Supplemental Materials:

Table S1: Demographic data as well as cognitive function level (SDMT), motor function level (percentage of participants with impaired postural control, maximum walking speed) and disease severity (EDSS) are compared across different courses of MS (relapsing-remitting MS, RRMS; secondary-progressive MS, SPMS; primary-progressive MS, PPMS).

	RRMS	**SPMS**	**PPMS**
n	69	18	24
Age (median, min-max)	38 (21 - 64)	53 (33 - 62)	54 (41 - 63)
Sex (F; M)	37; 29	8; 10	6; 18
Years since diagnosis (median, min-max)	5 (0 - 26)	12.5 (6 - 22)	4.5 (1 - 20)
EDSS (median, min - max)	2.0 (0,0 - 4.5)	5.0 (3,5 - 6,0)	3.5 (0,0 - 6,5)
SDMT: correct answers in 90s (mean, min - max)	61 (20 - 91)	45 (24 - 61)	49 (21 - 71)
Percentage of participants with postural stability deviation from 95% of the norm (number, % of the total group)	13 (19%)	17 (94%)	15 (63%)
SMSW in m/s (median, min - max)	1.60 (0.91 – 2.07)	1.30 (0.79 - 1.59)	1.49 (0.68 - 1.67)

Figure S1

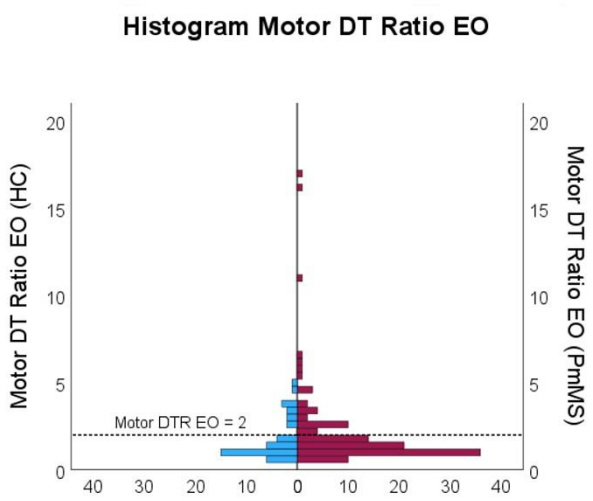
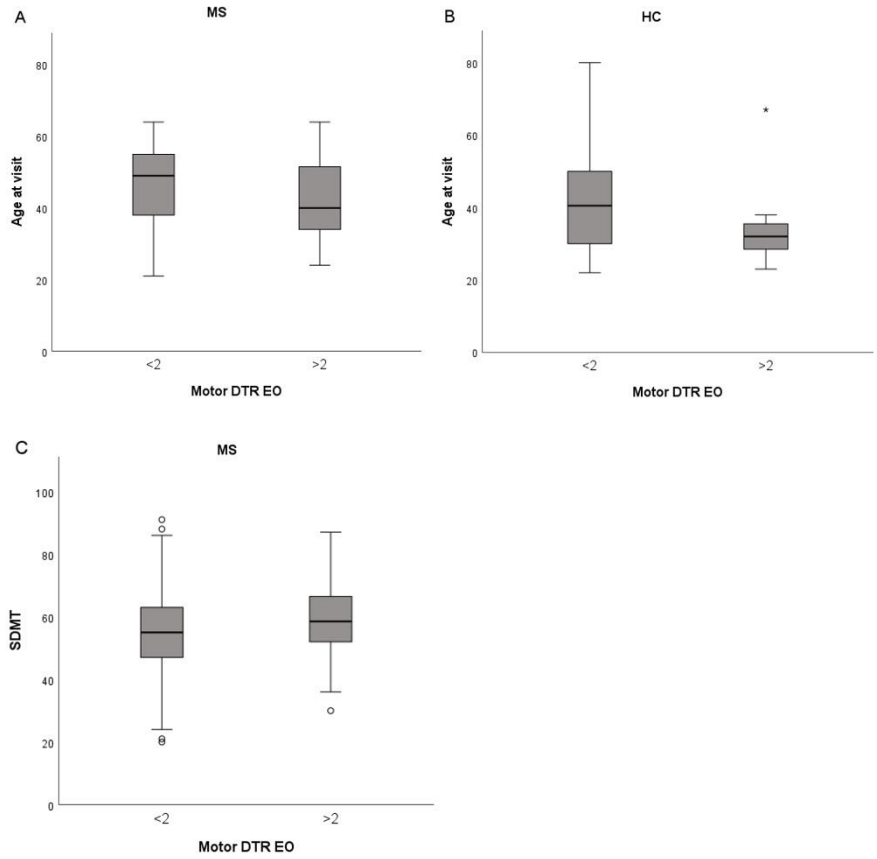


