

1 **Supplementary files**2 **Supplementary table 1:** Definition of neuropsychological parameters and cognitive subdomains.

<b>Cognitive domain (DSM-5)</b>	<b>Cognitive subdomains (DSM-5)</b>	<b>Neuropsychological parameter</b>	<b>Task (scale of measurement)</b>
Learning and memory	Visual Immediate memory span	SKT	Recalling objects immediately (number of false items)
		BTT	Tapping blocks in a given order (span forward)
	Visual free recall	SKT	Recalling objects after delay (number of false items)
	Visual recognition memory	SKT	Recognising between learned and new objects (number of false items)
		NVLT	Recognising repeated abstract figures (number of correct items)
	Verbal Immediate memory span	VLMT	Recalling items on a word list (number of correct items- first trial)
		VLMT	Recalling items on a word list (summarised number of correct items- learning trials)
		VLMT	Recalling items on a word list (number of correct items- short delay)
		VLMT	Recalling items on a word list (number of correct items- long delay)
Complex attention	Selective attention	TMT-A (speed)	Linking numbers in ascending order (seconds)
		AKT (speed)	Marking target stimuli (seconds)
		AKT (accuracy)	Marking target stimuli (number of correct items)

Executive functions	Verbal working memory	LNS	Mental reorganisation of letters and numbers (span)
	Visual working memory	BTT	Tapping blocks in a given order (span backward)
	Cognitive flexibility	TMT-B (speed)	Linking numbers and letters in alternate order (seconds)
	Inhibition	SKT	Naming interfering letter e.g. "S" instead of "T" (seconds)
	Decision making	SVT	Selecting target symbol from several symbols (number of correct items)
Language	Word fluency	RWT (phonetic)	Naming words with a specific initial letter (number of correct items)
		RWT (semantic)	Naming words from a specific category (number of correct items)

- 1 SKT=Syndrom-Kurztest (Short Performance Test). BTT=Block-Tapping Test. NVLT=Non-Verbal Learning Test.
- 2 VLMT=Verbaler Lern- und Merkfähigkeitstest (Auditory Verbal Learning and Memory Test). TMT=Trail Making
- 3 Test. AKT=Alterskonzentrationstest (Geriatric Concentration Test). LNS=Letter Number Span.
- 4 SVT=Symbolverarbeitungstest (Symbol Processing Task). RWT=Regensburger Wortflüssigkeits-Test
- 5 (Regensburger Word Fluency Test).

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7 **Supplementary Table 2:** Neuropsychological test results per group and assessment time

Test parameter	Baseline (n=46)				12-month follow up (n=46)				p	$\eta^2$
	Training (n=19)		Control (n=27)		Training (n=19)		Control (n=27)			
	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s	$\bar{x}$	s		
SKT visual immediate memory span	5.6	1.5	6.0	1.3	5.1	1.5	5.7	1.3	0.225	0.03
SKT inhibition (speed) <sup>*</sup>	25.3	6.0	26.9	5.7	23.6	4.8	27.1	5.4	0.144	0.05
TMT-A selective attention (speed)	37.3	10.5	41.4	11.4	37.6	15.0	40.8	10.5	0.679	0.00
TMT-B cognitive flexibility (speed)	88.9	37.0	97.7	25.8	87.7	36.0	99.7	29.5	0.43	0.01

SKT visual free recall	6.5	1.6	6.7	1.9	6.2	1.8	7.0	1.8	0.18	0.03
SKT visual recognition memory*	2.1	1.5	1.7	1.6	1.5	1.1	2.2	1.7	0.034	0.10
RWT word fluency (semantic)	22.4	6.2	21.2	5.5	21.2	6.0	20.7	5.1	0.618	0.00
RWT word fluency (phonetic)	10.5	3.0	11.9	5.3	12.0	4.0	12.3	5.3	0.388	0.01
VLMT verbal immediate memory span	5.4	2.0	4.9	1.5	6.2	1.6	5.1	2.1	0.12	0.04
VLMT verbal free recall (learning process)	43.0	9.8	39.4	10.9	46.4	9.7	42.6	10.9	0.633	0.00
VLMT verbal free recall (short delay)	8.3	2.6	7.5	3.2	9.1	3.5	8.7	3.7	0.718	0.00
NVLT visual recognition memory*	12.9	2.9	12.5	2.8	12.2	2.6	11.8	4.1	0.728	0.00
AKT selective attention (speed)	32.6	7.0	33.9	8.9	32.2	8.1	33.9	8.3	0.658	0.00
AKT selective attention (accuracy)*	54.2	1.3	54.1	1.4	54.3	1.0	54.1	1.3	0.846	0.00
LNS verbal working memory span	5.2	0.9	5.1	0.8	5.3	0.7	5.1	0.9	0.496	0.01
BTT visual immediate memory span (forward)	4.9	0.8	5.1	0.8	5.4	0.8	5.2	0.8	0.234	0.03
BTT visual working memory span (backward)	4.5	1.0	4.6	1.2	4.9	1.0	4.6	1.0	0.123	0.05
VLMT verbal free recall (long delay)	7.5	3.5	7.1	3.2	7.8	3.7	8.1	3.7	0.439	0.01
VLMT verbal recognition memory (accuracy)*	8.3	5.0	8.3	4.7	8.3	4.8	8.4	5.6	0.695	0.00
SVT decision making*	15.9	1.9	16.0	1.3	16.6	1.0	15.8	1.5	0.288	0.03
HADS anxiety	4.9	2.9	5.7	3.5	3.1	2.6	4.9	3.2	0.053	0.06
HADS depression	2.9	2.4	3.3	2.1	2.9	3.3	3.4	2.7	0.602	0.01

