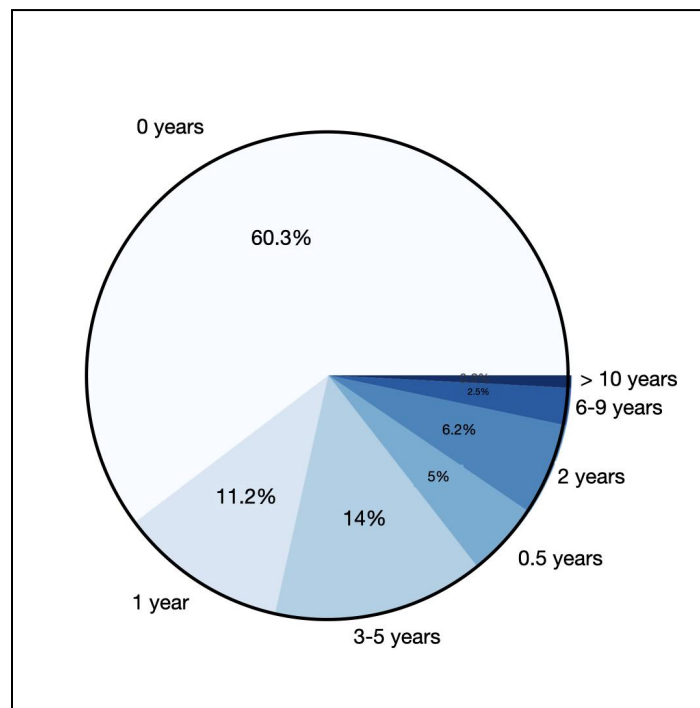


Supplementary Material

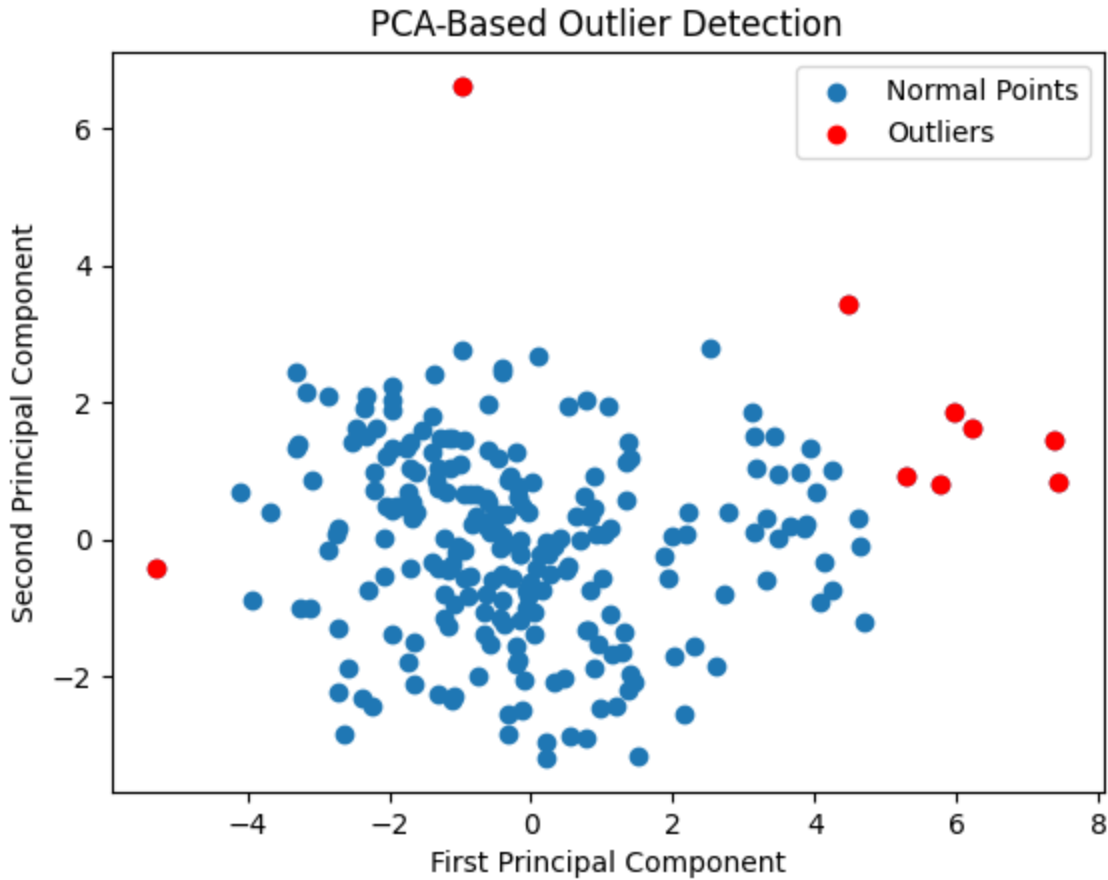
Frontoparietal network topology as a neuromarker of music perceptual abilities

M. Lumaca, P. Keller, G. Baggio, V. Pando, C. J. Bajada, M.A. Martinez, J.H. Hansen, A. Ravignani, N. Joe, P. Vuust, K. Vulic, K. Sandberg