Figure S2



Supplement 3: Inclusion and exclusion criteria of the respective studies

The VIMS, CIS, and VALKINECT studies were conducted at the Experimental and Clinical Research Center, a collaboration between the Max Delbrueck Center for Molecular Medicine and Charité – Universitätsmedizin Berlin.

The Ambos and OPRIMS studies were conducted at the Institute for Neuroimmunology and Multiple Sclerosis (inims), Universitätsklinikum Hamburg-Eppendorf.

The inclusion criteria for the studies were as follows:

VIMS Study (“Verlaufsuntersuchung visueller Parameter bei Patienten mit Multipler Sklerose versus gesunden Probanden zur Erstellung einer Datenbank (neuroophthalmologisches Register)”):

- Individuals with multiple sclerosis, patients with neurodegenerative, other neuroinflammatory, or cerebrovascular diseases, as well as healthy controls aged 18-80 years.

CIS Study (“Klinisch isoliertes Syndrom und neu diagnostizierte Multiple Sklerose: Diagnostische, prognostische und Therapie-Response Marker”):

- Adult men and women with clinically isolated syndrome (CIS) or early relapsing-remitting multiple sclerosis (a single relapse event).

VALKINECT Study ("Bestimmung der Richtigkeit, Reliabilität, Validität und Responsivität von video-perzeptiver Bewegungsanalyse mit Microsoft Kinect"):

- Individuals with pwMS following the revised McDonald criteria of 2017, who were capable of walking freely for 6 minutes or with the use of a unilateral walking aid, as well as HC matched in age, gender ratio, and height.

Ambos Study ("Arm Ergometry to Improve Mobility in Progressive Multiple Sclerosis"):

- Participants aged 18 to 60 years diagnosed with multiple sclerosis with manifest disability (EDSS 4 - 6.5), no EDSS progression in the 6 months prior to the start of the study, no relapse in the last 3 months, retained ability to perform a hand-crank ergometry, no severely impaired hand/arm function, and daily training being generally feasible.

OPRIMS Study ("Outcomes and predictors in primary-progressive MS"):

- Participants with primary progressive multiple sclerosis according to the McDonald criteria of 2010, EDSS score below 7, aged 18 to 65 years.

Exclusion criteria were as follows:

- VIMS Study: Lack of capacity to provide consent and withdrawal of consent.
- CIS Study: Factors affecting optical coherence tomography (especially eye conditions like glaucoma, retinopathy in advanced diabetes mellitus), pregnancy, contraindications for magnetic resonance imaging (such as prior adverse effects, non-removable metal elements in or on the body like pacemakers), immobility, lack of communication ability, and alcohol or drug abuse.
- VALKINECT Study: Relapse in the last 30 days, diagnosis of another neurological disease, or other motor limitations.
- Ambos Study: Cardiovascular diseases, metal parts in the body, no space for a home ergometer, severe cognitive deficits, pacemakers, or other electronic implants, pregnancy, known epilepsy.
- OPRIMS Study: Age younger than 18 years and older than 65 years, diagnosis of relapsing-remitting MS or secondary progressive MS, severe illnesses other than multiple sclerosis, contraindications for magnetic resonance imaging