://doi.org/10.1007/s00415-015-7750-3

Luo, Q., Deng, Z., Qin, J., Wei, D., Cun, L., Qiu, J., … Xie, P. (2015). Frequency dependant topological alterations of intrinsic functional connectome in major depressive disorder. *Scientific Reports*, *5*, 9710. https://doi.org/10.1038/srep09710

Lynall, M.-E., Bassett, D. S., Kerwin, R., McKenna, P. J., Kitzbichler, M., Muller, U., & Bullmore, E. (2010). Functional connectivity and brain networks in schizophrenia. *The Journal of Neuroscience: The Official Journal of the Society for Neuroscience*, *30*(28), 9477–9487. https://doi.org/10.1523/JNEUROSCI.0333-10.2010

Ma, S., Calhoun, V. D., Eichele, T., Du, W., & Adalı, T. (2012). Modulations of functional connectivity in the healthy and schizophrenia groups during task and rest. *NeuroImage*, *62*(3), 1694–1704. https://doi.org/10.1016/j.neuroimage.2012.05.048

Ma, X., Jiang, G., Li, S., Wang, J., Zhan, W., Zeng, S., … Xu, Y. (2015). Aberrant Functional Connectome in Neurologically Asymptomatic Patients with End-Stage Renal Disease. *PLOS ONE*, *10*(3), e0121085. https://doi.org/10.1371/journal.pone.0121085

Meng, C., Brandl, F., Tahmasian, M., Shao, J., Manoliu, A., Scherr, M., … Sorg, C. (2014). Aberrant topology of striatum's connectivity is associated with the number of episodes in depression. *Brain: A Journal of Neurology*, *137*(Pt 2), 598–609. https://doi.org/10.1093/brain/awt290

Messé, A., Caplain, S., Pélégrini-Issac, M., Blancho, S., Lévy, R., Aghakhani, N., … Lehéricy, S. (2013). Specific and evolving resting-state network alterations in post-concussion syndrome following mild traumatic brain injury. *PloS One*, *8*(6), e65470. https://doi.org/10.1371/journal.pone.0065470

Miao, X., Wu, X., Li, R., Chen, K., & Yao, L. (2011). Altered connectivity pattern of hubs in default-mode network with Alzheimer's disease: an Granger causality modeling approach. *PloS One*, *6*(10), e25546. https://doi.org/10.1371/journal.pone.0025546

Minati, L., Chan, D., Mastropasqua, C., Serra, L., Spanò, B., Marra, C., … Bozzali, M. (2014). Widespread alterations in functional brain network architecture in amnestic mild cognitive impairment. *Journal of Alzheimer's Disease: JAD*, *40*(1), 213–220. https://doi.org/10.3233/JAD-131766

Nakamura, T., Hillary, F. G., & Biswal, B. B. (2009). Resting network plasticity following brain injury. *PloS One*, *4*(12), e8220. https://doi.org/10.1371/journal.pone.0008220

Nathan, D. E., Wang, B. Q., Wolfowitz, R. D., Liu, W., Yeh, P. H., Graner, J. L., … Riedy, G. (2012). Examining intrinsic thalamic resting state networks using graph theory analysis: implications for mTBI detection. *Conference Proceedings: ... Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Annual Conference*, *2012*, 5445–5448. https://doi.org/10.1109/EMBC.2012.6347226

Nomura, E. M., Gratton, C., Visser, R. M., Kayser, A., Perez, F., & D'Esposito, M. (2010). Double dissociation of two cognitive control networks in patients with focal brain lesions. *Proceedings of the National Academy of Sciences of the United States of America*, *107*(26), 12017–12022. https://doi.org/10.1073/pnas.1002431107

Pandit, A. S., Expert, P., Lambiotte, R., Bonnelle, V., Leech, R., Turkheimer, F. E., & Sharp, D. J. (2013). Traumatic brain injury impairs small-world topology. *Neurology*, *80*(20), 1826–1833. https://doi.org/10.1212/WNL.0b013e3182929f38

Sanz-Arigita, E. J., Schoonheim, M. M., Damoiseaux, J. S., Rombouts, S. A. R. B., Maris, E., Barkhof, F., … Stam, C. J. (2010). Loss of "small-world" networks in Alzheimer's disease: graph analysis of FMRI resting-state functional connectivity. *PloS One*, *5*(11), e13788. https://doi.org/10.1371/journal.pone.0013788

