

Supplementary Table S1.

Covariate-adjusted omnibus parameters, adjusted group means, and Holm-corrected post-hoc comparisons.

Network Metric	Analysis Cohort	Omnibus ANCOVA (F, df, η^2)	Omnibus <i>P</i>-value (Raw / FDR <i>q</i>)	Adjusted Group Means (95% CI)	Post-hoc Pairwise Comparisons	Holm-adjusted <i>P</i>-value
Normalized clustering coefficient (γ)	Combined (n=57)	F=4.501, df=(2, 50), η^2 =0.153	Raw <i>P</i> = 0.016 FDR <i>q</i> = 0.112	Focal: 0.420[0.393, 0.446] FBTCS: 0.416[0.389, 0.443] HC: 0.467[0.440, 0.493]	N/A (Omnibus <i>q</i> > 0.05)	N/A (Omnibus <i>q</i> > 0.05)
Local efficiency (E _{local})	Combined (n=57)	F=3.784, df=(2, 50), η^2 =0.131	Raw <i>P</i> = 0.029 FDR <i>q</i> = 0.101	Focal: 0.177 [0.175, 0.180] FBTCS: 0.177 [0.175, 0.180] HC: 0.182 [0.179, 0.184]	N/A (Omnibus <i>q</i> > 0.05)	N/A (Omnibus <i>q</i> > 0.05)
Small-worldness (σ)	Combined (n=57)	F=3.613, df=(2, 50), η^2 =0.126	Raw <i>P</i> = 0.034 FDR <i>q</i> = 0.079	Focal: 0.379[0.353, 0.405] FBTCS: 0.380 [0.353, 0.407] HC: 0.424 [0.397, 0.450]	N/A (Omnibus <i>q</i> > 0.05)	N/A (Omnibus <i>q</i> > 0.05)
Nodal Efficiency of MOG.L (Ne)	Combined (n=57)	F=51.705, df=(2, 50), η^2 =0.674	Raw <i>P</i> = 0.000378 FDR <i>q</i> = 0.034	Focal: 0.138[0.132, 0.144] FBTCS: 0.177 [0.171, 0.183] HC: 0.138 [0.132, 0.144]	FBTCS vs Focal FBTCS vs HC	<i>P</i> < 0.003 <i>P</i> < 0.003
Global Efficiency (E _{global})	Right TLE (n=43)	F=3.128, df=(2, 36), η^2 =0.148	Raw <i>P</i> = 0.056 FDR <i>q</i> = N/A	r-Focal: 0.122[0.117, 0.127] r-FBTCS: 0.128 [0.124, 0.132] HC: 0.129 [0.126, 0.133]	N/A (Omnibus <i>q</i> > 0.05)	N/A (Omnibus <i>q</i> > 0.05)
Characteristic path length (L _p)	Right TLE (n=43)	F=2.837, df=(2, 36), η^2 =0.136	Raw <i>P</i> = 0.072 FDR <i>q</i> = N/A	r-Focal: 0.492[0.468, 0.517] r-FBTCS: 0.462 [0.440, 0.483] HC: 0.457 [0.439, 0.475]	N/A (Omnibus <i>q</i> > 0.05)	N/A (Omnibus <i>q</i> > 0.05)
Nodal Clustering (MFG.R)	Right TLE (n=43)	F=7.737, df=(2, 36), η^2 =0.301	Raw <i>P</i> = 0.000225 FDR <i>q</i> = 0.020	r-Focal: 0.147[0.133, 0.161] r-FBTCS: 0.120 [0.108, 0.132] HC: 0.114 [0.104, 0.124]	r-focal vs HC r-focal vs r-FBTCS	<i>P</i> < 0.003 <i>P</i> = 0.012
Nodal Efficiency of HIP.R (Ne)	Right TLE (n=43)	F=7.511, df=(2, 36), η^2 =0.294	Raw <i>P</i> = 0.000256 FDR <i>q</i> = 0.008	r-focal: 0.073 [0.054, 0.092] r-FBTCS: 0.105 [0.089, 0.122] HC: 0.119[0.105, 0.133]	r-focal vs HC r-focal vs r-FBTCS	<i>P</i> < 0.003 <i>P</i> = 0.032
Nodal Efficiency of PHG.R	Right TLE (n=43)	F=7.272,	Raw <i>P</i> = 0.000273	r-focal: 0.090 [0.071, 0.110]	r-focal vs HC	<i>P</i> = 0.003

		df=(2, 36), $\eta^2=0.288$	FDR q = 0.008	r-FBTCS: 0.119 [0.101, 0.136] HC: 0.137[0.122, 0.151]	r-focal vs r-FBTCS	P = 0.076 (Trend)
Nodal Efficiency of AMYG.R	Right TLE (n=43)	F=7.510, df=(2, 36), $\eta^2=0.294$	Raw P = 0.000243 FDR q = 0.008	r-focal: 0.072 [0.051, 0.093] r-FBTCS: 0.108 [0.090, 0.127] HC: 0.122[0.107, 0.137]	r-focal vs HC r-focal vs r-FBTCS	P < 0.003 P = 0.026