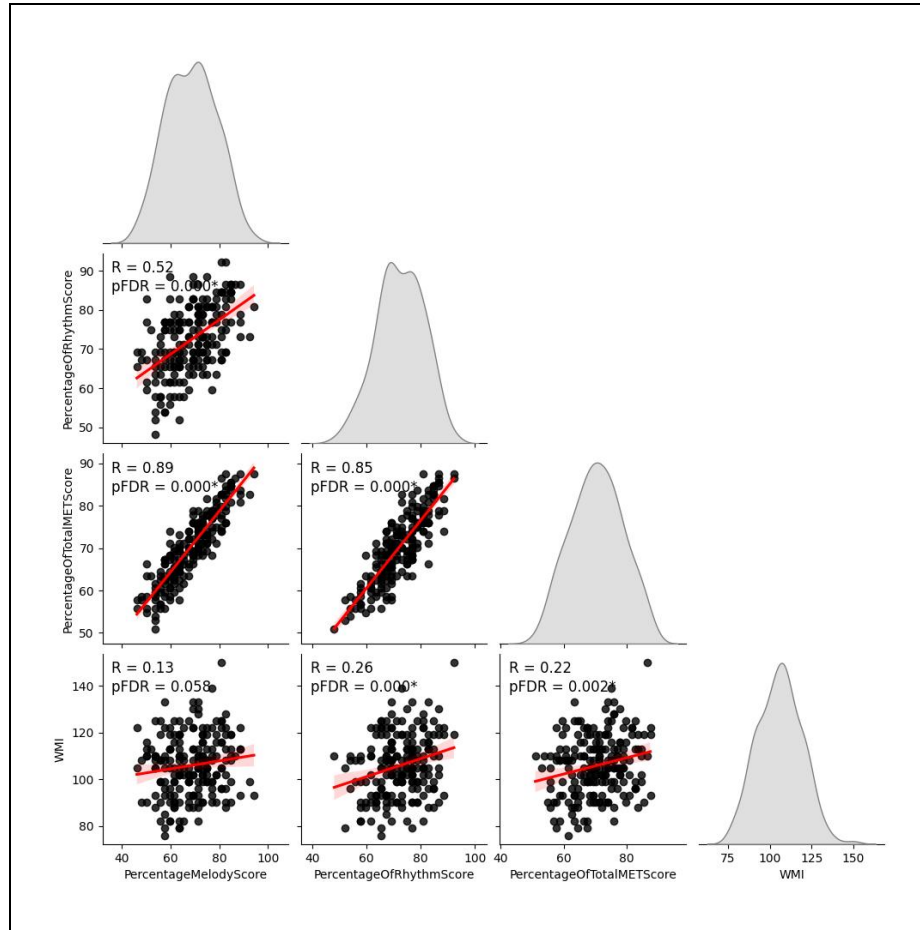
Supplementary Figures



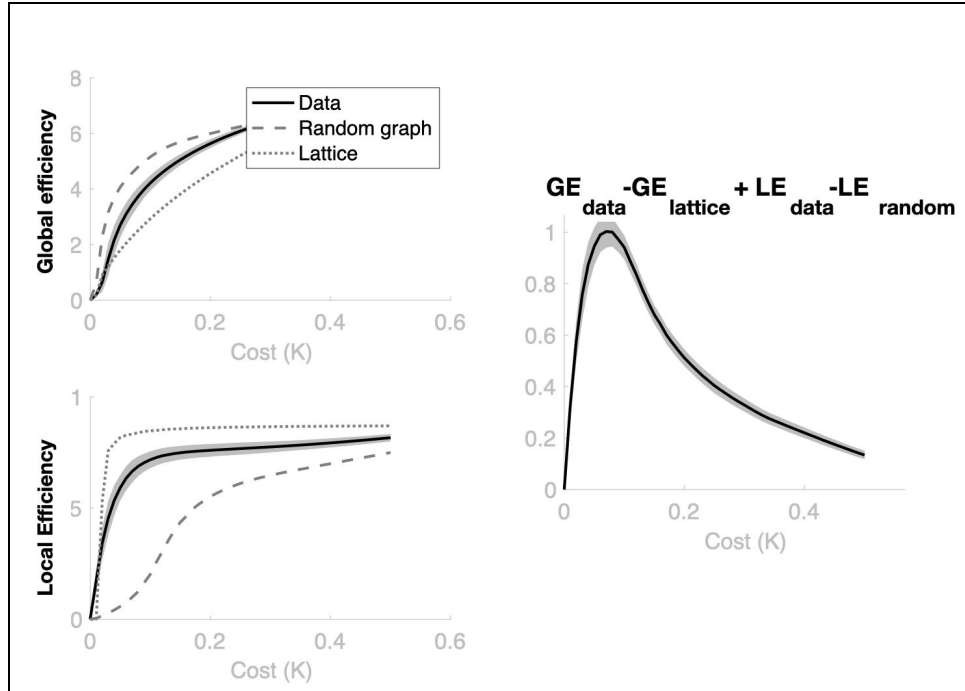
Supplementary Figure 1. Pie chart depicting the distribution of musical training duration among participants (N=241). Percentages indicate the proportion of participants categorized by their years of musical training.