Schoonheim, M. M., Hulst, H. E., Landi, D., Ciccarelli, O., Roosendaal, S. D., Sanz-Arigita, E. J., … Geurts, J. J. G. (2012). Gender-related differences in functional connectivity in multiple sclerosis. *Multiple Sclerosis (Houndmills, Basingstoke, England)*, *18*(2), 164–173. https://doi.org/10.1177/1352458511422245

Shen, Y., Yao, J., Jiang, X., Zhang, L., Xu, L., Feng, R., … Chen, W. (2015). Sub-hubs of baseline functional brain networks are related to early improvement following two-week pharmacological therapy for major depressive disorder. *Human Brain Mapping*, *36*(8), 2915–2927. https://doi.org/10.1002/hbm.22817

Shin, D.-J., Jung, W. H., He, Y., Wang, J., Shim, G., Byun, M. S., … Kwon, J. S. (2014). The effects of pharmacological treatment on functional brain connectome in obsessive-compulsive disorder. *Biological Psychiatry*, *75*(8), 606–614. https://doi.org/10.1016/j.biopsych.2013.09.002

Song, J., Nair, V. A., Gaggl, W., & Prabhakaran, V. (2015). Disrupted Brain Functional Organization in Epilepsy Revealed by Graph Theory Analysis. *Brain Connectivity*, *5*(5), 276–283. https://doi.org/10.1089/brain.2014.0308

Song, M., Du, H., Wu, N., Hou, B., Wu, G., Wang, J., … Jiang, T. (2011). Impaired resting-state functional integrations within default mode network of generalized tonic-clonic seizures epilepsy. *PloS One*, *6*(2), e17294. https://doi.org/10.1371/journal.pone.0017294

Spielberg, J. M., McGlinchey, R. E., Milberg, W. P., & Salat, D. H. (2015). Brain network disturbance related to posttraumatic stress and traumatic brain injury in veterans. *Biological Psychiatry*, *78*(3), 210–216. https://doi.org/10.1016/j.biopsych.2015.02.013

Su, Q., Yao, D., Jiang, M., Liu, F., Jiang, J., Xu, C., … Guo, W. (2015). Increased functional connectivity strength of right inferior temporal gyrus in first-episode, drug-naive somatization disorder. *The Australian and New Zealand Journal of Psychiatry*, *49*(1), 74–81. https://doi.org/10.1177/0004867414553949

Supekar, K., Menon, V., Rubin, D., Musen, M., & Greicius, M. D. (2008). Network analysis of intrinsic functional brain connectivity in Alzheimer's disease. *PLoS Computational Biology*, *4*(6), e1000100. https://doi.org/10.1371/journal.pcbi.1000100

Thomas, J. B., Brier, M. R., Ortega, M., Benzinger, T. L., & Ances, B. M. (2015). Weighted brain networks in disease: centrality and entropy in human immunodeficiency virus and aging. *Neurobiology of Aging*, *36*(1), 401–412. https://doi.org/10.1016/j.neurobiolaging.2014.06.019

Toussaint, P.-J., Maiz, S., Coynel, D., Doyon, J., Messé, A., de Souza, L. C., … Benali, H. (2014). Characteristics of the default mode functional connectivity in normal ageing and Alzheimer's disease using resting state fMRI with a combined approach of entropy-based and graph theoretical measurements. *NeuroImage*, *101*, 778–786. https://doi.org/10.1016/j.neuroimage.2014.08.003

Vaessen, M. J., Braakman, H. M. H., Heerink, J. S., Jansen, J. F. A., Debeij-van Hall, M. H. J. A., Hofman, P. a. M., … Backes, W. H. (2013). Abnormal modular organization of functional networks in cognitively impaired children with frontal lobe epilepsy. *Cerebral Cortex (New York, N.Y.: 1991)*, *23*(8), 1997–2006. https://doi.org/10.1093/cercor/bhs186

Vaessen, M. J., Jansen, J. F. A., Braakman, H. M. H., Hofman, P. A. M., De Louw, A., Aldenkamp, A. P., & Backes, W. H. (2014). Functional and structural network impairment in childhood frontal lobe epilepsy.