- 1 All test parameters were calculated with the ANCOVA, except those marked with an asterisk (\*). Data are means
- 2 (SD). p=value.  $\eta^2$ =effect size. SKT=Syndrom-Kurztest (Short Performance Test). TMT=Trail Making Test.
- 3 RWT=Regensburger Wortflüssigkeits-Test (Regensburger Word Fluency Test). VLMT=Verbaler Lern- und
- 4 Merkfähigkeitstest (Auditory Verbal Learning and Memory Test). NVLT=Non-Verbal Learning Test.
- 5 AKT=Alterskonzentrationstest (Geriatric Concentration Test). LNS=Letter Number Span. BTT=Block Tapping Test.
- 6 SVT=Symbolverarbeitungstest (Symbol Processing Task). HADS= Hospital Anxiety and Depression Scale.

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8 **Supplementary table 3:** SF-36 results per group and assessment time for the per-protocol analysis

SF-36 Faktor	Timepoint	Group	Mean	SD	n	p	$\eta^2$
Physical functioning	Baseline	Control	66.029	21.312	27	0.242	0.025
		Training	62.304	25.296	29		
	12-month follow-up	Control	70.370	21.791	27		
		Training	79.464	25.569	29		
Role limitations due to physical health	Baseline	Control	47.115	43.201	26	0.015	0.109
		Training	38.218	40.368	29		
	12-month follow-up	Control	52.885	40.204	26		
		Training	75.862	36.279	29		
Role limitations due to emotional problems	Baseline	Control	84.524	32.052	28	0.025	0.092
		Training	70.370	38.490	27		
	12-month follow-up	Control	64.286	42.483	28		
		Training	80.247	37.278	27		
Energy / Fatigue*	Baseline	Control	52.115	17.842	26	0.148	0.03
		Training	49.333	16.802	30		
	12-month follow-up	Control	62.885	17.786	26		
		Training	67.667	17.847	30		
Emotional well-being	Baseline	Control	74.000	14.935	26	0.967	0
		Training	75.267	17.759	30		
	12-month follow-up	Control	75.077	13.917	26		
		Training	78.267	14.694	30		
Social functioning	Baseline	Control	79.018	22.062	28	0.113	0.044
		Training	84.167	16.059	30		
	12-month follow-up	Control	77.679	25.765	28		
		Training	88.750	16.199	30		
Pain	Baseline	Control	84.643	18.767	28	0.049	0.068
		Training	77.500	27.606	30		
	12-month follow-up	Control	76.429	27.007	28		
		Training	83.500	24.217	30		
General health*	Baseline	Control	60.833	14.855	28		

		Training	57.716	15.353	29		
	12-month follow-up	Control	58.705	18.414	28		
		Training	62.802	19.295	29		
						0.087	0.031
Average of all factors	Baseline	Control	68.926	14.707	28		
		Training	63.664	16.819	30		
	12-month follow-up	Control	67.190	17.038	28		
		Training	77.145	18.898	30		
						<0.001	0.181
Health change (Item 2)	Baseline	Control	35.714	24.934	28		
		Training	21.667	14.284	30		
	12-month follow-up	Control	66.071	24.734	28		
		Training	71.667	25.200	30		
						0.037	0.075
Physical component summary	Baseline	Control	65.583	18.882	28		
		Training	59.215	20.113	29		
	12-month follow-up	Control	64.531	19.040	28		
		Training	75.265	21.685	29		
						0.005	0.138
Mental component summary	Baseline	Control	72.518	16.410	28		
		Training	68.989	17.117	30		
	12-month follow-up	Control	69.848	20.157	28		
		Training	78.329	18.918	30		
						0.018	0.095

- 1 All test parameters were calculated with difference values between pre- and post-tests, followed by Mann–Whitney
- 2 U-test for between-subject effects, except those marked with an asterisk (\*), which were calculated by ANCOVA.
- 3 Data include means (SD). n=number of cases. p=p-value.  $\eta^2$ =effect size.