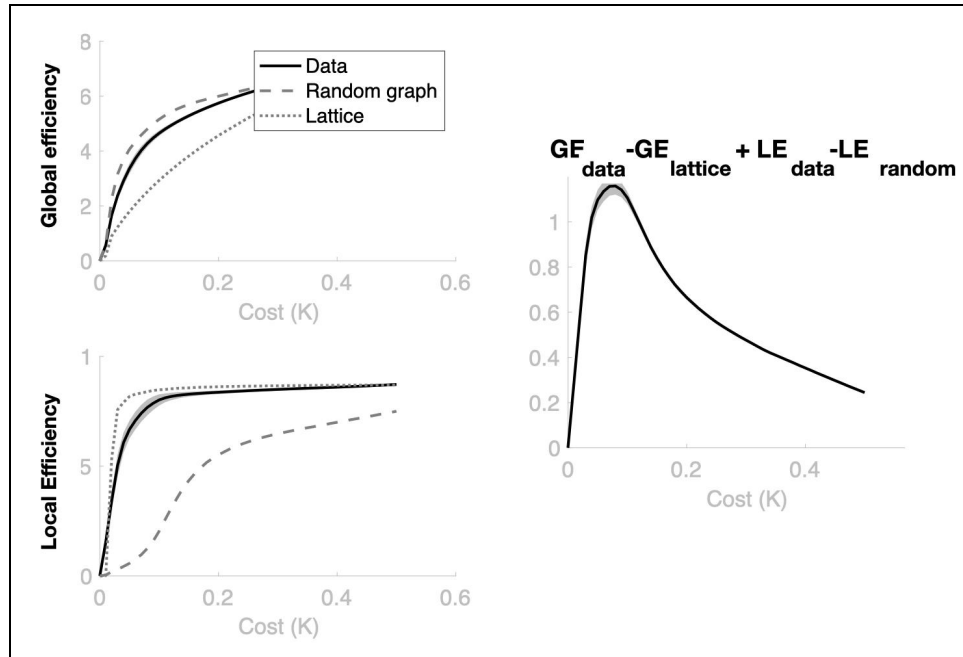
Supplementary Figure 2. Scores from the Musical Ear Test (MET) - encompassing total, rhythm, and melody - and Goldsmiths Musical Sophistication Index (Gold-MSI) subscales were standardized via z-score normalization to ensure equal weighting of variables. The resultant dataset was reoriented to align with principal axes of maximum variance. Outlier detection involved calculating Euclidean distances from the origin in the PCA plane, with primary emphasis on the first two components. Points exceeding two standard deviations from the mean Euclidean distance were designated as outliers. Each point in the scatterplot corresponds to one of the 241 participants.



Supplementary Figure 3. Seaborn pairplot displaying Pearson's statistical correlation between behavioural and cognitive scores. Scatterplots illustrate pairwise relationships between variables (percentage of MET melody score, percentage of MET rhythm score, percentage of MET total score, and Working Memory Index) with annotations for Pearson correlation coefficients and adjusted p-values (pFDR). Diagonal kernel density estimates provide univariate distribution views of each variable.



Supplementary Figure 4. Global and local efficiency of the functional network as a function of the cost threshold (k). The network exhibits small-world properties when it shows high global efficiency compared to a lattice graph and high local efficiency compared to a random graph.



Supplementary Figure 5. Global and local efficiency of the structural network as a function of the cost threshold (k). The network exhibits small-world properties when it shows high global efficiency compared to a lattice graph and high local efficiency compared to a random graph.

Supplementary Tables

Supplementary Table 1. Descriptive statistics for demographic information (age and gender), MET, and Gold-MSI subscales (N=232).

	Total	Mean	Std	Range
Demographics				
Age		24.43	4.73	18-49
Gender	130 females (56%)	-	-	-

MET				Score Range
Total	-	73.51	8.86	53-94
Melody	-	35.85	5.49	24-49
Rhythm	-	37.77	4.60	25-48
Gold-MSI				Score Range (theoretical max)
Active Engagement	-	29.70	8.42	9-61 (63)
Perceptual abilities	-	41.44	7.33	10-59 (63)
Musical Training	-	13.34	8.28	2-42 (49)
Emotions	-	28.68	6.35	10-43 (49)
Singing Abilities	-	23.5	6.57	9-42 (42)
General Sophistication	-	58.19	14.46	28-107 (126)
Items Gold-MSI				
Compliments	-	4.06	2.28	1-7
Identity	-	5.40	1.89	1-7
Hours of daily practice	-	2.81	2.10	1-7
Music Theory	-	3.38	1.86	1-7
Instruments played	-	3.05	2.04	1-7

Supplementary Table 2. Descriptive statistics for demographic information (age and gender), MET, and Gold-MSI subscales (N=225).

	Total	Mean	Std	Range
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Demographics				
Age	-	24.19	4.24	18-47
Gender	125 females (55%)	-	-	-
MET				Score Range
Total	-	73.44	8.82	53-94
Melody	-	35.81	5.51	24-49
Rhythm	-	37.73	4.59	25-48
Gold-MSI				Score Range (theoretical max)
Active Engagement	-	29.76	8.45	9-61 (63)
Perceptual abilities	-	41.39	7.38	17-59 (63)
Musical Training	-	13.34	8.29	2-42 (49)
Emotions	-	28.64	6.36	10-43 (49)
Singing Abilities	-	23.53	6.56	9-42 (42)
General Sophistication	-	58.25	14.48	28-107 (126)
Items Gold-MSI				
Compliments	-	4.05	2.28	1-7
Identity	-	5.41	1.88	1-7
Hours of daily practice	-	2.79	2.09	1-7
Music Theory	-	3.4	1.86	1-7
Instruments played	-	3.04	2.03	1-7

Supplementary Table 3. Descriptive statistics for demographic information, MET, Gold-MSI subscales, and WAIS-IV tests (N=201). This subset of participants was included in the regression analyses between functional connectomes and WAIS-IV scores.