PloS One, *9*(3), e90068. https://doi.org/10.1371/journal.pone.0090068

van Lutterveld, R., Diederen, K. M. J., Otte, W. M., & Sommer, I. E. (2014). Network analysis of auditory hallucinations in nonpsychotic individuals. *Human Brain Mapping*, *35*(4), 1436–1445. https://doi.org/10.1002/hbm.22264

Wang, J., Qiu, S., Xu, Y., Liu, Z., Wen, X., Hu, X., … Huang, R. (2014). Graph theoretical analysis reveals disrupted topological properties of whole brain functional networks in temporal lobe epilepsy. *Clinical Neurophysiology: Official Journal of the International Federation of Clinical Neurophysiology*, *125*(9), 1744–1756. https://doi.org/10.1016/j.clinph.2013.12.120

Wang, J., Wang, X., He, Y., Yu, X., Wang, H., & He, Y. (2015). Apolipoprotein E ε4 modulates functional brain connectome in Alzheimer's disease. *Human Brain Mapping*, *36*(5), 1828–1846. https://doi.org/10.1002/hbm.22740

Wang, J., Zuo, X., Dai, Z., Xia, M., Zhao, Z., Zhao, X., … He, Y. (2013). Disrupted functional brain connectome in individuals at risk for Alzheimer's disease. *Biological Psychiatry*, *73*(5), 472–481. https://doi.org/10.1016/j.biopsych.2012.03.026

Wang, L., Dai, Z., Peng, H., Tan, L., Ding, Y., He, Z., … Li, L. (2014). Overlapping and segregated resting-state functional connectivity in patients with major depressive disorder with and without childhood neglect. *Human Brain Mapping*, *35*(4), 1154–1166. https://doi.org/10.1002/hbm.22241

Wang, L., Li, H., Liang, Y., Zhang, J., Li, X., Shu, N., … Zhang, Z. (2013). Amnestic mild cognitive impairment: topological reorganization of the default-mode network. *Radiology*, *268*(2), 501–514. https://doi.org/10.1148/radiol.13121573

Wang, L., Xia, M., Li, K., Zeng, Y., Su, Y., Dai, W., … Si, T. (2015). The effects of antidepressant treatment on resting-state functional brain networks in patients with major depressive disorder. *Human Brain Mapping*, *36*(2), 768–778. https://doi.org/10.1002/hbm.22663

Wang, L., Yu, C., Chen, H., Qin, W., He, Y., Fan, F., … Zhu, C. (2010). Dynamic functional reorganization of the motor execution network after stroke. *Brain: A Journal of Neurology*, *133*(Pt 4), 1224–1238. https://doi.org/10.1093/brain/awq043

Wang, L., Zhu, C., He, Y., Zang, Y., Cao, Q., Zhang, H., … Wang, Y. (2009). Altered small-world brain functional networks in children with attention-deficit/hyperactivity disorder. *Human Brain Mapping*, *30*(2), 638–649.

https://doi.org/10.1002/hbm.20530

Wang, Y., Yan, C., Yin, D., Fan, M., Cheung, E. F. C., Pantelis, C., & Chan, R. C. K. (2015). Neurobiological changes of schizotypy: evidence from both volume-based morphometric analysis and resting-state functional connectivity. *Schizophrenia Bulletin*, *41 Suppl 2*, S444-454. https://doi.org/10.1093/schbul/sbu178

Wang, Z., Suh, J., Li, Z., Li, Y., Franklin, T., O'Brien, C., & Childress, A. R. (2015). A hyper-connected but less efficient small-world network in the substance-dependent brain. *Drug and Alcohol Dependence*, *152*, 102–108. https://doi.org/10.1016/j.drugalcdep.2015.04.015

Wee, C.-Y., Zhao, Z., Yap, P.-T., Wu, G., Shi, F., Price, T., … Shen, D. (2014). Disrupted brain functional network in internet addiction disorder: a resting-state functional magnetic resonance imaging study. *PloS One*, *9*(9), e107306. https://doi.org/10.1371/journal.pone.0107306