Note: All statistical models were evaluated using Analysis of Covariance (ANCOVA), controlling for age, sex, education years, and mean framewise displacement (FD) as continuous nuisance covariates. To rigorously address the multiplicity issue, the omnibus ANCOVA P-values for both the seven global network metrics and the nodal centrality metrics across all 90 AAL-defined brain regions were separately corrected using the False Discovery Rate (FDR) procedure. The exact FDR-adjusted q-values are reported. Following standard statistical guidelines, post-hoc pairwise comparisons were only conducted for metrics with significant omnibus effects (FDR q < 0.05); otherwise, they were marked as not applicable (N/A). To strictly control the family-wise error rate, all valid post-hoc pairwise comparisons were performed using the conservative Holm-adjusted procedure based on the Estimated Marginal Means (EMMs). Covariate-adjusted group means and 95% confidence intervals (CI) are presented.

Abbreviations: df, degrees of freedom; η^2 , partial eta squared; CI, confidence interval; EMMs, estimated marginal means; FDR, false discovery rate; N/A, not applicable; MOG.L, left middle occipital gyrus; HIP.R, right hippocampus; PHG.R, right parahippocampal cortex; AMYG.R, right amygdala.

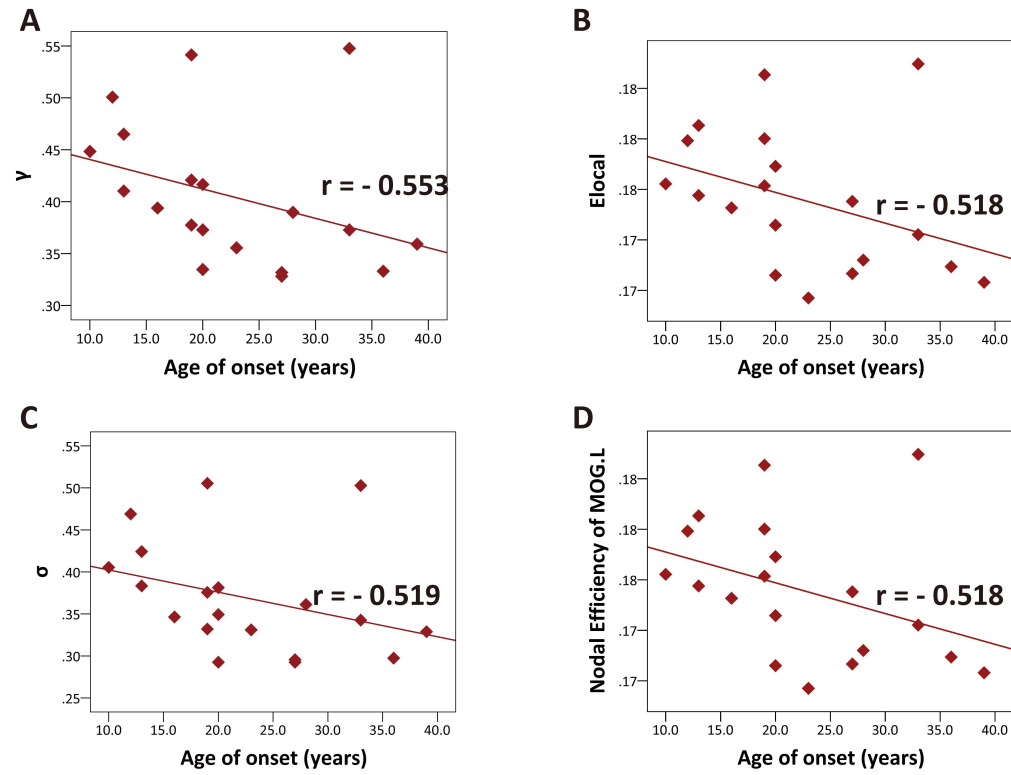


Figure S1. Exploratory correlations between network topology and age of onset in the FBTCS group.

Scatter plots showing negative correlations between age of onset and (A) normalized clustering coefficient (γ), (B) local efficiency (E_{local}), (C) small-worldness (σ), and (D) MOG.L nodal efficiency in the FBTCS group (n = 19). All correlations

were assessed using partial correlation analyses controlling for age, sex, and education. These analyses are exploratory and did not survive correction for multiple comparisons; therefore, they should be interpreted as hypothesis-generating.

Abbreviations: FBTCS, focal-to-bilateral tonic-clonic seizures; MOG.L, left middle occipital gyrus. $P < 0.05$ (uncorrected).