	Total	Mean	Std	Range
Demographics				
Age	-	24.58	4.67	18-47
Gender	105 females (52%)	-	-	-
MET				Score Range
Total	-	73.27	8.58	53-91
Melody	-	35.61	5.33	24-49
Rhythm	-	37.64	4.54	25-48
Gold-MSI				Score Range (theoretical max)
Active Engagement	-	29.76	8.72	9-61 (63)
Perceptual abilities	-	41.69	7.19	21-58 (63)
Musical Training	-	13.57	8.31	2-37 (49)
Emotions	-	28.72	6.54	10-43 (49)
Singing Abilities	-	23.56	6.68	9-42 (42)
General Sophistication	-	58.06	14.95	28-17 (126)
Items Gold-MSI				
Compliments	-	4.14	2.29	1-7
Identity	-	5.38	1.93	1-7

Hours of daily practice	-	2.70	2.07	1-7
Music Theory	-	3.51	1.87	1-7
Instruments played	-	2.94	2.03	1-7
WAIS-IV				
Verbal comprehension	-	109.87	10.51	83-137
Perceptual reasoning	-	113.99	13.37	78-150
Working memory	-	105.89	13.09	76-150
Processing speed	-	113.98	12.92	84-150
General Ability	-	112.37	10.01	83-142

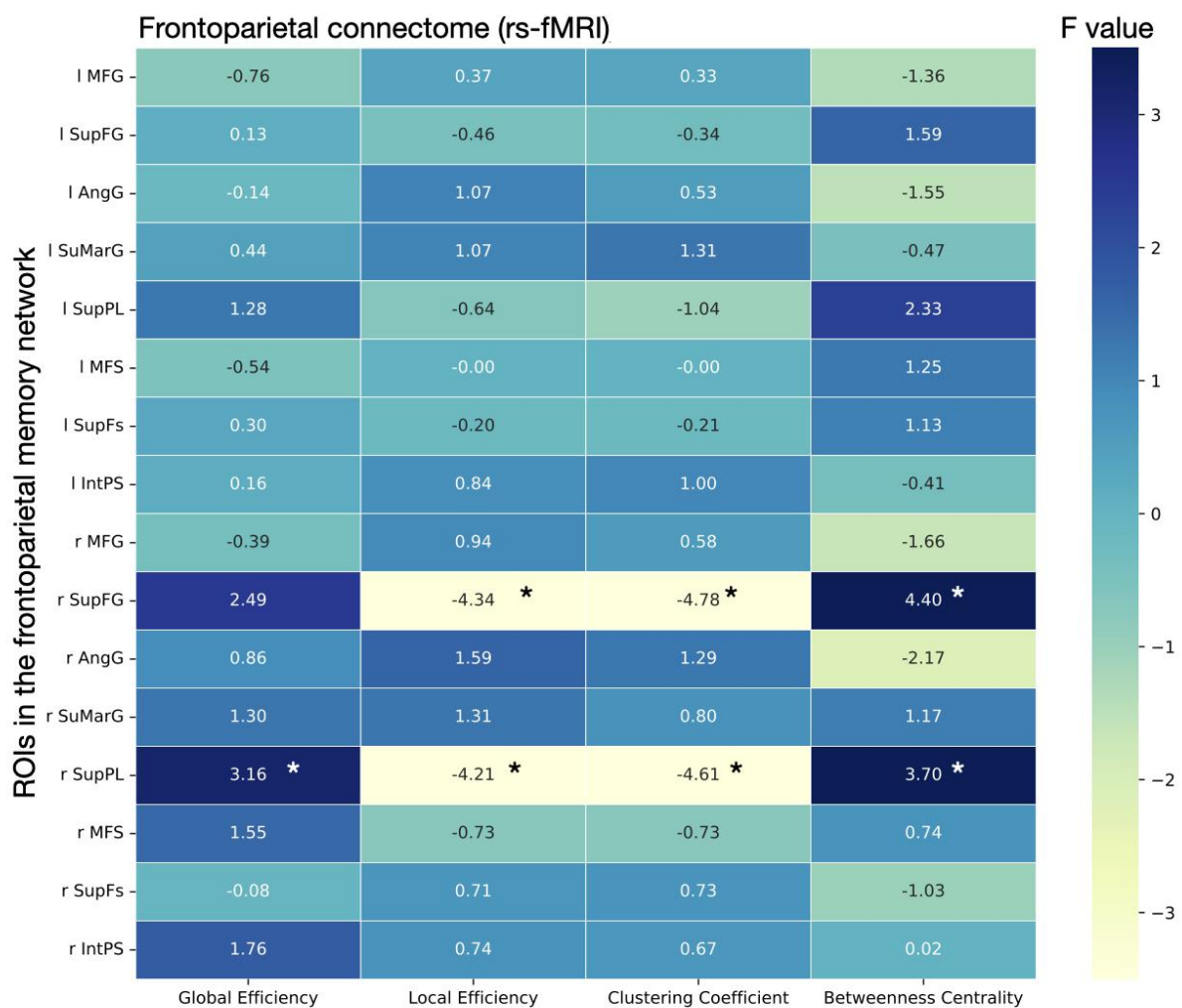
Supplementary Table 4. Descriptive statistics for demographic information, MET, Gold-MSI subscales, and WAIS-IV tests (N=195). This subset of participants was included in the regression analyses between structural connectomes and WAIS-IV scores.