Wei, L., Zhang, J., Long, Z., Wu, G.-R., Hu, X., Zhang, Y., & Wang, J. (2014). Reduced topological efficiency in cortical-basal Ganglia motor network of Parkinson's disease: a resting state fMRI study. *PloS One*, *9*(10), e108124. https://doi.org/10.1371/journal.pone.0108124

Wu, T., Wang, L., Chen, Y., Zhao, C., Li, K., & Chan, P. (2009). Changes of functional connectivity of the motor network in the resting state in Parkinson's disease. *Neuroscience Letters*, *460*(1), 6–10. https://doi.org/10.1016/j.neulet.2009.05.046

Xia, M., Wang, Z., Dai, Z., Liang, X., Song, H., Shu, N., … He, Y. (2014). Differentially disrupted functional connectivity in posteromedial cortical subregions in Alzheimer's disease. *Journal of Alzheimer's Disease: JAD*, *39*(3), 527–543. https://doi.org/10.3233/JAD-131583

Xu, H., Ding, S., Hu, X., Yang, K., Xiao, C., Zou, Y., … Qian, Z. (2013). Reduced efficiency of functional brain network underlying intellectual decline in patients with low-grade glioma. *Neuroscience Letters*, *543*, 27–31. https://doi.org/10.1016/j.neulet.2013.02.062

Yin, D., Song, F., Xu, D., Sun, L., Men, W., Zang, L., … Fan, M. (2014). Altered topological properties of the cortical motor-related network in patients with subcortical stroke revealed by graph theoretical analysis. *Human Brain Mapping*, *35*(7), 3343–3359. https://doi.org/10.1002/hbm.22406

Yu, Q., Erhardt, E. B., Sui, J., Du, Y., He, H., Hjelm, D., … Calhoun, V. D. (2015). Assessing dynamic brain graphs of time-varying connectivity in fMRI data: application to healthy controls and patients with schizophrenia.

NeuroImage, *107*, 345–355. https://doi.org/10.1016/j.neuroimage.2014.12.020

Yu, Q., Sui, J., Kiehl, K. A., Pearlson, G., & Calhoun, V. D. (2013). State-related functional integration and functional segregation brain networks in schizophrenia. *Schizophrenia Research*, *150*(2–3), 450–458. https://doi.org/10.1016/j.schres.2013.09.016

Yu, Q., Sui, J., Rachakonda, S., He, H., Gruner, W., Pearlson, G., … Calhoun, V. D. (2011). Altered topological properties of functional network connectivity in schizophrenia during resting state: a small-world brain network study. *PloS One*, *6*(9), e25423. https://doi.org/10.1371/journal.pone.0025423

Yuan, K., Qin, W., Liu, J., Guo, Q., Dong, M., Sun, J., … Tian, J. (2010). Altered small-world brain functional networks and duration of heroin use in male abstinent heroin-dependent individuals. *Neuroscience Letters*, *477*(1), 37–42. https://doi.org/10.1016/j.neulet.2010.04.032

Zhang, D., Liu, X., Chen, J., & Liu, B. (2014). Distinguishing patients with Parkinson's disease subtypes from normal controls based on functional network regional efficiencies. *PloS One*, *9*(12), e115131. https://doi.org/10.1371/journal.pone.0115131

Zhang, J., Wang, J., Wu, Q., Kuang, W., Huang, X., He, Y., & Gong, Q. (2011). Disrupted brain connectivity networks in drug-naive, first-episode major depressive disorder. *Biological Psychiatry*, *70*(4), 334–342. https://doi.org/10.1016/j.biopsych.2011.05.018

Zhang, T., Wang, J., Yang, Y., Wu, Q., Li, B., Chen, L., … Gong, Q. (2011). Abnormal small-world architecture of top-down control networks in obsessive-compulsive disorder. *Journal of Psychiatry & Neuroscience: JPN*, *36*(1), 23–31. https://doi.org/10.1503/jpn.100006

Zheng, H., Xu, L., Xie, F., Guo, X., Zhang, J., Yao, L., & Wu, X. (2015). The Altered Triple Networks Interaction in Depression under Resting State Based on Graph Theory. *BioMed Research International*, *2015*, 386326. https://doi.org/10.1155/2015/386326