Supplementary table 1. Values of global grey matter network properties according to cognitive status for the total group of multiple sclerosis (MS) patients, and for a subset of subjects with RRMS.

	Total MS group		RRMS subset	
	CP	CI	CP	CI
Size	7013.77 (657.73)	7057.48 (631.8)	6996.28 (623.4)	7027.29 (681.4)
Degree	1061.65 (91.06)	**987.5 (116.27)** [+]	1054.9 (87.60)	**981.4 (96.50)**[+]
% connections	15.18 (0.98)	**14 (1.13)** [+++]	15.11 (0.85)	**14 (0.95)** [+++]
Clustering '	0.4 (0.02)	0.37 (0.03)	0.4 (0.016)	0.38 (0.023)
Path length '	1.89 (0.01)	**1.9 (0.01)** [+]	1.892 (0.008)	**1.898 (0.007)** [+]
γ '	1.38 (0.03)	1.37 (0.03)	1.383 (0.027)	1.375 (0.032)
λ '	1.023 (0.003)	**1.020 (0.003)** [+]	1.023 (0.003)	**1.020 (0.003)** [+]
Small world property '	1.35 (0.03)	1.34 (0.03)	1.351 (0.026)	1.348 (0.028)

' is additionally corrected for connectivity density. CP is cognitively preserved and CI is cognitively impaired. Comparisons were performed for the total MS group, and for a subset of subjects with RRMS. All analyses were adjusted for gender, age, level of education and total grey matter volume. [+] is $p < .05$, [++] is $p < .01$, [+++] is $p < .001$.

Supplementary Table 2. Overview local differences network property values.

Property	Anatomical area	Healthy controls	MS patients	p	p-fdr
Degree	L parahippocampal gyrus	0.65 (0.9)	-0.15 (0.96)	0.00001	0.001
	L hippocampus	0.49 (0.83)	-0.11 (1)	0.0005	0.014
	R hippocampus	0.48 (0.85)	-0.11 (1)	0.0003	0.014
	L middle occipital gyrus	0.43 (1.03)	-0.1 (0.97)	0.001	0.021
	L fusiform gyrus	0.44 (1.19)	-0.1 (0.93)	0.001	0.021
	R middle temporal gyrus	0.5 (0.98)	-0.11 (0.97)	0.001	0.021
Path-length	R middle orbitofrontal gyrus	-0.42 (1.12)	0.09 (0.95)	0.002	0.037
	R caudate	-0.54 (0.9)	0.12 (0.98)	0.001	0.037
	L Heschl gyrus	-0.05 (1.29)	0.01 (0.93)	0.002	0.037
	R superior temporal pole	-0.35 (0.79)	0.08 (1.03)	0.002	0.037
	L middle temporal pole	-0.4 (0.86)	0.09 (1.01)	0.002	0.037
	R inferior temporal gyrus	-0.54 (0.91)	0.12 (0.98)	0.002	0.037
	L supplementary motor area	-0.29 (0.86)	0.06 (1.02)	0.003	0.04

L is left, R is right. These are Z values of local network property values that were statistically different between MS patients and healthy controls, after false discovery rate correction (p-fdr). Degree is corrected for local and global grey matter volume; other properties are additionally corrected for local degree and connectivity density.

Supplementary table 3. Overview local differences network property values MS cognitively preserved (MS-CP) vs MS cognitively impaired (MS-CI).

Property	Anatomical area	MS-CP	MS-CI	p	p-fdr
Path-length	L middle cingulum	-0.1 (0.91)	0.49 (1.27)	< 0.00001	0.0005
	L medial superior frontal gyrus	-0.06 (0.96)	0.3 (1.16)	0.00003	0.001
	L thalamus	-0.16 (0.94)	0.76 (0.96)	0.0005	0.01
	L inferior orbitofrontal gyrus	-0.12 (0.96)	0.57 (0.99)	0.0007	0.02
	R insula	-0.12 (1)	0.6 (0.79)	0.001	0.02
	L middle occiptal gyrus	-0.09 (1.01)	0.43 (0.81)	0.002	0.03
	R middle orbitofrontal gyrus	-0.08 (0.98)	0.37 (1.02)	0.002	0.03
	R Cuneus	-0.13 (0.96)	0.62 (0.95)	0.002	0.03
	L anterior cingulum	-0.06 (0.96)	0.27 (1.16)	0.003	0.03
	R postcentral gyrus	-0.04 (0.98)	0.18 (1.08)	0.004	0.04

L is left, R is right. These are Z values of local network property values that were statistically different between MS-CP and MS-CI, after false discovery rate correction (p-fdr). Degree is corrected for local and global grey matter volume; other properties are additionally corrected for local degree and connectivity density.

Supplementary table 4. Associations, β (SD), between global grey matter network property values and global cognitive functioning and functioning in 6 cognitive domains in total group of multiple sclerosis (MS) patients with additional correction for EDSS.

Cognitive domain	Network property							
	Size	Degree	% connections	Clustering'	Path-length'	γ'	λ'	Small world'
Average cognition	0.12 (0.09)	0.08 (0.11)	**0.19 (0.07)****	0.38 (0.32)	**0.23 (0.13)***	-0.11 (0.08)	**0.13 (0.07)***	-0.14 (0.08)
Executive functioning	0.13 (0.1)	-0.14 (0.12)	0.02 (0.08)	0.21 (0.36)	**0.32 (0.14) ****	-0.1 (0.08)	**0.19 (0.08)****	-0.14 (0.08)
Verbal memory	0.01 (0.1)	0.07 (0.12)	**0.16 (0.08)***	-0.12 (0.37)	0.21 (0.14)	-0.13 (0.09)	0.12 (0.08)	-0.16 (0.09)
Information processing speed	0.06 (0.1)	0.19 (0.12)	**0.26 (0.08)** ***	0.53 (0.34)	**0.23 (0.13)***	-0.08 (0.08)	**0.13 (0.08)***	-0.11 (0.08)
Visuospatial memory	0.13 (0.11)	0.11 (0.13)	0.08 (0.09)	-0.09 (0.4)	-0.06 (0.15)	-0.07 (0.09)	-0.03 (0.09)	-0.06 (0.09)
Working memory	0.07 (0.11)	0 (0.14)	0.1 (0.09)	**0.71 (0.4)***	0.1 (0.16)	0.08 (0.09)	0.06 (0.09)	0.08 (0.09)
Attention	0.09 (0.11)	0.08 (0.13)	0.1 (0.09)	0.38 (0.32)	**0.23 (0.13)***	-0.15 (0.09)	0 (0.09)	-0.16 (0.09)

All analysis are adjusted for age, gender, level of education and global grey matter volume, and EDSS, ' additionally corrected for connectivity density. γ is gamma (normalized clustering); λ is lambda (normalized path length) * is p <.10, ** is p<.05, *** is p <.01.