	Total	Mean	Std	Range
Demographics				
Age	-	24.44	4.45	18-47
Gender	101 females (51%)	-	-	-
MET				Score Range
Total	-	73.17	8.50	53-91

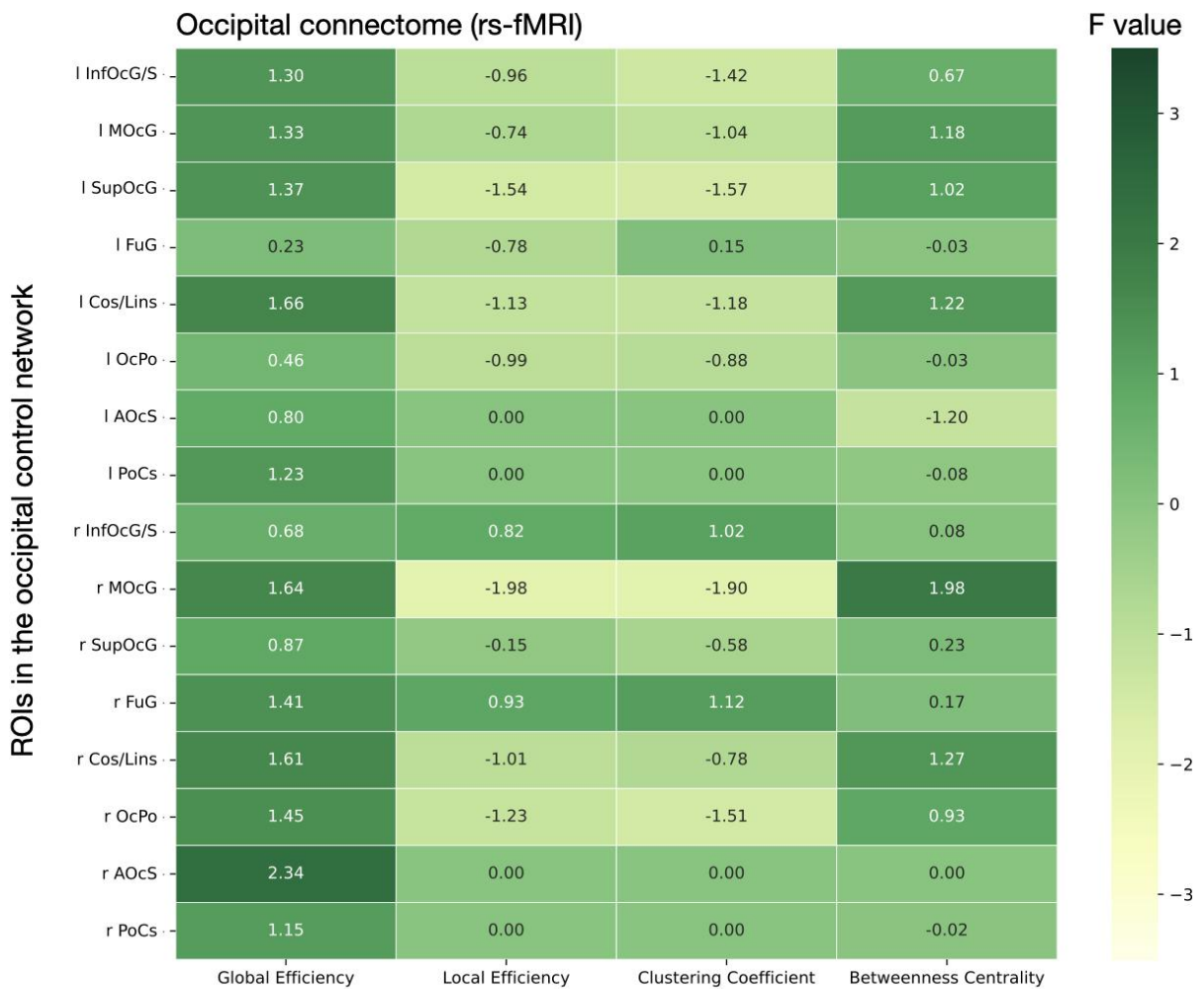
Melody	-	35.55	5.32	24-49
Rhythm	-	37.60	4.51	25-48
Gold-MSI				Score Range (theoretical max)
Active Engagement	-	29.80	8.75	9-61 (63)
Perceptual abilities	-	41.64	7.32	21-58 (63)
Musical Training	-	13.58	8.31	2-37 (49)
Emotions	-	28.63	6.48	10-43 (49)
Singing Abilities	-	23.58	6.66	9-42 (42)
General Sophistication	-	58.09	14.97	28-107 (126)
Items Gold-MSI				
Compliments	-	4.14	2.28	1-7
Identity	-	5.40	1.91	1-7
Hours of daily practice	-	2.69	2.05	1-7
Music Theory	-	3.52	1.87	1-7
Instruments played	-	2.94	2.03	1-7
WAIS-IV				
Verbal comprehension	-	109.83	10.47	83-137
Perceptual reasoning	-	114.04	13.33	78-150
Working memory	-	105.90	13.10	76-150
Processing speed	-	114.10	13.00	84-150

General Ability	-	112.41	10.03	83-142
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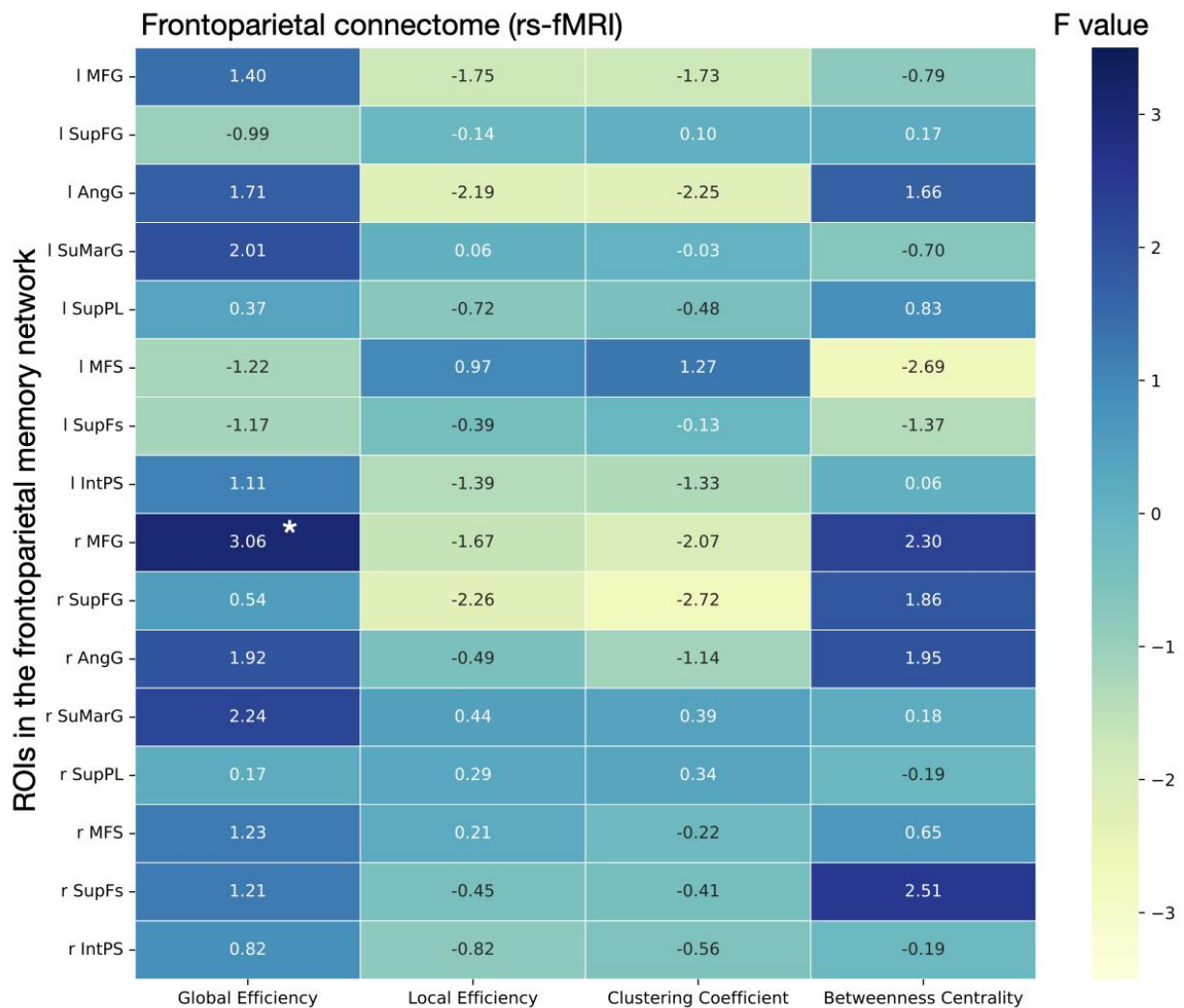
Supplementary Table 5. Table displays F-values from multiple regression analysis linking frontoparietal memory network graph metrics (structural connectivity) to percentage of MET total scores, adjusted for age, gender, and Musical Training Index (N=225). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.



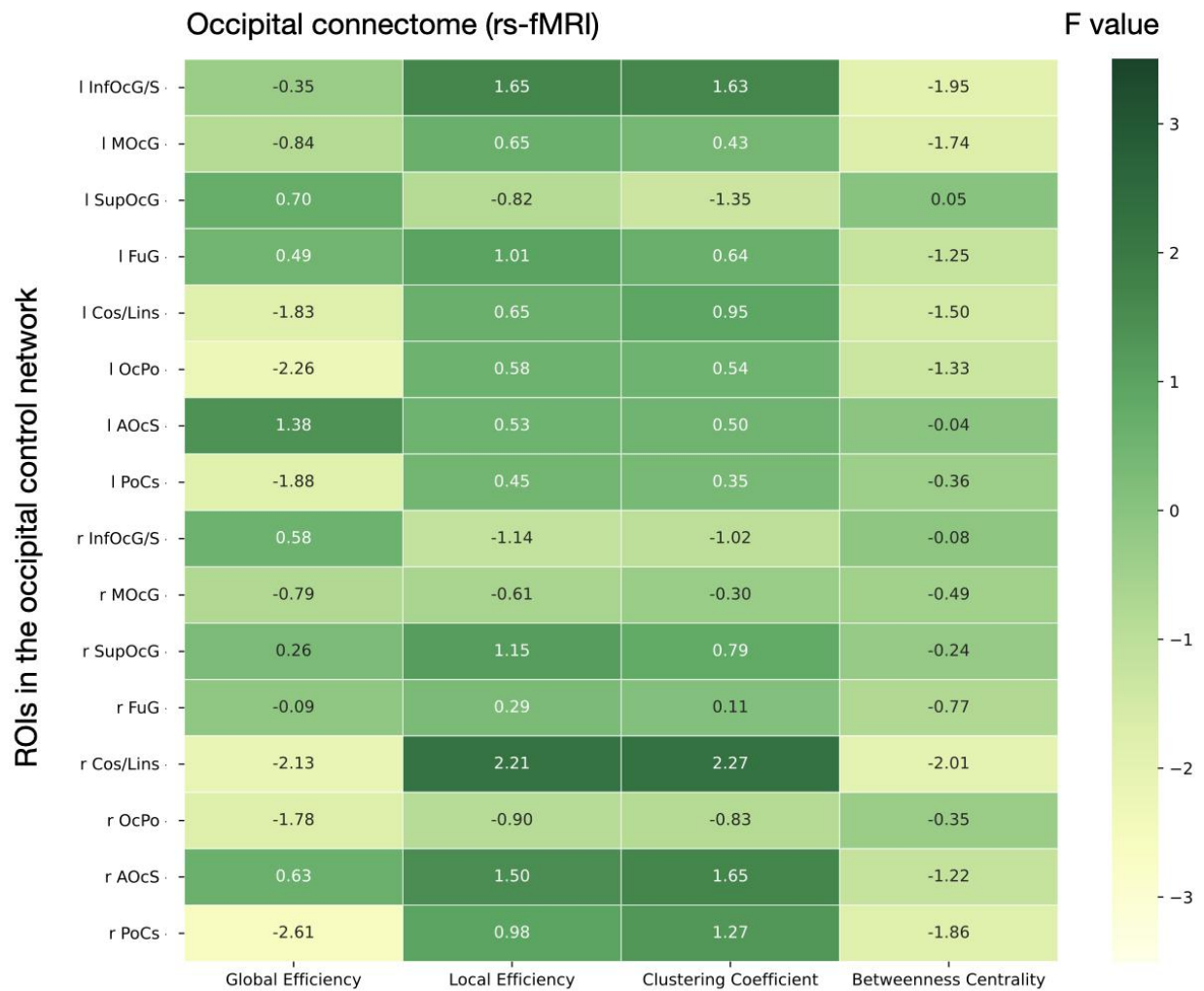
Supplementary Table 6. Table displays F-values from multiple regression analysis linking occipital control network graph metrics (structural connectivity) to percentage of MET total scores, adjusted for age, gender, and Musical Training Index (N=225). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.



Supplementary Table 7. Table displays F-values from multiple regression analysis linking frontoparietal memory network graph metrics (functional connectivity) to percentage of MET total scores, adjusted for age, gender, and Musical Training Index (N=232). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.



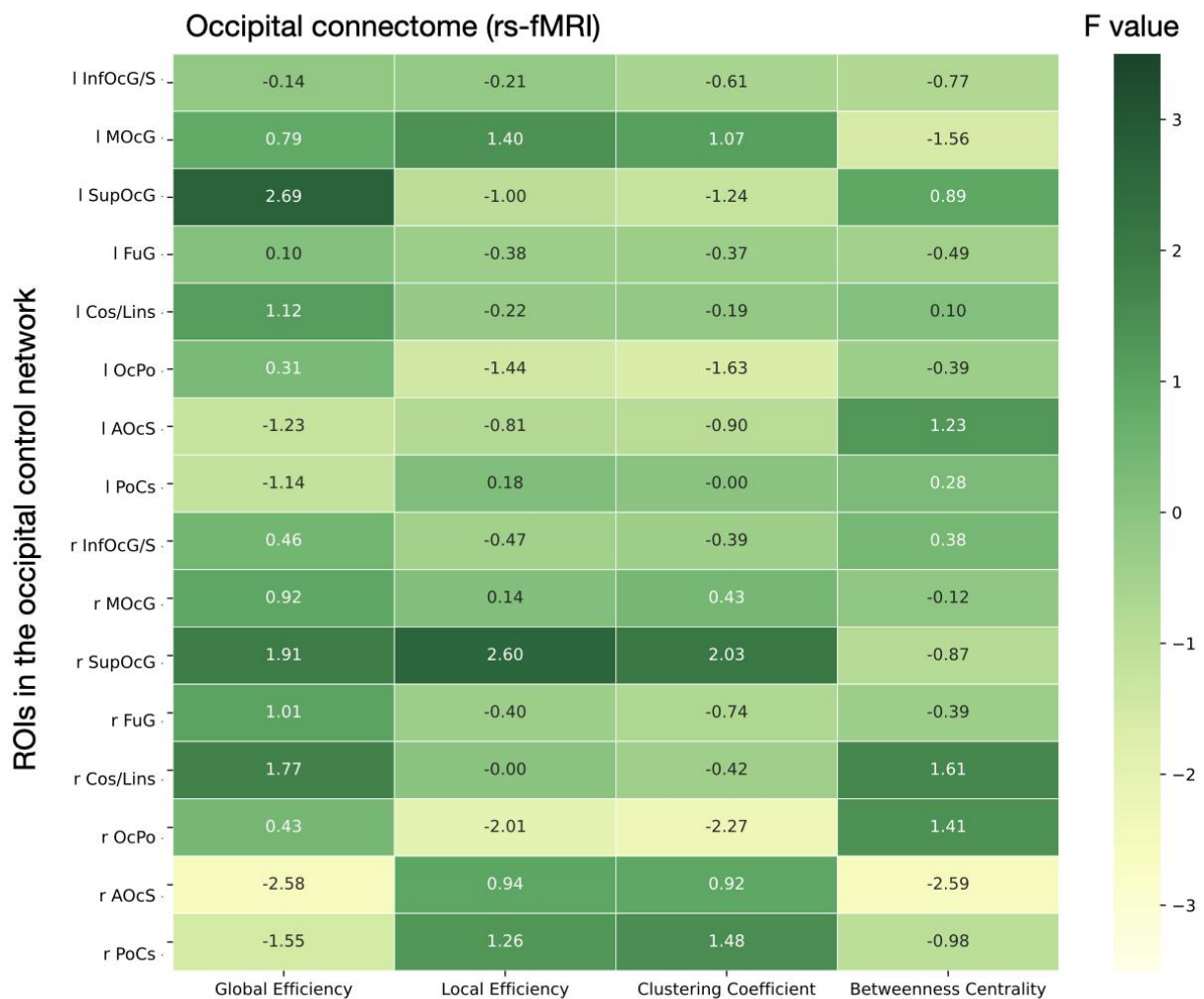
Supplementary Table 8. Table displays F-values from multiple regression analysis linking occipital control network graph metrics (structural connectivity) to percentage of MET total scores, adjusted for age, gender, and Musical Training Index (N=232). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.



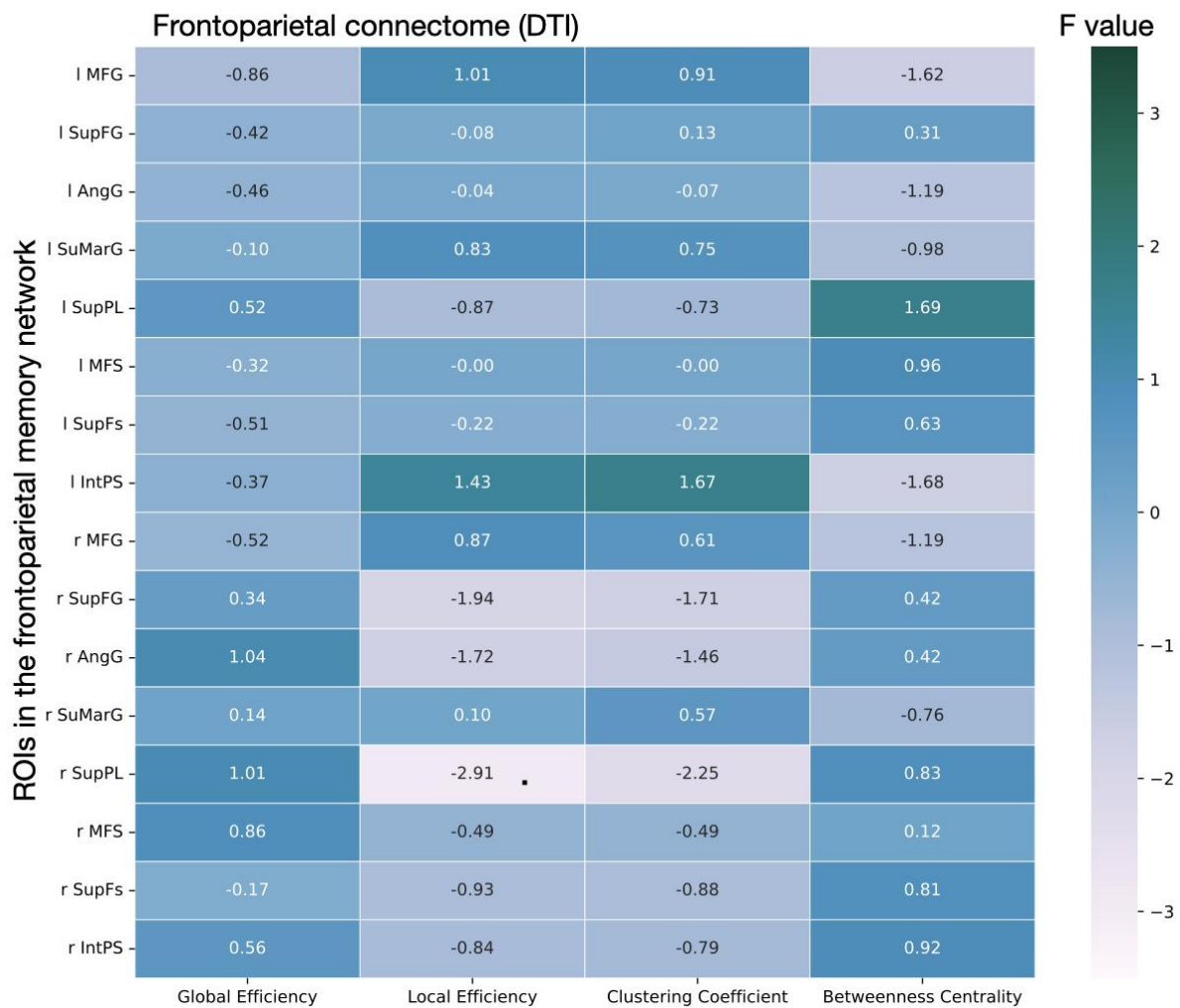
Supplementary Table 9. Table displays F-values from multiple regression analysis linking frontoparietal memory network graph metrics (functional connectivity) to WMI scores, adjusted for age, gender, and Musical Training Index (N=201). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.



Supplementary Table 10. Table displays F-values from multiple regression analysis linking occipital control network graph metrics (functional connectivity) to WMI scores, adjusted for age, gender, and Musical Training Index (N=201). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.



Supplementary Table 11. Table displays F-values from multiple regression analysis linking frontoparietal memory network graph metrics (structural connectivity) to WMI scores, adjusted for age, gender, and Musical Training Index (N=195). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.



Supplementary Table 12. Table displays F-values from multiple regression analysis linking occipital control network graph metrics (structural connectivity) to WMI scores, adjusted for age, gender, and Musical Training Index (N=195). Asterisks denote significant relationships using a false discovery rate of $q < 0.05$ (two-tailed), for each graph metric.

